INTERVENTION PROGRAM FOR DEPRESSION PREVENTION AMONG RICE FARMERS IN THAILAND

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ABSTRACT

Depression is pervasive among farmers. Although depression is a treatable condition, information on suitable programs against depression of farmers is now limited. In this study researchers have tried to establish an effective program against depression symptoms of farmers in Thailand. In the first phase, researchers tried to find the risk factors, and in the second phase, researchers sought to clarify the effect of the program containing the measures against risk factors. In the first phase, a cross-sectional study was used to examine the risk factors by gender among 459 male and 588 female rice farmers. Multiple logistic regression analysis was used to examine the factors associated with depression symptoms. Concerning health, eating healthy food, preparing to prevent the problem, having community integration, loud machines, and using the PPE during work with chemical substances were associated factors among males with depression symptoms. Interest of family in talking with the participant, being an accepted person in the community, loud machines, and work-related financial hardship were predictors among females with depression symptoms. The results of the first phase study suggested the support for health action, working styles, and an accepting atmosphere should be included in the program.

In the second phase, a randomized controlled trial was conducted to investigate the effects of the program containing the chemical intoxication prevention and the communication skills improvement on the depression symptoms among rice farmers. Ninety-two rice farmers (mean age was 49 years old) with mild-to-moderate depression symptoms, as measured by the CES-D, were randomly assigned for 6 weeks to either a program for chemical intoxication prevention or one for improving the communication skills in the family. The participants were then crossed over to the alternate program for an additional 6 week period. Both programs consisted of lecture and small group discussion on the starting day and a home visit by village health volunteers for 4 weeks from the starting day. After participation in the program, the CES-D score showed a significant decrease. No interaction was obtained between the two programs. The decreased CES-D score in the program for improving the communication skills were significantly related to the changes in the scales for knowledge, attitude and behavior on improving communication skills even after being adjusted using personal and communication factors. The decreased CES-D score in the program for chemical intoxication prevention were significantly related to the change in the scale for behavior on chemical intoxication prevention.

The findings in this study suggest that the program containing the chemical intoxication prevention or improving communication skills may be effective in improving a depressive state of rice farmers with mild-to-moderate depression symptoms.

KEY WORDS: RICE FARMERS/ DEPRESSION /CHEMICAL INTOXICATION/ COMMUNICATION SKILLS/ PREVENTION PROGRAM

220 pages

โปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาในประเทศไทย

INTERVENTION PROGRAM FOR DEPRESSION PREVENTION AMONG RICE FARMERS IN THAILAND

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บทคัดย่อ

โรคซึมเศร้าพบได้อย่างแพร่หลายในชาวนา ถึงแม้ว่าโรคซึมเศร้าจะเป็นภาวะที่รักษาได้ แต่ข้อมูลที่เกี่ยวข้องกับโปรแกรมการป้องกันโรคซึมเศร้าในปัจจุบันมีอยู่จำกัด ในการศึกษานี้ผู้วิจัยได้จัดทำโปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาในประเทศไทย ในการศึกษาระยะที่หนึ่ง ผู้วิจัยศึกษาเพื่อค้นหาปัจจัยเสี่ยงของภาวะซึมเศร้า และในระยะที่สองผู้วิจัยศึกษาผลของโปรแกรมซึ่งประกอบด้วยวิธีการในการป้องกันปัจจัยเสี่ยง ในการศึกษาระยะที่หนึ่งใช้การศึกษาสำรวจภาคตัดขวางเพื่อค้นหาปัจจัยสัมพันธ์ต่อภาวะซึมเศร้าโดยจำแนกตามเพศในชาวนา เพศชาย 459 คน และเพศหญิง 588 คน วิเคราะห์ปัจจัยที่มีความสัมพันธ์กับภาวะซึมเศร้าโดยสถิติวิเคราะห์ถดถอยพหุลอจิสติก ปัจจัยทำนายภาวะซึมเศร้าในเพศชาย ได้แก่ การให้ความสำคัญกับการดูแลสุขภาพ, การรับประทานอาหารที่มีประโยชน์, การเตรียมพร้อมเพื่อเผชิญปัญหา, การอยู่ร่วมกับชุมชนอย่างปรองดอง, การทำงานกับเครื่องจักรที่มีเสียงดัง และการใช้อุปกรณ์ป้องกันร่างกายในการทำงานกับสารเคมี ปัจจัยทำนายในเพศหญิง ได้แก่ ความสนใจของครอบครัวในการพูดคุยกัน, การได้รับการยอมรับจากคนในชุมชน, การทำงานกับเครื่องจักรที่มีเสียงดัง และภาวะยากลำบากทางการเงินอันเกี่ยวเนื่องจากการทำงาน จากผลการศึกษาในระยะที่หนึ่งให้ข้อเสนอแนะได้ว่าการสนับสนุนด้านสุขภาพ รูปแบบการทำงาน และการยอมรับสภาพแวดล้อมควรประกอบอยู่ในโปรแกรม

ในระยะที่สอง ใช้การทดลองแบบสุ่มเพื่อศึกษาผลของโปรแกรม ประกอบด้วย การป้องกันอันตรายจากสารเคมีทางการเกษตร และการพัฒนาทักษะการสื่อสารในครอบครัวที่มีต่อภาวะซึมเศร้าในชาวนา ชาวนาจำนวน 92 คน (อายุเฉลี่ย 49 ปี) ที่มีอาการซึมเศร้าเล็กน้อยถึงปานกลาง โดยประเมินจากแบบประเมินภาวะซึมเศร้า (CES-D) ถูกแบ่งเป็น 2 กลุ่ม และสุ่มเพื่อให้ได้รับโปรแกรมการป้องกันอันตรายจากสารเคมีทางการเกษตรหรือโปรแกรมการพัฒนาทักษะการสื่อสารในครอบครัวโปรแกรมใดโปรแกรมหนึ่งก่อน เป็นระยะเวลา 6 สัปดาห์ จากนั้นจึงสลับไขว้กันเข้าสู่อีกหนึ่งโปรแกรม เป็นระยะเวลา 6 สัปดาห์เช่นเดียวกัน รูปแบบกิจกรรมของทั้งสองโปรแกรมประกอบด้วย การบรรยาย การสาธิต และการอภิปรายกลุ่มซึ่งจัดในวันเริ่มต้น และการติดตามเยี่ยมที่บ้านโดยอาสาสมัครสาธารณสุขประจำหมู่บ้าน เป็นเวลา 4 สัปดาห์นับจากวันเริ่มต้น ภายหลังการเข้าร่วมโปรแกรม ภาวะซึมเศร้าของชาวนาลดลงอย่างมีนัยสำคัญทางสถิติ ไม่พบปฏิสัมพันธ์ระหว่างทั้งสองโปรแกรม การลดลงของคะแนนภาวะซึมเศร้าในโปรแกรมการพัฒนาทักษะการสื่อสารในครอบครัวมีความความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับการเปลี่ยนแปลงของคะแนนความรู้ ทัศนคติและพฤติกรรมการสื่อสารในครอบครัวแม้หลังการปรับค่าโดยควบคุมตัวแปรปัจจัยส่วนบุคคลและปัจจัยการสื่อสาร การลดลงของคะแนนภาวะซึมเศร้าในโปรแกรมการป้องกันอันตรายจากสารเคมีทางการเกษตรมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับการเปลี่ยนแปลงของคะแนนพฤติกรรมการป้องกันอันตรายจากสารเคมีทางการเกษตร

จากผลการศึกษาพบว่า โปรแกรมการป้องกันตนเองจากสารเคมีทางการเกษตรและการพัฒนาทักษะการสื่อสารในครอบครัวสามารถช่วยลดภาวะซึมเศร้าระดับเล็กน้อยถึงปานกลางในชาวนาได้

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CHAPTER I
INTRODUCTION

1.1 Background and Significance

Depression presents depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite and poor concentration (American Psychiatric Association (APA), 2013). These problems sometimes become chronic or recurrent, lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities, suffer greatly, function poorly at work and in the family, and in the worst case results in suicide (WHO, 2013). Depression affects more than 350 million people around the world and is one of the significant contributors to the second ranked (after coronary occlusion) diseases of the world, 5.7% of total DALYs (Colin & Dejan, 2006). It tends to be the major public health problem of the current world's health.

In Thailand, depression disorder is the common psychiatric disease affecting about 3 million (Department of Mental Health Thailand, 2013). The majority are workers between the ages of 34-44 and 55-59 years (Bureau of Epidemiology Thailand, 2012). Depression symptoms are the major cause of depression disorder (APA, 2005). Depression symptoms are caused by various factors including non-changeable factors; for example, genetics, and changeable factors, such as lifestyle-related factors that result from the interaction between persons, groups, family and the community. Since the environment, time and place of all factors influence depression symptoms, depression symptoms among workers are caused by working conditions and work environments (Mykletun & Harvey, 2013; Onwuameze et al., 2013).

Worldwide, there are approximately 1.3 billion agricultural workers (ILO, 2012). This represents half of the total world labor force. Almost 60% of them are in developing countries in Asia (ILO, 2012). In a large population-based study of anxiety and depression in relation to occupations, male agricultural workers had the highest level of depression of all occupation groups (Sanne et al., 2004).

In Thailand, agricultural workers have the most important power for the economic foundation of the nation. Agricultural workers are the majority, about 70% of informal workers (National Statistical Office, 2011). In 2007, the suicide rate in agricultural workers was ranked 1st among the various occupations and that rank is still in the top 5 of occupations that committed suicide (Epidemiological Office, 2007).

Farmers have to face many risk factors of depression from both their lifestyle-related factors and work-related factors (Onwuameze et al., 2013). The NIOSH Job Stress Model explained that the factors involved psychosocial problems related to negative emotional states of depression, anxiety, and tension or stress from individual factors, work-related factors (job stressors), non-work factors (lifestyle-related factors) and social relationships (NIOSH, 1988). Although the Job Stress Model does not directly explain depression symptoms, it is important to note that stress, anxiety and depression are moderately inter-correlated (Lovibond & Lovibond, 1995) and this model explains problems in terms of work-related factors and lifestyle-related factors among working ages. Thus, this study used this model for a framework to examine factors related to depression among rice farmers.

Work-related risk factors can be divided into 4 categories. The first one is a chemical risk factor caused by pesticide exposure. Chemical exposure causes various diseases including depression (Cheryl et al., 2008; Kim, Ko & Lee, 2014). The second one is a biological risk factor, such as carrier diseases from animals to humans (Catana et al., 2011; Centers for Disease Control & Prevention (CDC, 2013)). The third one is a physical factor; for example, inappropriate working positions, and working in the field with hot temperatures (CDC, 2013). The last one is a risk from psychological factors; for example, work-related financial problems that cause depression (Grav et al., 2011) and suicide (Grzywacz et al., 2010).

In addition, rice farmers are also risk takers for lifestyle-related factors like other occupations in the community. Lifestyle-related factors of farmers include health behaviors; smoking, alcohol consumption, sleeping hours, exercise (Sanne et al., 2004; Lovelock et al., 2009; Atlantis et al., 2004), relaxing activities, and family and social relationships (Scarth et al., 2000; Strawbridge et al., 2002). In Thailand, mental health among agricultural workers is not sufficiently described. Only one study reported in Prajuab Kere Kan Province that 37% of farmers had depression symptoms caused by

personal factors such as coping skills, interpersonal conflicts, changing life events and pesticide poisoning history (Klinsrisook et al., 2013). This indicates that there is a lack in the study about depression among farmers although farmers are the majority group of workers in Thailand.

The Center for Mental Health Services 9 office has the responsibility for mental health care and promotion of the public in four provinces including Nakhon Ratchasima, Chaiyaphum, Buriram and Surin. They collected data from 2007-2012, and found that in this region there were 14,900 depression patients; ranked first of the cases of Thailand. Nakhon Ratchasima's Rajanarindra Psychiatric Hospital (responsible for patients in the same region) collected data from 2009–2012, and found among out-patient services there were 110,876 cases. Among these, 13,367 cases were rice farmers. This rate was very high when compared with rates of the psychiatric hospitals in the other regions of Thailand (Nakhon Ratchasima Rajanarindra Psychiatric Hospital, 2013). This region was, therefore, selected to examine factors related to depression symptoms and to enforce a preventive depression program for rice farmers.

The empirical evidence shows that more than 40% of patients with depression were new cases (Smit et al., 2004), and why a strategy or program is necessary for prevention of depression to reduce the number of new occurring cases (Smit et al., 2004; Flannery & Schroeder, 2006). Current research on mental health has shifted attention from treatments to prevention programs, particularly prevention programs for depression (Ahola et al., 2013; Martin, et al., 2013). In addition, researchers focused on changeable risk factors (Onwuameze et al., 2013).

The depression prevention program that intervenes lifestyle-related factors contains things such as early inhibition negative attitudinal styles (Topper et al., 2010), enhancing coping strategies (Dam et al., 2007), proactive lifestyle exercise for example (Martin et al., 2013; Eveline et al., 2010), no smoking, quit drinking alcohol (Martin et al., 2013; Schomerus et al., 2008), relaxation (Mino et al., 2006) such as meditation or mindfulness techniques (Rapee, 2008; Klinsrisook et al., 2013), and promoting positive social networking (Grav et al., 2011; Schomerus et al., 2008). The depression prevention program that relates to the work-related factors contains things such as creating a work-life balance (Martin et al., 2013; Topper et al., 2010;

Schomerus et al., 2008), promoting a good working environment; and chemical, physical, biological, and psychosocial aspects (Mykletun & Harvey, 2013; ILO, 2012; CDC, 2013).

Earlier studies that analyzed the results of programs preventing depression and anxiety found that the programs had positive effects on depression, even if a small impact (Martin et al., 2013). Researchers had to examine the value of programs to prevent depression that focus on prevention among high risk factors to upgrade to the emergence of symptoms of depression disorders (Flannery & Schroeder, 2006; Topper et al., 2010; Schomerus et al., 2008). Because the reviewed literature showed the knowledge gaps that limited evidence of depression prevention programs, therefore, this study is interested in developing a program to prevent depression for rice farmers in Thailand that focuses on both lifestyle-related factors and work-related factors.

1.2 Research Questions

1. What is the situation of depression symptoms of rice farmers in the community?

2. Which risk factors are associated with depression symptoms in rice farmers?

3. What is the effect of preventive depression programs from the selected factors?

1.3 Research Objectives

General Objective

To assess the prevalence of depression symptoms, factors related to depression symptoms and examine the effectiveness of the preventive depression program among rice farmers who live in highly prevalent areas of depression symptoms in Nakhon Ratchasima Province.

Specific Objectives

Phase I

1. To assess the prevalence of depression symptoms of rice farmers in the community.

2. To assess factors related to depression symptoms of rice farmers in the community.

Phase II

1. To develop a depression prevention program, work-related program and lifestyle-related program.

Phase III

1. To examine the effectiveness of the work-related depression prevention program and lifestyle-related depression prevention program in developing knowledge, attitude and behavior thereby combating depression symptoms.

2. To examine the effectiveness of the work-related depression prevention program and lifestyle-related depression prevention program at the end of the intervention implementation.

3. To provide a scale of the knowledge, attitude and behavior in predicting actual behavior changes for depression prevention in relation to the change of depression symptoms scores.

1.4 Research hypotheses

1. Prevalence of depression symptoms among rice farmers is high.

2. Factors related to depression symptoms resulted from people related to working as workers and those related to a lifestyle as people in the community.

3. The developed and tested intervention programs from work-related and lifestyle-related depression prevention programs decrease the depression symptoms.

4. Knowledge, attitude and behavior were the predictors of actual behavior change in relation to depression prevention behavior and change in depression symptoms scores.

1.5 Scope of the study

The target population is rice farmers who live in the area of service of the Center for Mental Health Services 9. It is one of the academic centers to promote and support the mental health community in the area covered by the zoning of the Ministry of Health. The area consists of 4 provinces, Nakhon Ratchasima, Chaiyaphum, Buriram, and Surin. Because the area of the Center for Mental Health Service 9 has the highest prevalence of depression patients in Thailand, the people in this area were selected as the target population for this study. The duration of data collection is one year and 4 months, during July 2014 – November 2015. This study focuses on finding the situation of depression symptoms and the factors associated to the depression symptoms among rice farmers, then using the results, literature reviews, consulted stakeholders and expertise leading to develop the instruments for assessment and to design the preventive depression program which is suitable for rice farmers.

1.6 Definition of Terms:

Terms used in this study are defined as follows:

Rice farmer means those who occupy in the growing of rice and working on the process of rice plantations until harvest (Longman dictionary of contemporary English, 2013).

For this study rice farmer means a person whose major occupation or having their main income from a rice growing product and lives in the area responsible to the Center for Mental Health Services 9.

Study variables defined as follows.

Demographic data includes personal characteristics: sex, age, highest educational level, religion, marital status, disease, medication (using prescription only), alcohol consumption and smoking, sleeping hours, exercise, number of family members, family income and psychiatric disorder in family history.

Lifestyle-related factors refer to the behaviors or usual practice, which individuals perform on a regular basis, and do so repeatedly (Merrium-Webster Dictionary, 2014).

For this study lifestyle factors refer to the perception of farmers who perform on a regular basis, and do so repeatedly or interact with others in everyday life. They were measured in 4 aspects including health behaviors, recognition of family relationships, patterns of coping with problems, social networks and participation in the community. The questionnaire created by the researcher was used.

Health behaviors

Health behaviors refer to an action taken by a person to maintain, attain, or regain good health and to prevent illness. Health behavior reflects a person's health beliefs (Mosby's Medical Dictionary, 2009).

For this study health behaviors refer to behaviors on a regular basis to maintain their health, including healthcare awareness, observing abnormal symptoms, eating behaviors, alcohol use, smoking, sleeping hours, sanitation, and an annual health checkup. These were measured by the questionnaire created by the researcher.

Family relationships

Family relationship refers to the nature of the processes that occur within the family, interaction between family members, duties and responsibilities of family members in accordance with the expectations of society and the family, and the interaction between the family and the environment both inside and outside the family (Friedman, Bowden & Jones, 2003).

In this study family relationships refer to the perception of rice farmers about the interaction of the family members themselves, the expression of their roles, respect, showing love, generosity towards each other, and leisure and recreational activities done together. These were measured by the questionnaire created by the researcher.

Coping patterns

Coping patterns refer to cognitive processes of individuals and adapted to understand the issues and changes that occur, and dealing with problems or stress by using experience. Available resources in terms of problem-focused coping is aimed at problem solving or doing something to alter the source of the stress. Emotion-focused coping is aimed at reducing or managing the emotional distress that is associated with the situation, such as having a good communication or being interested to talk with each other among family members (Folkman & Lazarus, 1980, 1988).

In this research, the patterns of coping with the problems refer to the perception of farmers about the problems themselves, understanding of the problems by problem-focused, emotion-focused and social support. These were measured by the questionnaire created by the researcher.

Social networks and participation in community activities

Social networks and participation in community activities refers to the network of social interactions and personal relationships, face-to-face interaction among neighbors and community members involving interpersonal trust and social norms of tolerance and cooperation, and a sense of belonging on the part of community members (Graham, 2008).

In this study social networks and participation in community activities means awareness of farmers about the existing network of relationships with their communities, the feeling of being a part of the community, feeling to get help or support from the community, conflict in the community and doing activities together. These were measured by the questionnaire created by the researcher.

Work-related factors refer to perceived work conditions and work environments.

Work conditions

Work conditions mean job content, work load and work pace, work hours, and work situations that can affect the workers' health (WHO, 2014).

In this study work conditions mean work duration, accidents from work, chemical substances used and ways of exposure to chemical substance.

Work environments

Work environments mean the environment surrounding workers and effects on the worker's health including the physical environment, chemical environment, biological environment, and psychosocial environment involved in combination with physical and mental health effects (ILO, 2012).

In this study, work environments include physical environment, chemical environment, biological environment, psychological environment and health risks and/ or health protective behaviors related to the work environments of rice farmers.

1) Physical environment means the perception of rice farmers to the lighting, noise, temperature, air ventilation, convenience of transport, and preventing

accidents and injuries that occur during the operation of rice farming. These were assessed by a questionnaire derived from the U.S. NIOSH Job Stress Model (1988) and review literature.

2) Chemical environment means chemical substance exposure that rice farmers use in all processes of growing rice. This study will assess this by using a questionnaire derived from review literature including screening pesticide exposure and pesticide poisoning, information on pesticide use, the year of the pesticide use, average hours per day of use, application methods, and use of PPE and safety behaviors.

3) Biological environment means the natural biological factors (as wild animals and plants or bacteria) that affect human life at the workplace (Bureau of Occupational and Environmental Diseases, 2012). In this study, biological environment means the exposure to pathogens or disease vectors or animal carriers of disease, toxin found in the agricultural sector and perceived hazards from biological environments of rice farmers.

4) Psychosocial environment means occupational stress by various environmental factors in the workplace which affect the mental and social life of workers that can cause changes to the physical, emotional and psychological being of the workers (psychosomatic disorders) (Bureau of Occupational and Environmental Diseases, 2012). In this study, psychosocial environments refer to interpersonal and social interactions that influence behavior and development in the work and health of rice farmers. The researcher reviews literature and selects the significant psychosocial environment variables and relevance to the context of Thai rice farmers including perceived job demands and control, perceived uncertainty of external conditions, work-related financial hardship such as not having enough ready cash or had debt load, being honored and being appreciated by society and having support from related governmental organizations.

Depression symptoms

Depression symptoms refer to having a depressed mood, psychomotor agitation or restlessness, or being slowed down or appear tearful which may lead to abnormal activity in daily living, or a severe depressed mood (Spangler, 2011).

The CES-D scale is a short self-report scale designed to measure depressive symptomatology in the general population (Radloff, 1977).

This study refers to having a depressed mood measured by using the Thai version of the Center for Epidemiologic Studies Depression Scale (CES-D-20 items) that follows the concept of Radloff (1977). Each item has four response categories on how often the respondents experienced the depression symptoms during the past week. The cutoff score of 16 is indicative of “significant” or “mild” depression symptoms, 30 and higher scores indicating greater symptoms having to be referred for treatment. This study was tentatively categorized as a mild-to-moderate depression symptom with scores of 16-29 for select cases for intervention and analysis.

Depression prevention programs

Depression prevention program refers to the intervention designed to enhance protective factors and eradicating risk factors of depression (Townsend, 2008).

In this study, depression prevention program means the intervention program which was developed for depression prevention among rice farmers. The program was constructed by using baseline data and information from the literature review together with information from community stakeholders from both work-related factors and lifestyle-related factors. Those two interventions were developed by using the review literature and occupational concepts in accordance with Social Cognitive Theory. The program methods comprised of lecture, participatory learning and action, showing the good role model, small group discussion, brainstorming, continuous dialogue and home visits for support and continuing practices by village health volunteers.

CHAPTER II
LITERATURE REVIEW

This study focuses on finding the prevalence of depression symptoms and its associated factors to depression symptoms among rice farmers. The depression prevention program was designed for rice farmers in the community corresponding to predictors of depression. This researcher studied the documents and related research including:

1. Rice farmers
2. Work characteristics
3. Health problems of rice farmers
4. Depression: Definition and assessment
5. NIOSH Job Stress Model and factors related to depression
6. Modification/reduction of risk factors to prevent depression
7. Social Cognitive Theory and intervention for depression prevention

In order to be able to develop the preventive depression program that will be offered to rice farmers, it is important to know the potential of depression approaches in various factors and contexts. The search was carried out using the following terms: depression, agricultural workers or rice farmers, and depression prevention program.

Rice farmers

Worldwide there are approximately 1.3 billion agricultural workers. This represents half of the total world labor force. Almost 60% of them are in developing countries. A great majority of agricultural workers are found in Asia (ILO, 2012). Rice farmers are those working in the informal sector and are the most important power for the economic foundation of the nation (National Labor Statistical Office, 2011). They are a disadvantaged group because they do not have contracts. They are not protected by labor laws, and they are not sheltered by the social work system (ILO, 2012).

In Thailand the rice farmer is the most important power for the economic foundation of the nation because the Thai economy is mainly reliant on the agriculture sector. In 2008-2010, the percentage of agriculture, hunting and forestry were found to be the major groups being around 37 - 39% of the work group population. Specifically considering informal workers, rice farmers are the majority (70%) of this group (The National Labor Statistical Office, 2011).

Rice farmers have low levels of literacy. In 2011, Thai Labor Statistics found informal workers with no education at 3.2%, not having finished primary school at 36.8%, having graduated primary school at 25.4%, and only 15.2% having graduated secondary school National Labor Statistical Office, 2013). This low level of education may also affect the low level of skilled work and low income of skilled subsistence of rice farmers. They are facing various kinds of occupational hazards from work processes, work conditions and the work environment.

Work characteristics

Rice farmers are vulnerable to high health risks and occupationally related diseases (Lovelock, 2012). Work characteristics have an influence on both mental well-being and health (Schuurman, 2011). Rice farmers are in a different context from employees in the factory or workers in an organization. This study has incorporated both perspectives by focusing on work-lifestyle relations and factors outside of the work setting. This study will extend the topic to the social life of the individual and not solely on work-family issues. Frequently, the farmer's work is faced with frustrating problems that engage in complex or hazardous tasks such as planting and

harvesting operations that may cause personal injuries. In addition, farmers have large investments in machinery which has more direct impact upon the farm family economics than any other factor except crops and livestock prices, as well as the long range physical and emotional investment burdens (Jelstad, 2013). Continually working around faulty equipment, unshielded hazards or poorly maintained shops, and living in a house with other hazards can bring about high levels of frustration and anxiety (Robinson & Tevis, 2013). Rice farmers have many work processes and each of these processes is a risk to their health.

Work processes

Tasks carried out in the open air exposing workers to climatic conditions, the variety of tasks performed by the same person, and contact with animals and plants thus exposes workers to bites, poisoning, infections, parasitic diseases, allergies and other health problems, and the use of chemicals and biological products (ILO, 2012). A study about the work process of rice farmers in Thailand found that the work process of rice farmers involved multiple tasks and multiple risks. The work process and occupational health during each rice-farming process is as follows (Buranatrevech & Sweatsriskul, 2005):

1) Land preparing process is land preparation; the occupational health and safety problems among farmers from this process were irritation from smoke during burning rice stalks, musculoskeletal problems and injuries.

2) Seed-soaking and scattering/fertilizer-applying process; the occupational health and safety problems among farmers from this process were musculoskeletal problems and exposure to wet and humid soil.

3) Pesticides-mixing and spraying process; the occupational health and safety problems among farmers from this process were acute symptoms from pesticide exposure and musculoskeletal problems.

4) Weed-pulling process: the occupational health risks of this process are musculoskeletal problems.

5) Rice-harvesting; the occupational health risks of this process are exposure to vibration, exposure to loud noise, exposure to a lot of dust and musculoskeletal problems.

The working process of rice farmers has to deal with exposure to work hazards; physical, biological, chemical and psychosocial risk factors.

Work conditions

Rice farmers are comprised of a diversity of workers with various factors that can affect their health (Kearney et al., 2014). Many risk factors such as longer work hours per day, physically harder work, lower income, and worries about finance have been identified in several studies as the most important stressor in farmers' lives (Mejia & McCarthy, 2010). The working conditions of rice farmers, common health problems, lifestyle and risk factors were presented as a background to identify risk problems.

Thai Labor Statistics found a majority of informal workers are rice farmers. They work too hard (22%), do not continue working (19%), and have low income (46%) (Health Information System Development Office, 2013). This can affect their ability to provide appropriate food, or take care of their health and quality of life.

The lifestyle and health behavior of rice farmers, as an occupational group, face greater risks to their occupational safety. This high vulnerability has been explained in terms of the lifestyles associated with farm occupations. Rice farmers have been observed as risk takers, with attitudes and behaviors that are shaped by social relations, physical hardship, psychological stress and economic risks. Certain health behaviors are known to be associated with increased mortality due to risk factors such as stress, smoking and alcohol consumption. Smoking and the consumption of alcohol are common, along with the use of pain killers and stimulant drinks, which all have harmful health effects (LoveLock, 2012).

Work environments

According to ILO estimated in 2012, in several countries the fatal accident rate in agriculture is double the average. All other industry workers suffer 250 million accidents every year and found a total of 335,000 fatal workplace accidents worldwide. There were some 170,000 deaths among agricultural workers (ILO, 2012). They were exposed to a range of environmental factors which place them at risk of

various conditions and diseases. The most frequent hazards in agriculture were related to the work environment including physical environment, chemical environment, biological environment, and psychosocial environment.

Physical environment

Regarding the physical work environment, health hazards were caused from tractors and agricultural machinery, noise and vibration, extreme temperatures due to weather conditions, ergonomic hazards, excessive long hours and carcinogenic agents and UV radiations (ILO, 2012; Siriruttanapruk & Anantagulnathi, 2004; Nirathron & Chmkajang, 2011). Therefore, this study measured the physical environment in terms of the perception of rice farmers to lighting, noise, temperature, air ventilation, convenience of transportation, and preventing accidents and injuries that possibly occur during the operation of rice farming.

Chemical environment

Many rice farmers choose to use chemicals to keep weeds and pests from destroying their crops and to add more nutrients to the soil. There are three different kinds of pesticides; herbicides, insecticides and fungicides (ILO, 2012). The health of farmers is at risk due to chemical hazards, both acute and chronic poisoning (World Health Organization, 2004; Nirathron & Chmkajang, 2011). The review literature found that farmers have been reported to have higher rates of depression than other population groups. Some studies have been done to describe the effects of exposure to organophosphate compounds or pesticide exposure and depression symptoms among the farming population (Beseler, 2008; Kim, Ko & Lee, 2014).

The most common type of pesticides imported were herbicides (glyphosate), followed by insecticides (organophosphates, carbamates), fungicides (benzimidazoles, vinclozolin) and others (Office of Agricultural Economics, 2012). The greatest risk of exposure comes from the mixing and application of these pesticides to the crops (Kaewboonchoo, et al., 2015).

The impact of chemical substance exposure on the central nervous system and depression was seen in previous studies. Chemical exposure was found to have an effect on the neurobehavioral function among agricultural workers (London, 2012).

One risk factor for depression is pesticide poisoning (Stallones & Beseler, 2002; Beseler, 2008). Poisoning with organophosphate pesticides is more common among farmers, where suicide is most prevalent (Dilek, 2011). The chief target organ of pesticides is the brain because pesticides seek out lipids. The brain is highly lipid with a high density of acetylcholinesterase, which is the target enzyme of pesticides. They inhibit the enzyme acetylcholinesterase. This enzyme controls the metabolism of the neurotransmitter acetylcholine. They also inhibit the conversion of tryptophan into serotonin, which leads to insufficient levels of serotonin and ultimately depression (Cynthia, 2013). In addition, organophosphate pesticides are taken directly into our nervous system (the brain, spinal cord, and long nerves) and then transformed into chlorpyrifos-oxon, which is actually 3,000 times more potent than the original compound (Won, et al., 2007). The findings may reflect a link between chlorpyrifos and depression. Agricultural workers have the highest prevalence of pesticide exposure with 41% of the working population (National Statistical Office, 2012). The prevalent rate of pesticide exposure is highest in June, July, and August and found in 33.2%. Because this period is rainy, agricultural workers start cultivation and use a lot pesticides (Health Information System Development Office, 2009).

The survey in 2007 of pesticide exposure in agricultural workers' risk assessment by using paper strips for blood tests showed that the volume of high risk was 89,376 cases, where 34,428 cases were unsafe blood levels (38.5%) (The Bureau of Occupational and Environmental Diseases, 2012). On the other hand, pesticide exposures are themselves associated with risk factors for depression disorders and end up in suicide. For example, Stallones & Beseler, (2002) studied pesticide poisoning and depression symptoms among farm residents and found farm residents who were exposed to pesticides have a higher risk of depression than those who were not exposed (5.87 times). In 2008, Beseler, et.al, found that farm workers who were exposed to pesticide poisoning have a higher risk of depression than agricultural workers who were not exposed (2.57 times). It means pesticide poisoning was more strongly associated with depression. The ecological studies suggested an association between OP exposure and depression and affective disorders (London, 2009). In a recent study in South Korea, depression symptoms were significantly associated with a history of acute occupational pesticide poisoning and that the relationship was

associated with the severity of the symptoms of poisoning among male farmers (Kim, Ko & Lee, 2014).

In conclusion, the review literature showed that the depression symptoms and chemical exposure while farmers work have been significantly associated. Therefore, in this study, chemical environment means chemical substance exposure that rice farmers have used in all processes of growing rice.

Biological environment

The biological work environment refers to the natural biological factors (as wild animals and plants or bacteria) that affect human life in the workplace (Bureau of Occupational and Environmental Diseases, 2012).

Farmer's work outdoors which exposes them to many types of biological hazards including vector-borne diseases, venomous wildlife and insects, and poisonous plants (ILO, 2012). Vector-borne diseases may be spread to workers by insects. It may transfer a disease-causing agent. They are especially dangerous to workers who have allergies to the animal. Anaphylactic shock is the body's severe allergic reaction to a bite or sting and requires immediate emergency care. Poisonous plants can cause allergic reactions if the leaves or stalks are damaged and come in contact with the worker's skin (CDC, 2013; ILO, 2012). All biological hazards can make an impact on both the physical and mental health of farmers because it can occur during all working processes of growing rice.

The frequency of health problems found from the impact of biological hazards can be concluded as toxic or allergenic agents: plants, flowers, dusts, animal waste, gloves, and oils. Parasitic diseases are such as bilharziasis and facioliasis. Transmissible animal diseases are: brucellosis, bovine tuberculosis, hydatid disease, tularaemia, rabies, Lyme disease, tinea, and listerioses. Other infectious and parasitic diseases are: leishmaniasis, bilharziasis, facioliasis, malaria, tetanus, and mycosis. Contact with wild and poisonous animals includes: insects, spiders, scorpions, snakes, and certain wild mammals. (ILO, 2012; Siriruttanapruk & Anantagulnathi, 2004; Nirathron & Chmkajang, 2011)

In conclusion, even though the review literature has not shown exposures to pathogens or disease vectors or animal carriers of diseases, toxin found in the

agricultural sector will be associated with depression symptoms. Nevertheless, this researcher is interested in whether or not the perceived hazards, dangers or impact of the biological environment of rice farmers will have with relationship to the mental state like depression. In addition, the biological environment hazards are unavoidable for rice farmers, therefore, the researcher has included this variable into this study.

Psychosocial environment

Agricultural workers confront a myriad of stressors that likely affect mental health (Grzywacz, 2009). The evidence suggested that general stressors such as discrimination and poverty may contribute to elevated levels of psychosocial distress (Vega et al., 1985). More recently, stressors more specific to agricultural workers such as social marginalization, poor housing and living conditions have been associated with elevated depression and anxiety symptoms (Grzywacz et al., 2006; Hiott, Grzywacz, Arcury & Quandt, 2006). The study about safety practices and depression among farm residents in Colorado found the association between depression and some unsafe practices (Beseler & Stallones, 2010). Many psychosocial factors are associated with job stress or the harmful physical and emotional responses from work also found among rice farmers.

In Thailand, most agricultural workers are still in the informal sector who work largely outside the regulations. Concurrently, unionization rates are low and few workers are aware of their rights (Kelly et al., 2010), the psychosocial risk factors, and the lack of survey data or studies concerning the psychosocial problems of agricultural workers. Therefore, occupational diseases caused by psychosocial factors did not appear to develop an intervention for solving problems. However, there are many documents on the persistence of poverty and low socioeconomic status problems among agricultural workers in Thailand. The vulnerability of these workers is also attributed to their low educational attainment, limited access to information, and risky lifestyles such as alcohol drinking and smoking. Natural disasters affected the low, or failure of, production of agriculture and increased the debt of agricultural families (20.4%) (National Statistical Office, 2012).

In conclusion, psychosocial environment means occupational stress by various environmental factors in the workplace which affect the mental and social life

of workers and can cause changes to the physical, emotional and psychological life of workers (psychosomatic disorders) (Bureau of Occupational and Environmental Diseases, 2012). Psychosocial environment in this study refers to interpersonal and social interactions that influence the behavior and development of the work and health of the rice farmer, the researcher's review literature and selection of significant psychosocial environment variables and relevance to the context of Thai rice farmers to include the perceived job demands and control, perceived uncertainty of external conditions, work-related financial hardship (had not enough ready cash, debt load), being honored and appreciated by society and having support from related governmental organizations.

Health problems of rice farmers

Rice farmers have faced occupational hazards, a risky life style and all factors changing in society that can impact their physical and mental health.

Physical health

Compared to the all-cause and specific-cause death rates of the same aged Australian male farmers and farm managers with other men found a 33% death rate higher than the Australian male population of the same age. Cause of death was related to neoplasms, circulatory disease, and all external causes (Fragar, Depczynski & Lower, 2011).

Cancer incidents were found among Glyphosate-Exposured pesticide applicators in the agricultural workers' health study (De Roos et al, 2005). Farmers' exposure to chemicals such as pesticides, insecticides, fungicides, fertilizers, feed additives, veterinary products, detergents and disinfectants has also greatly increased giving rise to possible health risks from acute and chronic poisoning (Chatzi et al., 2005).

Major farm-related injuries are cut-injuries (85%), eye injuries (24%) and accidents (2%). Cut injuries usually occurred during the use of hand tools or machines and most were relatively minor (Sarkar et al, 2012).

Many air-borne hazards are capable of producing acute, sub-acute and chronic health problems such as asthma, extrinsic allergic alveolitis and bronchitis. Nasal blockage complaints were more common among farmers, and also found hypersensitivity, nasal polyps and symptoms in lower airways (Holmstrom et al, 2008). In addition, the study found the high prevalence of allergic rhinitis and work-related respiratory symptoms in grape farmers compared to control subjects (Chatzi et al., 2005).

The farmers' health may also be endangered through contact with animals as farmers are exposed to the hazards of zoonoses (Gerrard, 1998). Toxic or allergenic agents are: plants, flowers, dusts, animal waste, gloves, and oils. Parasitic diseases are such as bilharziasis and facioliasis. Transmissible animal diseases are: brucellosis, bovine tuberculosis, hydatid disease, tularaemia, rabies, Lyme disease, tinea, and listerioses. Other infectious and parasitic diseases are: leishmaniasis, bilharziasis, facioliasis, malaria, tetanus, and mycosis (Chmkajang, 2011).

In Thailand, rice farmers are informal workers that do not have health insurance, other health services or protection. They use the Universal Coverage of Health Care Scheme (UC) for their health care. In the national health record of 2010, the number and rates of out-patients according to 21 groups of causes from the Health Service Units found the top five number of diseases of the respiratory system are 28,605,575; diseases of the circulatory system 19,879,824; diseases of the digestive system 17,962,368; diseases of the musculoskeletal system and connective tissue are 17,925,550; endocrine, nutritional and metabolic diseases are 16,615,598 (units per 1,000 population), respectively (Ministry of Public Health, 2010).

Rice farmers' work involves repeated bending, heavy lifting, and regular exposure to natural and chemical skin and respiratory irritants, and other dangerous conditions. Each year, rice farmers needlessly die or are disabled from heat stress, chemical exposure, unsafe transportation, and farm machine accidents. On the other hand, it differs from formal workers. Illness from work for agricultural workers does not have a direct data record for this work group, but this group of workers are the major group of informal workers that have a recent record in 2011. It found the major health problems are 67.3% have accidents from being cut by sharp objects or machines during work, falling 12.3%, being burned 4.8%, tractor or vehicle accidents 2.9%,

crashing or being crushed 8.7%, accidents from pesticide 3%, and others 1% (National Labor Statistical Office, 2011).

In addition, rice farmers and their families are regularly exposed to unsafe and unsanitary conditions such as mold, raw sewage, unsafe drinking, lack of sanitation facilities, poor ventilation, and vermin. They get stress caused by their low level income and debt from production failure. This is a behavior that can be observed despite the transition of illnesses from communicable illnesses to non-communicable illnesses due to, for example, the consumption of alcohol, smoking or living in an unhealthy environment.

In addition, a report on the health of Thai people revealed that health expenditure per person in Thailand had increased 1.6 times, from 2,486 baht in 1995 to 3,974 baht in 2005, of which the expenditure was on medical treatments rather than health promotion (Institute of Population and Social Research, 2009). Therefore, the health problems of rice farmers are problems for the Thai government expenditure for people's health.

The occupational health and safety situation in Thailand is in a transitional stage. We are in the period of facing both old period (or classical) and new occupational health problems (Siriruttanapruk & Anantagulnathi, 2004). At present, many traditional health hazards in workplaces, such as unsafe work practice, still exist. All of these health risk factors cannot be eliminated or controlled effectively. At the same time, many new hazards in new work environments, e.g. stress at work, are emerging (Siriruttanapruk & Anantagulnathi, 2004). Also, among rice farmers mental health problems are complicated and need more study.

Mental health of rice farmers

All occupations are accompanied by stress factors that individuals must learn to cope with. Farmers are no exception. As the complications and pace of agriculture have increased, many of the physical and mental demands on farmers and their families have become greater. Financial problems, physical fatigue, noise, or temperature often increased farmers' vulnerability not only to accidents but also to stress-related diseases and mental disorders (Goffin, 2014).

Frequently, farmers result in symptoms such as insomnia, ulcers, colitis, hypertension, headaches, and changes in behavior such as temper outbursts and periods of depression (APA, 2004). It was also previously shown that suicide is more common in rural areas during periods of severe economic depression (Gallagher et al., 2007).

The stressors more specific to agricultural workers such as social marginalization, poor housing and living conditions have been associated with elevated depression and anxiety symptoms (Grzywacz et al., 2006; Hiott, Grzywacz, Arcury, & Quandt, 2006; Magafia & Hovey, 2003). The study about safety practices and depression among farm residents found that the general health status and depression are associated with some unsafe practices on the farm (Beseler & Stallones, 2010). The three-year follow-up study found pesticide poisoning was significantly associated with depression. Depression remained elevated after adjusting for decreased income and increased debt (Beseler & Stallones, 2008).

In Thailand, a survey of mental health problems, Department of Mental Health in 2011, showed that 20 percent of Thai people have mental health problems and found that the number of patients with psychiatric disorders who are under service has continuously increased in the years of 2007-2010; particularly depression (Department of Mental Health, 2012).

Epidemiology of suicide in Thailand found the majority in the age groups of young adulthood (ages 30-40 years) and elderly (over 60 years). Farmers accounted for one of the first ranked occupations that had suicide, followed by employees/workers (Department of Mental Health, 2012). It is a great loss both economically and socially. The World Health Organization is worried that depression is severe and that there were potentially more than 350 million people worldwide in 2012, and patient numbers will increase from being ranked 4th in 2010 to being ranked first in the world in the year 2030 (Health Information System Development Office, 2013).

Costs for depression care had a mean cost of $580 per patient (Unutzer, Katon & Fan, 2008). Depression is a common and recurrent disorder that causes significant occupational disability. In any given year, at least 4% of Thais suffer from major depression and three times that number experience minor depression. Twice as

many women as men are affected by this disorder. Depression is associated with significant levels of social, physical, and occupational impairment (Department of Mental Health, 2012).

The studies among 17,295 workers, ages 40-49 years including farmers and non-farmers, found differences in anxiety and depression levels between farmers and non-farmers could be explained by the farmers' longer work hours, physically harder work and lower income (Sanne et al. 2004).

Descriptions of agricultural workers' mental health in Thailand are in short supply. In 2011, from a quantitative and qualitative cross-sectional study of intentional self-harm and committed suicide in Buriram Province, there is data from 300 case studies. From all case studies, 80 cases (26.7%) are committed suicides. The first three occupations are farmers (38%), laborers (26.7%), and students (19%). Half of all cases are married and 75% of them are found to have no health problems (Setachandana, 2011).

In a recent study from Prachuap Khiri Khan Province among agricultural workers who farm vegetables and fruits, prevalence of depression was found in 37.2% of the participants. Factors associated with depression in both females and males are a family history of depression. Particularly personal factors, age, education level, and rest or appropriate sleeping hours in females were associated with depression. For males adaptation for resolved problems, interpersonal conflict, life crisis events, and isolation were associated with depression. Furthermore, a biological factor is the acetylcholinesterase (AChE) level in females associated with depression (Klinsrisook, et al., 2013).

The leading cause of suicide is major depression disorder (20.4%) and the least is alcohol abuse (9.2%) (Department of Mental Health, 2012).

In conclusion, for this study, the researcher is interested in depression problems among rice farmers that have directly affected health outcomes, cost of health care service, and quality of life in the family, community and society.

Depression

Depression affects more than 350 million people of all ages, in all communities, and is a significant contributor to the global burden of disease across the world (Marina et al, 2012). From ten leading causes of DALYs in projections of Global Mortality and Burden 2002-2030 found that psychiatric disorders, especially depression, increases the morbidity of the population of the world. The unipolar depression disorder is ranked second in the world (after coronary occlusion) at 5.7% of the total DALYs (Colin & Dejan, 2006). Especially when long-lasting and with moderate or severe intensity, depression may become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. At its worst, depression can lead to suicide. Suicide results in an estimated 1 million deaths every year (WHO, 2013).

Depression is projected to become the major mental health problem in Thailand. The national prevalence rate of depression increased from 56 per 100,000 population in 1997 to 197 per 100,000 population in 2007 (Department of Mental Health, 2007). An earlier survey from the Department of Mental Health reported prevalence of depression at 1.8% of the entire population (900,000 patients) or it can be said that of out of 100 people there will be two patients who have been depressed once in their lifetime (Department of Mental Health, 2015).

A survey of mental health problems, Department of Mental Health of Thailand 2012, found that 20 percent had mental health problems and found that the number of patients with psychiatric disorders who were recruited in 2008-2010 were continuously increasing, particularly depression disorders (National Statistical Office, 2012).

The prevalence of depression disorders in Thailand is around 3 million people. They can be assessed by health care services for early detection and treatment including major current depression episodes and dysthymia currently around 1,493,606 (2.7% of total patients). Females have a higher number than males and the majority are in the working age groups between 35-44, and 55-59 years old (Bureau of Epidemiology Thailand, 2012). Farmers accounted as one of the first ranked occupations, followed by employees/workers (Department of Mental Health, 2013).

Depression definitions

Depression is a worldwide common mental illness that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. Moreover, these problems can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities, and finally, at worst, is suicide (WHO, 2013).

Major depression is a syndrome or grouping of symptoms where there is a predominance of affective symptoms (pathological sadness, lassitude, irritability, subjective feeling of distress and impotence in the face of life's demands). The basis for distinguishing these pathological changes from ordinary changes is given by the persistence of the clinical symptoms, their severity, the presence of other symptoms and the degree of functional and social impairment that accompanies it (APA, 2005).

Behaviors associated with depression vary. These can be divided into affective, physiological, cognitive, and behavioral (Catana et al., 2011).

- The affective are such as anger, anxiety, apathy, dejection, loneliness, low self-esteem, sadness, guilt, and sense of personal worthlessness.
- Physiological are such as abdominal pain, anorexia, backache, chest pain, constipation, dizziness, fatigue, headache, impotence, indigestion, insomnia, menstrual changes, nausea, overeating, sleeping disturbances, vomiting, and weight change.
- Cognitive are such as ambivalence, confusion, inability to concentrate, indecisiveness, loss of interest and motivation, pessimism, self-blame, self-deprecation, self-destructive thoughts, and uncertainty.
- Behavioral are such as aggressiveness, agitation, alcoholism, altered activity level, drug addiction, intolerance, irritability, lack of spontaneity, over-dependency, poor personal hygiene, psychomotor retardation, social isolation, tearfulness, underachievement, and withdrawal (Gail, 2009).

Impact on occupational performance: Individuals with depression may show poor self-esteem and low motivation, whereas those experiencing manic episodes may have exaggerated self-esteem and difficulty completing and finishing

tasks. People with depression are at an increased risk of accidents and job loss (Catana et al, 2011).

There are different kinds of depression mood disorders, including bipolar disorder (manic-depression illness), post-partum depression and psychosis, but unipolar disorder is the most common depression disorder (Public Health Agency of Canada, 2013). Depression is the oldest, most common psychiatric illness and a serious problem that continues to be covering in stigma and ignorance and all too often goes unrecognized or inadequately treated (Catana et al., 2011).

Signs and symptoms

Medical definitions classify depression as all of the following:

Major depression or disorder also known as clinical depression or major depression when a major depression episode occurs with symptoms that last for most of the day, or nearly every day for at least two weeks; at least one of the symptoms is either 1) depressed mood or 2) a noticeable decrease in interest or pleasure in all or most activities. At least four (or more) additional symptoms are present as follows:

1) Depressed mood most of the day, or nearly every day, as indicated by either a subjective report (e.g., feels sad or empty) or an observation made by others (e.g., appears tearful).

2) Markedly diminished interest or pleasure in all, or almost all, activities most of the day, or nearly every day (as indicated by either a subjective account or an observation made by others).

3) Significant weight loss when not dieting, or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day.

4) Insomnia or hypersomnia nearly every day.

5) Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings or restlessness or being slowed down).

6) Fatigue or loss of energy nearly every day.

7) Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).

8) Diminished ability to think or concentrate, or indecisiveness, nearly every day (either a subjective account or as observed by others).

9) Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or specific plan for committing suicide.

The symptoms do not meet criteria for a mixed episode. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (APA, 2004). The criteria are used for a psychiatric physician diagnosis case.

In this study, the researcher focused on screening risk cases for depression, therefore the screening tools for assessment were reviewed.

Depression assessments

A depression screening should function similarly to a vital sign, providing an easy-to-assess, reliable marker of the need to address a patient's depression (Nease & Malouin, 2003). We grouped the depression screening instruments into 2 categories.

1. Self-report measures

Accuracy and ease of administration of commonly available screening instruments for assessment scales, for example Beck Depression Inventory (BDI), Center for Epidemiologic Study Depression scale (CES-D), Geriatric Depression Scale (GDS) and Zung Self-Depression Screener (SDS). The primary screening instruments used in many studies are the Center for Epidemiologic Study Depression scale (CES-D), used as the main instrument.

2. Clinician-rated measures

The assessment instruments are used by physicians, nurses, or trained professionals for depression assessment with the purpose for intensive screening for a treatment process, diagnosis, case formulation and treatment outcome evaluation; for example, Hamilton Rating Scale for Depression (HAM-D), Montgomery Asberg Depression Rating Scale (MADRS), Symptom-Driven Diagnostic System for Primary Care (SDDS-PC), M.I.N.I. and Brief Psychiatric Rating Scale.

Depression screening measures do not diagnose the depression but they provide an indication of the severity of symptoms and assess the severity within a

given period of time (e.g., the past seven to 14 days). Although each measure has a unique scoring system, higher scores consistently reflect more severe symptoms. All measures have a statistically predetermined cutoff score at which depression symptoms are considered significant. An interview is necessary because many conditions have symptoms that are common to depression.

The clinical judgment should supersede strict adherence to DSM criteria because the clinical manifestations of depression may vary by age, gender, or cultural background (Sharp & Lipsky, 2002). In an earlier version of DSM-5, the bereavement exclusion has been removed from DSM-IV-TR in order to provide an accurate diagnosis for people who need professional help and no diagnosis for those who do not (Pies, 2014). This new version may lead to increased use of medication in treating individuals who have experienced a loss and to help differentiate between normal bereavement associated with a significant loss and a diagnosis of a mental disorder (APA, 2013).

Self-report measures were considered being used in this study because of their accuracy, ease of administration, and available screening instruments as follows:

1). Zung Self-Rating Depression Scale

The Zung Self-Rating Depression Scale was developed by Zung in 1965 for screening depression symptoms. The questions mainly measured 3 aspects, including the affective aspect, physical aspect, and mental aspect. It consists of 20 multiple-choice items comprised of 10 negative questions and 10 positive questions with a 4 level Likert scale from 1-4; rarely or none of the time (score = 1), some or a little of the time (score = 2), occasionally or a moderate amount of the time (score = 3), and most of the time (score=4). A summary score is calculated. The range of scores on the Zung Self-Rating Depression Scale is 20-80 and was divided to four levels of probability of depression: normal (less than 50), minimum (50-59), moderate (60-69) and severe (≥70). Reliability = .73 (Zung, 1965). The latter of this questionnaire is not popular because it cannot assess changes in depression symptoms as it should. The Thai version of the Zung Self-Rating Depression Scale was translated in B.E. 2528 reliability = .83 (Chunjam et al., 2011).

2). Beck Depression Inventory (BDI)

The Beck Depression Inventory was developed by Beck, Ward, Mendelson, Mock and Erbaugh in 1961. The purpose of the questionnaire is to measure expressive behaviors of adolescents and adults. It consists of 13 multiple-choice items, reliability = .80. The questionnaire has been well recognized to differentiate depression symptoms. In 1978, the first revision (BDI-IA) had deleted some items and changed the content of some items. In 1993, the second revision (BDI-II) was for use in cognitive therapy and the third revision had changes to the new questionnaire BDI-II (Beck Depression Inventory-II) that follows the DSM-IV criteria. The purpose of BDI-II is to measure the severity of depression and other behaviors of depression adolescents and depression adults (Beck, Steer, & Brown, 2006). The BDI-II consists of 21 items, which assesses 15 items of mental symptoms, and 6 items of physiological symptoms. The questions have a 3 level Likert scale from 1-3, with rarely or none of the time (score = 1), a moderate amount of the time (score = 2), and most of the time (score=3). A summary score is calculated. The range of scores on the BDI-II is 0-63 and was divided to four levels of probability of depression: normal (0-13), minimum depression (14-19), moderate depression (20-28) and severe (29-63). Reliability = .93 (Beck et al., 2006). This questionnaire was used for the research and treatment because the accuracy, ease of administration and re-assessment availability. The Thai version of the BDI-II was translated in B.E. 2522 by Sriyong, reliability .80-.90 (Chunjam, et al., 2011).

3). Center for Epidemiological Studies Depressed Mood Scale (CES-D)

The CES-D is a valuable tool for identifying an at-risk group for depression and for studying the relationship between depression symptoms and other variables. Previous research supports the use of the scale in epidemiologic research, in needs assessment studies conducted by or for health planners, and as a screening measure. The CES-D items include depressed mood, feelings of guilt, worthlessness and helplessness, psychomotor retardation, loss of appetite and sleep difficulties. A summary score is calculated. The range of scores on the CES-D-20 is 0-60 (Radloff, 1977). A CES-D-20 cutoff score of 16 is indicative of “significant” or “mild” depression symptoms, higher scores indicating greater symptoms. The Thai version of CES-D–20 was translated in 1997, reliability=0.92, internal consistency=0.85,

sensitivity=93.33 and specificity=94.2. The CES-D is recommended in targeted, high-risk populations (Sharp & Lipsky, 2002).

In addition, there are Thai instruments for depression measurements suitable for Thai people and culture as follows:

1). Thai Geriatric Depression Scale (TGDS) or depression measurement for aging people was developed by the brain rehabilitative group in B.E.2536. It was developed from the Geriatric Depression Scale to assess depression among aging people in Thailand. The questionnaire consists of 30 items. Item numbers 1,5,7,9,15,19,21,27,29,30 with an answer of "No" will get a score = 1, for the remaining items the answer of "Yes" will get a score = 1. A summary score is calculated. The range of scores on the TGDS is 0-30 and was divided to four levels of severity of depression: normal (0-12), minimum depression (13-18), moderate depression (19-24) and severe (25-30). Reliability = .93. This questionnaire is accurate, and has ease of administration (Chunjam et al., 2011).

2). Thai Depression Inventory (TDI) or the measurement for depression by Lotrakul & Sukanich was in B.E. 2541. They developed the TDI from the Beck Inventory, The Center for Epidemiology Studies Depressions Scale and Hamilton Rating Scale for Depression to measure the severity of depression among Thai people in 5 aspects: physiological aspect, emotional aspect, cognitive aspect, adaptive aspect, and ability to perform daily activities in the past week. The questionnaire consists of 20 items. The questions have a 3 level Likert scale from 1-3. A summary score was calculated. The range of scores on the TDI is 0-60, a score higher than 35 means the severity of depression. Reliability = .86 (Lotrakul & Sukanich, 1999).

3). Khon Kaen University Depression Inventory (KKU-DI) was developed by Arunpongpaisal, S. et al. in B.E. 2538 for screening depression among adolescents and adults who live in the North-East region of Thailand. The questionnaire consists of 30 items. The questions have a 4 level Likert scale from 0-3; rarely or none of the time (score = 0), some or a little of the time (score = 1), frequently (score = 2), and almost every day (score= 3). A summary score was calculated. The range of scores on the KKU-DI is 0-90. The cutting point of the score is 20 which means they have depression. Reliability = .94 (Arunpongpaisal et al., 1995).

Depression measures should be selected based on the patient population. For this study we will use the CES-D-20 questionnaire for screening depression because many studies have shown to be useful to assess depression among agricultural workers for this measure, such as the study of safety practices and depression among farm residents (Stallones & Beseler, 2004), depression and pesticide exposures among private pesticide applicators enrolled in the agricultural health study (Beseler et al., 2008), and depression symptoms among Latino farmworkers across the agricultural season (Grzywacz et al., 2010). In Thailand, the study of farmers also used CES-D (Klinsrisook et al., 2013).

We decided to use the CES-D-20 items to be a measuring tool for depression symptoms among rice farmers in this study.

NIOSH Job Stress Model and factor related to depression

The U.S. National Institute for Occupational Safety and Health (NIOSH) is a world leader in preventing work-related illness, injury, disability, and death by conducting scientific research, recommending appropriate health and safety rules and regulations, and by investigating workplace hazards (Douglas et al., 2012).

The relationship between work-related psychological stressors and health are sufficient to make a need for occupational stress assessment.

Job stressors are the multiple psychosocial factors at work thought to impact the health and well-being of workers.

Acute reaction or job related strains are workers' negative psychological and emotional reactions to stressors, such as headaches, muscle/joint complaints, fatigue, and negative mood states including depression.

Many psychosocial factors are associated with job stress or the harmful physical and emotional responses from work. The concept can be dissected into three types of variables including job stressors, strains, and health outcomes as shown in the following figure (NIOSH, 1988).

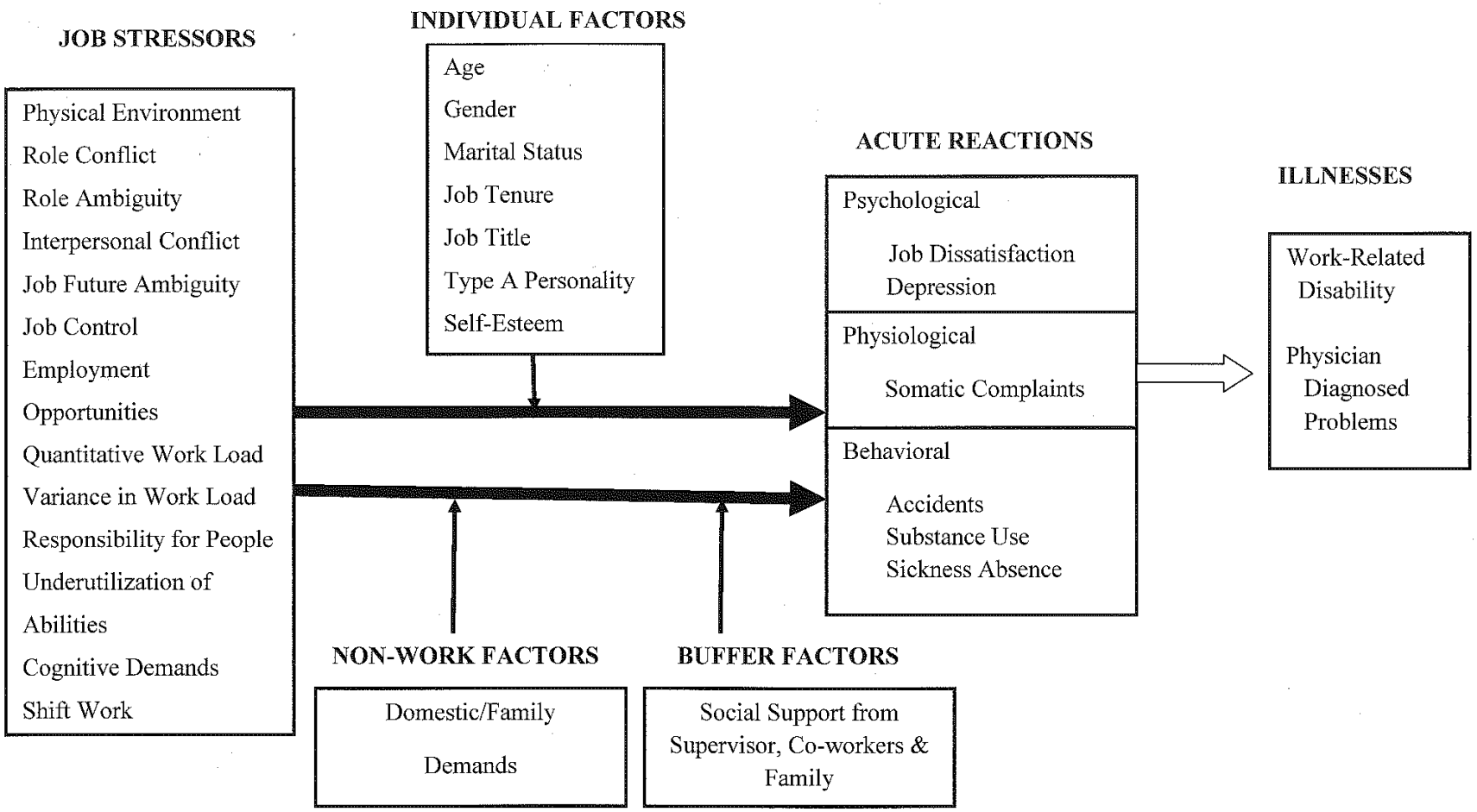

Figure 2-1. Model of job stress and health, 1988, National Institute for Occupational Safety and Health (NIOSH), U.S.A. (Hurrell & Mclaney, 2013)

The NIOSH model was used in many researches both in the formal sector and informal sector employments. For example, the study correlates depression symptoms among workers in small- and medium-scale manufacturing enterprises in Japan that used the NIOSH Job Stress Model to identify the interaction between psychosocial factors at work and adversely affected health. Job stressors and social support at work were associated with increased depression symptoms (Ikeda et al., 2009).

Many psychosocial factors are associated with job stress, or the harmful physical and emotional responses from work also found among rice farmers. The NIOSH model has major concepts for considering the stressors of rice farmers in the holistic view. Even some variables of the NIOSH model do not fit within the context of rice farmers but the major concepts are still significant to be the framework for this study.

Farmers have to face many risk factors of depression both from their lifestyle-related factors and work-related factors (Onwuameze et al., 2013). The NIOSH Job Stress Model (1988) explained that the factors involved psychosocial problems related to negative emotional states of depression, anxiety and tension or stress from individual factors, work-related factors (job stressors), non-work factors (lifestyle-related factors) and social relationships (NIOSH, 1988). Although the job stress model does not directly explain depression symptoms, it is important to note that stress, anxiety and depression are moderately inter-correlated (Lovibond & Lovibond, 1995) and this model distinguishes problems in terms of work-related factors and lifestyle-related factors among working ages. Therefore, this study has used this model to be a framework to examine factors related to depression among rice farmers.

Therefore, the researcher had to select and add more variables that can represent all job stressors and other specific variables for rice farmers, e.g. chemical environment. The NIOSH model will help to understand all risk and protective factors to examine appropriate predicting factors that can be developed for a preventive depression program.

Factors related to depression

Depression results from a complex interaction of social, psychological and biological factors (Onwuameze, 2013). There is growing evidence that etiology of mood disorders is complex, with interacting contributions from biological, genetic, psychosocial and environmental factors (WHO, 2013).

Causes of depression remain unknown. Various factors could take part in its origin, such as certain genetic factors, childhood experiences and current psychosocial adversities (social context and personality aspects). Difficulties in social relations, gender, socio-economic status or cognitive dysfunctions could also play an important role as risk factors in the development of depression, although it is most likely that it is an interaction of biological, psychological and social factors (APA, 2005).

Many psychosocial factors associated with job stress or the harmful physical and emotional responses from work have been found among rice farmers. In addition, a researcher selected and added more variables that can represent all job hazards and other specific variables for rice farmers, such as chemical environment: pesticide exposure that helps to understand all risks and protective factors to examine appropriate predicting factors in order to develop a depression preventive program.

Individual factors

Personal history and biological factors influence how individuals behave and increase their likelihood of becoming the depression symptoms. Among these factors are genetics, such as a family history of psychiatric illness, psychological or personality disorders, chronic diseases, medical use, self-perceived health, disability, and alcohol consumption.

As to the genetic factors, both heredity and environment play an important role in severe mood disturbances. Family, twin, and adoption studies show that the life-time risk is 20% for relatives of people with depression (Gail, 2009). Depression disorder is easily found in patients who have a history of family illness, family history of psychiatric disorder and co-factors such as stress (Laramic et al (2009). There was an association between some genotype and higher levels of depression symptoms but the specific gene for causing depression is still unknown (Nebes et al. 2002).

Major depression disorder may be associated with other medical conditions, many risk factors from the clusters of chronic diseases such as a number of chronic health conditions (Adams et al. 2004; Braam et al. 2005), Parkinsonism and cognitive impairment/dementia (Minicuri et al. 2002; Biderman et al. 2002; Blazer et al. 2002). Major depression is associated with psychiatric or neurological co-morbidities such as schizophrenia, 57%, Alzheimer's disease, 30-35%, and stroke, 20-25% (Department of Mental Health, 2012). The chronic illness was independently associated with depression disorders even after adjusting for co-morbidity and functional status (Niti et al., 2007).

Demographic factors

Demographic factors are also included in personal factors as to age, for this study. The epidemiologic catchment area study of CDC reported a 1-year prevalence of depression disorder highest for people aged 30-44 years (3.9%) compared with other age groups (Chapman & Perry, 2008). In China, similar to Thailand, ages 35-49 years had a higher risk than other age groups by 1.34 times (Zhang, 2011).

Regarding gender, females have higher prevalence rates of depression than males in many studies (Bisschop et al., 2004; Jorm et al., 2005). Females had a higher risk of depression than males by 4.64 times (Chapman & Perry, 2008).

People with no high school education had a higher risk of depression by 1.4 times (Chapman & Perry, 2008). There was a higher number of severe depression cases in the group with a lower level of education than other groups (Blazer et al., 2002). Ethnic minority was a risk for depression symptoms (Siegel et al., 2004).

Lower income and living conditions were associated with depression symptoms (Siegel et al., 2004; van der Wurff et al., 2004).

Non-work factors or lifestyle-related factors

Health behavior factors

A low exercise level or lower number of activities (Adams et al. 2004). For medical use, factors associated with depression are use of psychotropic and somatic medication and drug misuse (Biderman et al., 2002). Self-perceived health, for example, and poor self-perceived health were risk factors for depression symptoms

(Minicuri et al., 2002; Biderman et al., 2002) and with patients with chronic pain depression was found at an approximate rate of 30% (Department of Mental Health, Ministry of Public Health Thailand, 2012). Disabilities, which are risk factors of depression, are such as functional limitations, and vision or hearing loss (Braam et al., 2005).

Health habits which are risk factors for depression are alcohol problems, smoking, and obesity (Jorm et al., 2005; Almeida & Pfaff, 2005). People who consumed alcohol every day or almost every day had a higher risk of depression than those who never used it by 1.29 times (Chapman & Perry, 2008).

Family relationships

Work and family life stress can be major or minor stressors that may produce disturbances of mood including loss of attachment, major life events, role strain, and physiological changes (Gail, 2009). Friends, intimate partners and peers may influence the risks of becoming depressed (Lueboonthavatchai, 2006).

In this study, family relationship was measured. A healthy family has a balance of structure, function, environment and skills to cope with stress and problem solving in the family. This is the concept of Friedman who indicated that when the 4 dimensions of the family are in balance, family members will be strong and there will be good family health (Friedman et al., 2003). For rice farmers, family factors tended to be linked to the work, all family members can work together and the relationship of family also involves their work.

Buffer factors

Stressful life events

Stressful life events means the occurrences or stressors that were likely to bring about readjustment-requiring changes in people's usual activities such as “traumatic” events; for example, life-threatening or otherwise threatening to physical integrity, other major events (e.g., spousal bereavement) or both, over the life course of the people (Dohrenwend, 2006).

Adverse life events can precipitate depression. Such events include loss of self-esteem, interpersonal problems, socially undesirable occurrences, and major life

disruptions. Events perceived as undesirable are most often the precipitants of depression (Patton et al, 2003).

Stressful life events are followed by the worsening of psychiatric symptoms, physical health changes, impairment of social role performance, and depression illnesses (Schwarzer, 2007). The concept of stressful life events overlaps with the psychiatric concept of loss. For example, childhood physical and sexual abuse has been found to be associated with high depression symptoms in women. In addition, the presence of multiple family disadvantages, such as marital and family disruption, parental physical illness, poor physical care of child and home, social dependence, family over-crowding, and poor parenting in early life, have been found to be associated with depression in adulthood (Kendler et al., 1999).

All people experience stressful life events but not all people become depressed. The specific events can contribute only partially to the development of depression (Stuart, 2009).

The most stressful events of working as farmers were increased work load at peak times, dealing with workers' compensation, bad weather, and complying with health and safety legislation (Goffin, 2014). Age, being separated or divorced, being a deer farmer, the farm not making a profit in the last year, and supervising staff were independently associated with higher stress (Firth et al 2007).

Most cross-sectional and longitudinal studies on risk factors for depression showed associations with quantitative and qualitative aspects of stressful life events (Vink et al. 2008). Stressful events were, for example, negative life events in childhood (Kraaij & de Wilde, 2001), bereavement (Adams et al. 2004; Kraaij & de Wilde, 2001), and recent negative life events (Ormel et al. 2001; Isaacowitz & Seligman, 2001; Oldehinkel et al. 2003). Stressful life events cannot be controlled, but the ways to think about them and overcome that situation are important factors.

Coping patterns

Events perceived as undesirable are most often the precipitants of depression (Patton et al, 2003). Lazarus's theory was among the first studies on psychological stress reaction to stressors which identifies how cognitive appraisal and the way people think can influence the stressor's impact (Bernstein et al., 2006). If someone believes that the stressor is controllable, even if it isn't, the impact is

definitely reduced and that person experiences less harm from the stressor (Carver, et al., 1989). The effective coping strategy is an important factor to reduce the impact of the stressors (Folkman et al., 1986).

An increasing trend of literature indicates that coping is a major mediator between stressful events and psychological/somatic health outcomes (Padyab, 2009). The effect of the stressor is reduced by the use of an effective coping strategy. Most of these methods are categorized as either problem-focused or emotion-focused (Folkman & Lazarus, 1988). The first, termed problem-focused coping, is aimed at problem solving or doing something to alter the source of the stress. The second, termed emotion-focused coping, is aimed at reducing or managing the emotional distress that is associated with the situations. The two forms of coping are problem-focused and emotion-focused that can be measured by the Ways of Coping questionnaire, and the first research using the revised version was reported in Folkman and Lazarus (1980).

In addition, the term social support refers specifically to aid from significant others that is intended to meet the emotional or material needs of the individual (Thoits, 2011). Social support networking helps people cope with stressful events. Besides that, it can enhance psychological well-being (Schwarzer & Knoll, 2007).

Evidence from informal workers, especially among rice farmers, has been more limited. People who get less social support from others are more likely to experience a poorer quality of life, including depression (Brummett et al., 2012; Grav et al., 2011).

In this study, the coping pattern was measured by selecting some items from a ways of coping questionnaire (Folkman and Lazarus, 1985) in terms of problem-focused, emotion-focused and social support and adapted it to fit with rice farmers.

Social support

Social support is seen as one of the social determinants for overall health in the general population (Wilkinson & Marmot, 2003). Subjective perception that support would be available if needed may reduce and prevent depression and unnecessary suffering (Schwarzer & Knoll, 2007).

Cobb (1976) defined social support as information leading the subject to believe that he is cared for and loved, esteemed and a member of a network of mutual obligations.

Types of Social Support (House, 1981)

(1) Emotional support, as one of a structural dimension of social support for new venture creations, is the most important dimension. It means entrepreneurs perceive emotional support in new venture creations, including sympathy, concern, love, and trust (House, 1981). Especially, it can be accomplished by an operational definition, including self-respect, friendship, trust, concern, and hearing. Under Thai cultural background, people are not good at expressing their emotions. Emotional support is the most important type of support because this type of support has been most clearly linked to health in terms of both direct effects and buffering effects (House & Kahn, 1985).

(2) Instrument support includes instrument activities that are helpful to workers; examples of instrumental support include financial help, rides to the doctor, providing housing, and cooking meals. In a health context, instrument support acts directly on something that is causing stress for the individual who is ill, while informational and emotional support can be offered for a larger range of health-related stressors (Grav et al 2011). This means that instrument support acts directly on stress. Because of this, it is generally only applicable in a buffering context. Instrument support, like all other forms of support, giving someone money for example, is a form of instrument support that communicates emotional support. An interesting fact is that the instrument support for Thai farmers was mostly not found from any organizations. Being different in a rural society possibly brings trouble to a farmer. In Thai society, especially in rural areas, people live their lives depending on each other. They have close relationships, and care tremendously about maintaining their relationships with others. Therefore, changing or breaking community's belief and convention would make a crack in one relationship towards the others. An instrument support example is when that farmer needs hands to help in the field, such as harvesting; he/she might get refused by the neighbors. It is very challenging to be independent in the community.

(3) Information support means the society can provide information about dealing with individual or environmental problems for workers. The simplest

definition of informational support is the provision of information or advice. Its intent is almost always to give the focal individual a means to help themselves; for example, many times it is given when the focal individual is struggling with a problem or making a decision (Schaefer et al., 1981).

(4) Feedback support or appraisal support is also a kind of information flow which is coming from people who can be used by workers to evaluate themselves. It also includes others' feedback information. It aims at helping workers establish their directions and acquire better acceptance in new venture creations. Although the four kinds of support are not completely mutually independent, they display their independent dimensions of social support (House, 1981). An example of appraisal support is information about common disease symptoms which allows the focal individual to understand their circumstances and assess their health but is not related to a specific problem the focal individual is currently experiencing. Appraisal support can also take the form of opinions, rather than facts, given by a supporter to the focal individual. Appraisal support might be conceived of as a specific type of affirmation support: one that is information-based rather than based on emotions.

There is agreement among researchers that categorizes social support in two broad domains: structural and functional support (Schwarzer & Knoll, 2007). Structural social support includes the amount, density and frequency of contact in one's network, and functional support is the support provided by one's social network (Lett et al. 2005). Functional measures judge whether interpersonal relationships (family, friends and significant others) serve a particular function; for example, emotional, tangible, informational and appraisal support.

According to House (1981), emotional support involves the provision of caring, empathy, love and trust, and tangible support as the provision of tangible goods and service. Theorists distinguish functional support into 'received functional support' (actually received) and 'perceived functional support' (available if needed). Perceived functional support deals with an individual's subjective experience of an expected availability where trust in a mobile support system is feasible (Lett et al. 2005, 2009).

The association between social support and depression has been well studied since the mid-1970s (Grav et al., 2011), however, evidence from the informal workers, including the rice farmer, has been more limited. A large number of risk factors have been studied and reported for depression, including social support.

There are a variety of instruments currently used to assess social support, though there is no single best measure. This situation may be partially due to the fact that a wide range of different measurement strategies have yielded scores that have successfully been related to various health outcomes. Instruments range from single items used to assess whether or not major types of support (emotional, instrumental) are available or yes/no answers to more extensive instruments which include multiple items asking about various types of emotional support and various types of instrumental/informational support. In conclusion, social support networking helps people cope with stressful events and/or other trouble situations.

Besides, it can enhance psychological well-being. Social support distinguishes between four types of support including emotional support, instrumental support, information support and appraisal support (House, 1981). The 4 aspects are as follows:

1) Emotional support means sharing life experiences, and involves the provision of empathy, love, trust and caring.

2) Instrumental support involves the provision of tangible aid and services that directly assist a person in need. It is provided by close friends, colleagues and neighbors.

3) Informational support involves the provision of advice, suggestions, and information that a person can use to address problems.

4) Appraisal support involves the provision of information that is useful for self-evaluation purposes: constructive feedback, affirmation and social comparison.

From review literature, many studies have found a higher probability of experiencing depression among people who have a lack of social support. Evidence from informal workers, especially among rice farmers, has been more limited. People who get less social support from others are more likely to experience a poorer quality of life, including depression (Brummett et al., 2012; Grav et al., 2011).

Social relationships

Social relationships, occurring in such places as neighborhoods and workplaces, also influence depression symptoms (NIOSH, 1988). Farmers involved in both community activity and the work setting are not the same as with formal organizations. Farming tends to be conceptualized as a lifestyle rather than a job, with family and housing linked to the work. Farmers organize their own work, although with this comes the burden of worrying about the future (Sanne et al. 2004). Social support is one of most important factors in predicting the physical health, mental health and well-being of everyone. The initial social support given is also a determining factor in successfully overcoming life stress. Thus, it is also a major factor in preventing negative symptoms such as depression and anxiety from developing (Lowe, 2015). Social relationships provide various dimensions of social support including attachment, social integration, reassurance of worth, reliable alliance, and guidance/assistance (Cutrona & Russell, 1987)

In this study, the researcher has measured some dimensions of social support. Social relationships such as social networks and participation in the community were measured by selecting some items from the Social Provisions Scale (Cutrona & Russell, 1987) and adapted it for congruency with rice farmers.

The work-related risk factors are defined as the direct cause on depression among agricultural workers. However, it has limited information on both occupational and lifestyle factors among rice farmers in Thailand (Klinsrisook, 2013; Chunjam, 2008; Siriruttanapruk & Anantagulnathi, 2004; Kaewboonchoo et al., 2015).

Any person who has depression problems are a complex, unique human being who cannot be understood through an assessment of only one factor. In this study, Phase I determined factors affecting depression among rice farmers, and Phase II developed the intervention program for depression prevention needed specifically for the changeable or modification/reduction risks of depression symptoms.

Modification/reduction of factors to prevent depression

Depression affects a person, family, and society in terms of feeling, daily living, and economic status. Increasing incidences and impact of depression among rice farmers are important issues. Therefore, this study aims to develop and test the suitable prevention program for depression. As to the objectives of this study, the modification factors to prevent depression were reviewed.

Many factors are associated with depression. Therefore, studies carried out to examine factors associated with depression among farmers have identified both non-modifiable factors such as younger age, modifiable factors such as pesticide exposure, psychosocial factors such as income decline, and health behavior factors such as alcohol use. In order to develop the depression prevention program, we, therefore, focused on modification, reduction and changeable factors.

Modifiable in terms of protective factors had been identified in the literature as follows:

1) Preventive behaviors and healthy lifestyle choices, as well as frequent leisure activities and exercise, were identified as protective factors (Carruth & Logan, 2002; Nabkasorn et al., 2005; Brumby et al., 2011:2013).

2) Good physical health and health behaviors were identified as a protective factor as well as understanding the link between good physical health and mental well-being, such as having health concerns, healthy eating, no smoking, and no alcohol consumption (Pratt & Brody, 2010; Cramm & Nieoer, 2012; Jacka et al., 2014).

3) Social support and social relationships included protective factors such as having family or having a confidant at home, good family relationships and having close friends. Studies found that perceived social support was an important variable in the relationship between agricultural stress and job satisfaction (Welke, 2004; Wyllie et al., 2013; Lowe, 2015).

4) Practical help was being able to get practical help from the family and the community, and the ability to access appropriate services (Steger & Kashdan, 2009; Wyllie et al., 2013; Kolstrup et al., 2013).

As to modifiable in terms of risk factors, the farm environment presents many hazardous working conditions. Dangers and worries have been identified in the literature as follows:

1) Physical work environments, for example, and loud noise-induced hearing loss can also induce depression symptoms among farmers (Canton & William, 2012; Cooper et al., 2010.

2) Chemical substance exposure to pesticides and organophosphates (Beseler & Stallones, 2008; Kim et al., 2013; Onwuameze et al., 2013).

3) Mechanical hazards and machinery break-down mentioned in the literature was a risk of depression (Goffin, 2014; Roy et al., 2013).

The reviewed literature found that both risks and protective factors for depression among farmers is not currently fully understood, especially in Thai farmers. Therefore we needed to have the first phase as the cross-sectional study to identify it.

Social Cognitive Theory and intervention for depression prevention

Depression models: There are many depression models that explained depression depending on the basic concepts or theories as follows:

Biological model: The biological model explores chemical changes in the body during depressed states. Abnormalities can be seen in many body systems during a depression illness, including electrolyte disturbances, neurophysiological alterations, dysfunction and faulty regulation of autonomic nervous system activity and neurochemical alterations in the neurotransmitters, especially in the biogenetic amines including catecholamines-dopamine, norepinephrine, and epinephrine, as well as serotonin and acetylcholine (Gail, 2009). Genetics**,** both hereditary and environmental, play an important role in severe mood disturbances. Family, twin, and adoption studies show that the life-time risk is 20% for relatives of people with depression (Stuart, 2009).

Behavioral model views people as being capable of exercising control over their own behavior. Thus the key assumption in this model is that a low rate of positive reinforcement is the antecedent of depression behaviors. Depression also occurs in the presence of certain punishing events such as marital or interpersonal discord, work or school hassles, or negative reactions from others. The behavioral model of depression emphasizes an active approach to the person and relies heavily on an interactional view of personality (Stuart, 2009).

Cognitive theory proposes that people experience depression because their thinking is disturbed (Beck et al, 1979). Depression is seen as a cognitive problem dominated by a person's negative evaluation of self, the world, and the future (Stuart, 2009).

Learned helplessness-hopelessness theory proposes that it is not trauma itself that produces depression, but the belief that one has no control over the important outcomes in life and therefore refrains from adaptive responses (Seligman, 1975). These negative expectations lead to hopelessness, passivity, and an inability to assert oneself, then in turn the symptoms of hopelessness contribute to depression (Stuart, 2009).

Object loss theory refers to traumatic separation of the person from significant objects of attachment. This mourning in the early years often affects later personality development. It can predispose the child to psychiatric illness or be beneficial and help develop resilience (Stuart, 2009).

Coping behavior theory defines the coping behavior that refers to coping strategies including active coping, planning to cope, seeking instrumental support, seeking emotional support, religion, acceptance, humor, self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame (Carver et al., 1989). Coping mechanisms are important to personal adaptation (Schwartzman, 2012). These beliefs and coping behaviors are potentially modifiable and could be the target of interventions to decrease functional impairment in depressed people (Catana et al., 2007).

In conclusion, it is important to point out that no one theory is sufficient to explain depression. Depression symptoms are a complex problem that are hard to assess with only one factor. This researcher has reviewed the working model related to mental health, particularly depression symptoms, to find more specific factors among the working age as a framework for determining factors affecting depression among rice farmers.

Depression symptoms are quite varied in nature and their causation is complex, encompassing occupational as well as non-occupational factors. This greatly complicates the task of developing an appropriate prevention strategy.

The conceptualizing primary prevention strategy is based on a risk-benefit point of view. The following three categories of primary prevention have been identified (WHO, 2013):

1. Universal prevention is targeting the general public or a whole population group.

2. Selective prevention is targeting individuals or subgroups of the population whose risk of developing a mental disorder is significantly higher than that of the rest of the population.

3. Indicated prevention is targeting persons at high-risk for mental disorders.

Selective prevention for rice farmers in this study is also focusing mainly on rice farmers who are at higher risks of developing depression disorder with screening CES-D scores of 16-29 and were selected for intervention to prevent depression.

Criteria to identify possible interesting preventive interventions: the candidate intervention is directed at one (or more) amenable risk factors that 1) are strongly associated with the onset of depression disorder; 2) result in a substantial decrease in the incidence rate if their adverse effect can be successfully prevented, and 3) are associated with a low number-needed-to-be-treated (Smit et al., 2004).

The prevention literature concerns the risk status of participants that are offered the intervention (Topper et al., 2010). Importantly, according to the IOM classification, the term prevention is restricted to interventions offered to individuals who have not yet developed a particular disorder, whereby the interventions aim to prevent a future onset of the disorder (National Research Council & Institute of Medicine, 2009).

The recent meta-analysis review of preventing the onset of major depression disorder found that the preventive interventions lowered the incidence of depression by 21%, compared with the control (Zoonen et al., 2014). Another meta-analysis of preventing the development of depression at work (Tan et al., 2014) found that most interventions tested required substantial amounts of face-to-face teaching or group training time, ranging from a single four-hour session to a year-long intervention of re-designing the work environment.

Prevention programs have been shown to reduce depression (Mino et al., 2006; Brouwer et al., 2006). However, the depression prevention program among agricultural workers was scarce because the intervention of mental health problems in a general community setting is still a relatively new area of research (Cuijpers, 2012). The prevention of depression is an area that deserves attention (Zoonen et al., 2014). This limited the conclusions that could be drawn.

The preventive depression program targets both risk factors of individuals and the environments. Emphasis is twofold including assisting individuals to increase their ability to cope effectively with stressors, and targeting and diminishing harmful forces within the environments (Townsend, 2008).

The intervention was designed to enhance protective factors and eradicate risk factors of depression among rice farmers (selected group), both working stressors and lifestyle factors. Those two interventions will be developed by selecting the significant and changeable factors from our preliminary study (Hanklang at el., 2016).

Theory-based interventions are more effective in health-related behaviors compared to approaches without a theoretical framework, since they are a means to development of interventions as well as to guide the evaluation of these interventions (Plotnikoff et al., 2009). Social Cognitive Theory is well recognized as a useful framework for the design of depression prevention interventions (Glans, 1997).

Social Cognitive Theory

Social Cognitive Theory (SCT) is an updated version of social learning and theory, both of which were developed by Albert Bandura (1986). SCT explains psychosocial functioning and human behavior in terms of a triadic, dynamic and reciprocal interaction of personal factors, behavior, and the environment (Bandura, 1991).

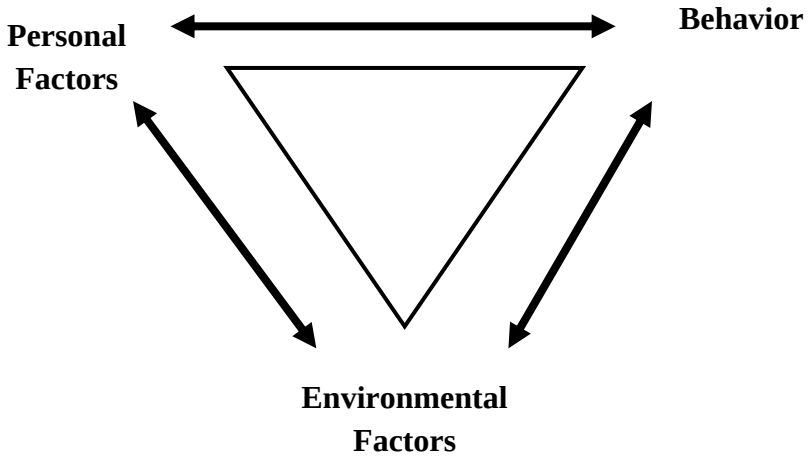

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Figure 2-2. A triadic, dynamic and reciprocal interaction of personal factors, behavior, and the environment (Bandura, 1986)

According to this theory an individual's behavior is uniquely determined by each of these three factors. It contends that behavior is largely regulated antecedently through cognitive processes. Therefore, response consequences of a behavior are used to form expectations of behavioral outcomes. It is the ability to form these expectations that gives humans the capability to predict the outcomes of their behavior, before the behavior is performed (Bandura, 1991).

Humans can learn by observing others, and that observational learning from a model requires four cognitive stages: attention, retention, reproduction and motivation, and can learn by participating in an act personally (Bandura, 1971). Knowledge structures are formed from the styles of thinking and behavior that are modeled from the outcomes of exploratory activities, verbal instruction, and innovative cognitive syntheses of acquired knowledge. Human beings have evolved an advanced capacity for observational learning that enables them to develop their knowledge and skills from information conveyed by modeling influences (Bandura, 1986).

Applications of theories of health behavior have tended to assume adequate knowledge of health risks. Knowledge creates the precondition for change. But additional self-influences are needed to overcome the impediments to adopting new lifestyle habits and maintaining them (Bandura, 1991).

According to Bandura (2004), knowledge is a precondition for behavior change. This idea is quite easy to be accepted; for example, people who become aware that smoking may cause cancer clearly have a foundation for behavior change. Therefore, knowledge is a fundamental starting point for all health promotion programs (Bandura, 2004). Bandura (1986) distinguishes different types of knowledge. In the health promotion contexts, content knowledge involves understanding the advantages and drawbacks of a given health behavior; this only represents a minimal awareness. The more advanced type of knowledge is procedure knowledge that involves understanding how to engage in a given health behavior. Knowledge is viewed as a gateway that must be passed before more complex personal and social issues come into play (Bandura, 1986). However, knowledge is a necessary, but not sufficient, basis for behavior change. Knowing how to do something and actually doing it, especially on a regular basis or regular lifestyle, are two very different things. Thinking sequentially, a health promotion program using SCT as a

guide, would begin by creating awareness or a good attitude of the health behavior and proceed to building levels of procedural knowledge (Midgley, 2000).

Attitude refers to the overall feeling of humans which is associated with hatred, certain thoughts and degrees of fright towards certain things or objects, which can be either in a positive or negative sense (Thurstione, 1967: 119). To provide people with the confidence and ability they need to actually adopt the health protective behavior, efficacy belief is a major basis of action. Unless people believe they can produce desired effects by their actions, they have little incentive to act or to persevere in the face of difficulties and setbacks. Whatever else may serve as motivations, they must be founded on the belief that one has the power to produce desired changes by one's actions (Bandura, 1998).

Behavior is predicted by self-efficacy together with outcome expectancies or a good attitude towards outcome of behavior change. It is suggested that an individual will 1) be more inclined to behave in the specific way and 2) try to perform the behavior if he/she believes both that the behavior will have a particular desired effect, and that he/she is able to perform the behavior (Albery & Munofo, 2008: 112). The causal relationship between self-efficacy and outcome expectancies is presented in Figure 2-3 (Bandura, 1997: 22).

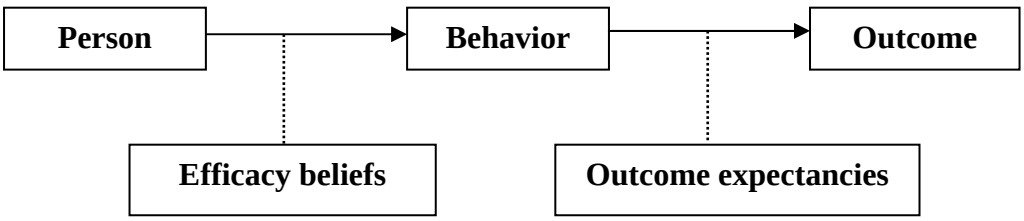


Figure 2-3. Causal relationship between self-efficacy and outcome expectancies

The SCT posits that most behavior is learned vicariously. Humans can learn by observing others, in addition to learning by participating in an act personally. The educational nature of these approaches makes them easily adaptable to a preventive intervention modality. Therefore, intervention programs for depression prevention also need to improve knowledge and simultaneously raise the attitude of preventive behavior among

rice farmers. Knowledge, attitude and behavior were the main variables to indicate the effects of the depression prevention program in this study.

Relevant Research

The SCT has been used to study a wide range of health problems. Training is one of the most essential methods for prevention program.

The literature review for depression prevention by the workplace approach is difficult to determine whether individual components or the suite of intervention activities were required to achieve positive outcomes (Zoonen et al., 2014).

Effective interventions for depression that appeared to be effective are: information, social support, access to treatment and advice, managerial education, team based approaches to improving work environments, addressing absenteeism, addressing excessive workload and providing relief periods from heavy workloads. The importance of addressing risk factors for mental health disorders in agricultural sectors were promoting supportive work environments and promoting positive relationships (Roche et al., 2012).

Little is known about interventions most likely to be effective in reducing the prevalence of depression in agricultural workers. There are large bodies of work on the prevalence of depression, health seeking behaviors, attitudes, risk factors and interventions in general (Bonde, 2008). Many prevention programs implemented across the lifespan have provided evidence on the reduction of elevated levels of depression symptoms (Marina et al, 2012).

Sanne, et al (2004) suggested for a depression intervention base on their population-based studied that preventive measures, such as mental health educational programs, teaching of coping strategies, self-help groups and specific practical support should be strongly considered.

Social Cognitive Theory was applied on a variety of interventions for a varied population in the following examples:

The breastfeeding educational program for mothers of pre-term infants using education from the SCT included modeling, verbal persuasion, reinforcement, vicarious experience and self-monitoring/self-regulation were the main constructs. Mothers in the intervention group showed a significant improvement in their breastfeeding skills, therefore

the education strategies from Bandura's SCT was effective in improving breastfeeding outcomes among mothers of pre-term infants (Ahmed, 2009).

A study designed to explain leisure time physical exercise among high school students measured self-regulation in five domains; goal-setting, self-monitoring, gaining and maintaining social support, planning to overcome barriers and securing reinforcements. This study had built-in goal-setting activities throughout the intervention, worked with participants to create realistic and measurable goals, and also allowed time for reflection and evaluation about success or failure in meeting goals (Winters et al., 2003).

The quasi-experimental research applied Social Cognitive Theory to assess the effect of the program in changing fruits and vegetable consumption behavior among students. The program was composed of 6 learning activities for 8 weeks, and the following learning methods were used; modeling procedure, presenting VCD, demonstrations, educational games, role-playing, measuring fruits and vegetables, and preparation of fruits and vegetable dishes. After the experiment, there was a significantly higher mean score of knowledge about fruits and vegetables, attitudes towards fruits and vegetable consumption, and fruits and vegetable consumption behavior that means the program was effective in changing fruits and vegetable consumption behaviors among students (Suwansin et al., 2014).

The study examined the impact of self-administered, computer-based intervention on nutrition behavior, self-efficacy, and outcome expectations among supermarket food shoppers. Participants accessed grocery store kiosks for tailored messages about healthy eating and received coupons to purchase healthy food. SCT constructs used self-efficacy, self-regulation and outcome expectations. The kiosk provided users with personalized nutrition information, behavioral strategies, and goal-setting activities. Intervention groups demonstrated higher levels of nutrition self-efficacy, more positive physical and social outcome expectations, and more frequent attainment of goals for consumption of fat, fiber, fruits and vegetables (Anderson et al., 2000).

The effective interventions that intervened subjects by using knowledge, attitude and practice as a main variable for the framework were found in many studies. For example, in the cognitive behavioral intervention the sessions were comprised of a series of lectures, discussions of homework assignments and practical skill-training

sessions. The results showed to be effective in prevention of preventive depression symptomatology (Dam et al., 2007).

The study design is quasi-experimental by using the compass campaign modules composed of major media, local media, website, mental health advisor & call center, a video & facilitators' manual, navigator program and service provider strategies. After 14 months of the campaign, the experimental area had an impact on the awareness of mental health campaigns, self-identified depression, help for depression sought in the previous year, correct estimate of prevalence of mental health problems, increased awareness of suicide risk, and a reduction in perceived barriers to seeking help (Wright, 2006).

Social cognitive theory proposes that personal, environmental, and behavioral factors operate as reciprocal, interacting determinants of each other. The cognitive process is a key mediator between external stimuli, such as an intervention and behaviors (Bandura, 1998). Cognitive processes presumably influence an individual's ability; for example, to control PPE using behavior and its determinants such as personal, environmental, and behavioral factors. In addition, environmental factors that would be a key to adherence to behavior influencing using PPE involves social support (Atkins, 2010).

In Thailand, studies of interventions to deal with depression for physical illness subjects include counseling, relaxation, and meditation. Cognitive intervention and social intervention were carried out in mental health and drug addicted subjects. Behavioral intervention such as self help groups, music therapy, push relaxation, and muscle relaxation were provided to elderly subjects. Education, counseling, and supportive interventions were provided to care giver subjects. All of the intervention programs decreased depression (Chunjam et al., 2011).

The evidence in Thailand showed that there was no intervention of depression prevention in occupational groups, particularly in the high prevalence of depression in agricultural workers.

SCT is intuitively appealing because it fits with the typical goals of public health work, particularly health behavior research provided in a broad range of areas to examine in order to promote behavior change; for example, physical activity (McNeill, et al., 2006), smoking prevention (Aroza et al., 2010) or condom use (Solomon, 2014).

It was widely used for a variety of health behaviors and populations. It contains the assumption that individuals play an active role in their health. This varied use of SCT among health problems, health promotion, disease prevention and among various group of population were already used and got the effective results. Therefore this study used the SCT to apply for intervention design.

The review literature already shows the factors related to depression in populations of both lifestyle-related factors and working-related factors, thus this study has focused on rice farmers and selected factors that are changeable and significant to depression into the program. Therefore, the one important issue was to explore the significant factors that are changeable in the program by comparing the lifestyle factors program's effect and working-related factors program's effect that are worth implementing by using the cross-over design.

Cross-over design will be used to compare the results of the program focused on lifestyle-related factors and working-related factors. It means there are two interventions for both the overall group and the individual participants. In order to control the various confounding factors among rice farmers who participate, the program can tell which intervention is more effective and which intervention is first implemented to get better results and thereby provide the study with strong internal validity (Jones & Michael, 2003).

The conceptual framework is shown in the following figure:

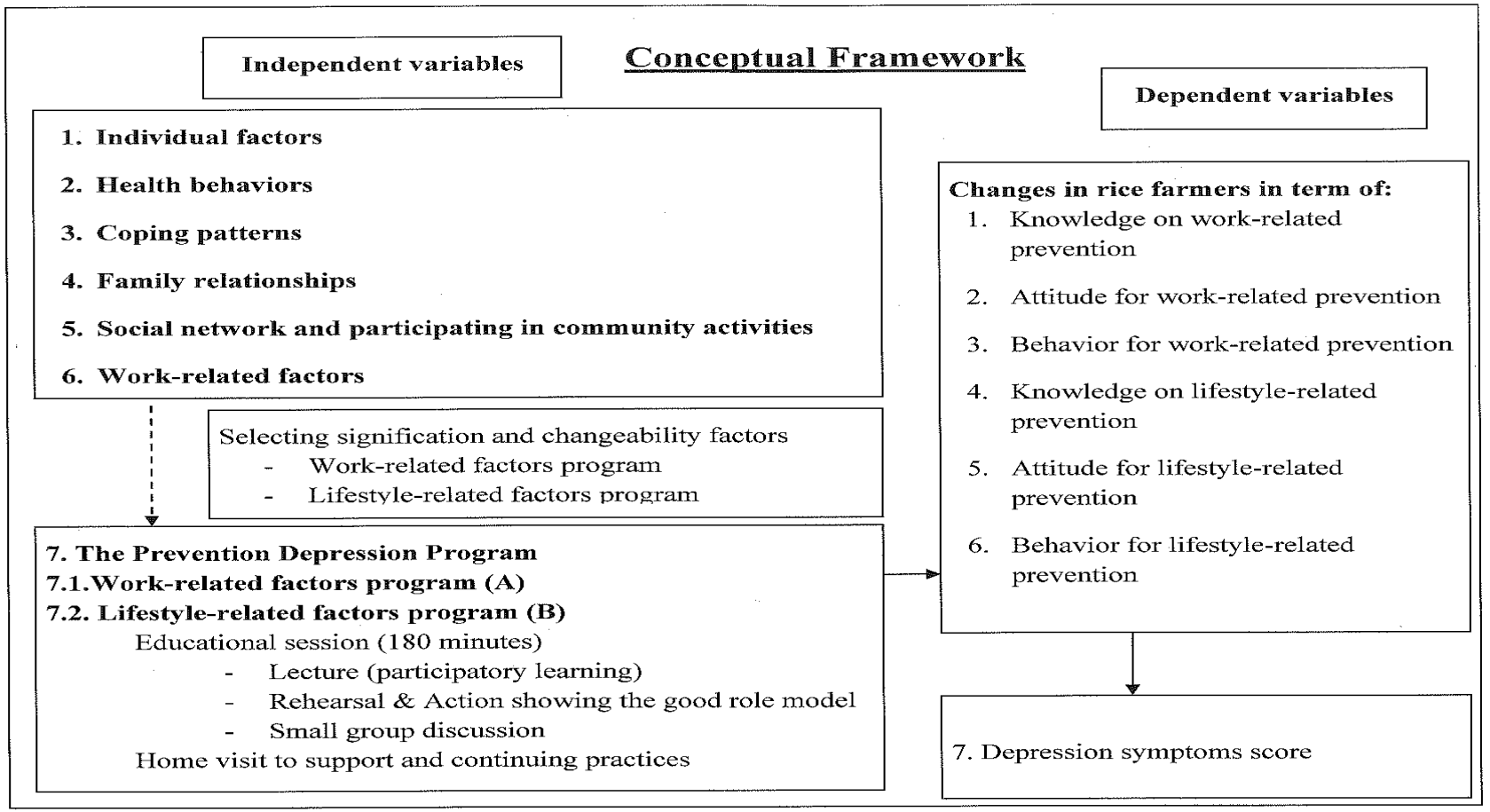


Figure 2-4. Conceptual Framework

CHAPTER III
MATERIALS AND METHODS

This chapter describes the research methodology approaches adopted in this study. These consisted of research design, population and sample size, research instruments, a depression prevention program for rice farmers in Thailand, data collection and data analysis.

This study used intervention. Its plan has three phases. Phase I is to find the prevalence of depression and its related factors. Phase II is to develop an intervention program by selecting the best predictive and changeable factors among the results of Phase I. Phase III is implementing and evaluating the intervention program.

Research Design

Research Design

The design of the current study was based on the research procedure divided into the three main phases: (1) the preliminary study (cross-sectional survey), (2) program development, preparation and planning phase, and (3) implementation and evaluation phase. First, the preliminary study was taken to examine the prevalence and factors related to depression symptoms. The best predictors should be selected to consider in detail to determine the program priorities and also to foster, detect and formulate the new program. Second, the program development was developed using information from Phase I, the review literature and consulted stakeholders performed parallel with preparation and planning to implement. The strategies of the program were created based upon the application of the Social Cognitive Theory (Bandura, 2004). Third, the program implements and evaluates the outputs and outcomes of the program. All research procedures were presented in Figure 3-1.

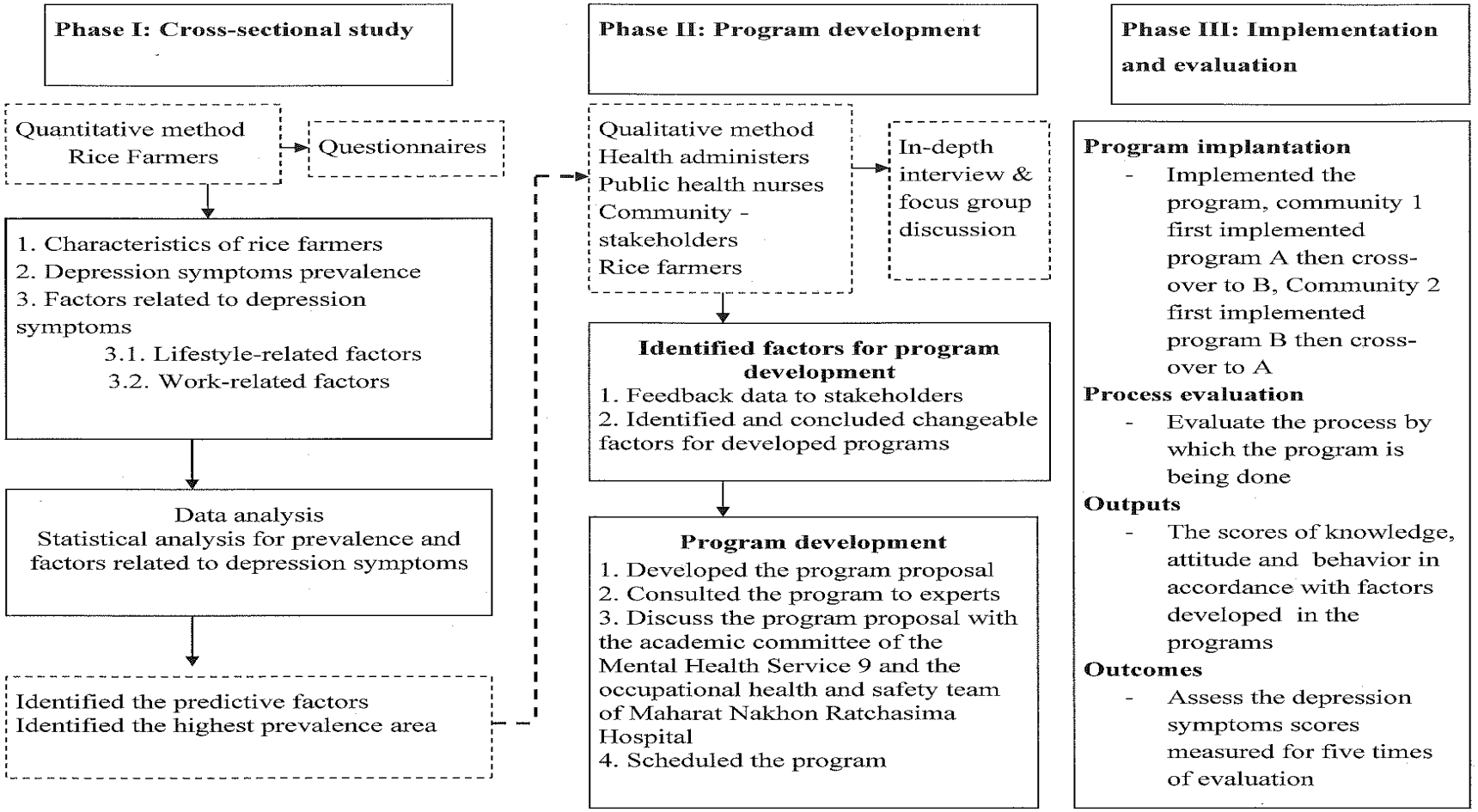


Figure 3-1. The diagram of the research design and procedure

Duration of Study

The period of data collection of the research, the duration of the research of all processes, were used for 16 months. The researcher started operations after approval by the Human Research Ethics Committee, Faculty of Public Health, Mahidol University. Data collection periods were divided into 3 phases as follows:

Phase I: Cross-sectional study was performed for 4 months.

Phase II: Program development, preparation and planning took 6 months.

Phase III: Program implementation and evaluation was performed for 6 months.

In each phase, the participants, instruments, data collection, and data analysis are described in detail. The three phases are presented as follows:

Phase I: Cross-sectional study

This phase explored the prevalence of depression symptoms among rice farmers. To determine the risks and protective factors, the cross-sectional study design was done based upon the NIOSH Job Stress Model (NIOSH, 1988). In this study, the potential predictive factors for depression among rice farmers were composed of 1) individual factors such as age, gender, and educational level, 2) non-work factors or lifestyle-related factors such as health behaviors, and family relationships, 3) buffer factors such as coping patterns, social network and support from the community, and 4) work-related factors such as work conditions and work environments. The quantitative method was used and the procedures for data collection are described below.

Population and Sample size

Subjective area is the one where the Center for Mental Health Services 9 provides its service. The Center is one of the academic centers to promote and support the mental health of the people. The area has the highest prevalence of depression patients in Thailand by the zoning of the Ministry of Health. The area consists of 4 provinces; Nakhonratchasima, Buriram, Chaiyaphum, and Surin.

Population

The target population of this study is rice farmers who live at the subjective area, which are at risk of depression, totaling 552,140 (National Statistics, 2013).

Table 3-1: The target population of this study

Province Name	Number of farmers (persons)
1. Nakhonratchasima	202,160
2. Chaiyaphum	124,134
3. Buriram	119,737
4. Surin	106,109
Total	552,140

Sample Size

Sample size for the cross-sectional study was calculated by the following formula (Daniel, 1999):

$n = n_{SRS} \times D.E.$

n_{SRS} = sample size that comes from Simple Random Sampling (SRS)

n = Adjusted sample size from multi-stages random sampling by D.E. (Design Effect). The formula to calculate the sample size was used to estimate the proportion of the sample size for one group.

$$n_{SRS} = \frac{n_0}{1+\frac{n_0}{N}}, \qquad n_0 = \frac{Z^2_{\alpha/2}\,\pi(1-\pi)}{d^2}$$

N = size of population (552,140)

n_{SRS} = sample size that comes from simple random sampling

$Z_{\alpha/2}$ = percentile value (100 - $\alpha/2$)% under the normal curve

set at 0.05.

π = proportion of depression, due to no data of pilot study of the study area, therefore the researcher used the proportion of research studies of depression in

fruit and vegetable farmers. Assessed using the CES-D Scale (a tool similar to be used in this study) at Prachuap Khiri Khan Province in 2013 that has an estimate of 37 percent depression.

d = precision of estimation = $|P-\pi|$ is the statistical discrepancy between the estimated P values deviated from the parameters, set at 0.05.

$$n_0 = \frac{(1.96)^2(0.37)(1-0.37)}{(0.05)^2} = 358.19$$

$$n_{SRS} = \frac{358.19}{1+\frac{358.19}{552{,}140}} = 357.96 \approx 358$$

Size of design effect indicated the influence of a multi-stage random sampling. Design effect is the ratio between the variance of variables that was obtained by variance multi-stage sampling compared with the variability of the variable from a variance of simple random sampling (SRS) (Daniel, 2005).

$$\text{Design effect} = \frac{Variance(Multi-stage)}{Variance(SRS)}$$

This research cannot calculate the design effect by a pilot survey. It has to be estimated by the nature of research problems. The rate of depression in each area may have a high value difference. Design effect is set at 2.5. The sample size is calculated.

n = Design effect x n_{SRS}

= 2.5 x 358

= 895 persons

With a sample size of 895 people adding 20% to prevent the missing cases, the minimum sample size of this study sums up to 1,074 people. Selecting the

population is done by the responsibility of the Center for Mental Health Services 9. The multi-stage sampling is used. One province is selected from the 4 provinces.

Sample: Participants are recruited from the areas by using multi-stages random sampling. Respondents are asked to be interviewed by a questionnaire to assess eligibility for entry into the study.

Random sampling method: Initially, four provinces where more than 25% of out-patients suffer from depression were farmers selected as the potential subjective area.

Multi-stages random sampling was then used to select the study population using the following steps:

First, one province was randomly selected out of four provinces in the subjective area.

Second, four districts were selected out of 32 districts in the selected province.

Third, two sub-districts were selected from each district.

Fourth, three villages were selected from each sub-district.

Fifth, three blocks were selected from each village.

Finally, fifteen households were selected in each block.

In total, 1,080 households were selected in the province (Extract ratio =0.135%) based on complex survey sample size calculation with design effect (2.5).

Inclusion criteria: The criteria for this step are:

1. Rice farmer participants aged 20-years-old or more
2. Working duration at least 5 years as a farmer
3. Willing and be able to participate in the study

Exclusion criteria: The criteria for excluding participants from this step are:

1. Rice farmer participants who were diagnosed as depression disorder or who were on medication for mental disorders.
2. Rice farmer participants who have difficulties communicating in Thai.
3. Rice farmer participants who are not available at the time of data collection.

Research instruments

The factor related to depression symptoms questionnaire (Appendix B) was developed based upon the concepts, theories and literature related to depression prevalence that is presented below.

Personal factors

Personal factors included 12 items. They were gender, age, marital status, highest education level, diseases, psychiatric disorder in family history, prescribed medication, number of family members, alcohol consumption, smoking, sleeping hours and exercise habit.

Depression symptoms

The depression symptoms were measured using the Thai version of the Center for Epidemiologic Studies Depression Scale (CES-D). It is a brief, self-reporting questionnaire designed to measure the current state of depression in epidemiological research and has been widely used among the Thai population with good reliability and validity (Lotrakul & Sukanich, 1999). The CES-D has been widely used and shown to have satisfactory validity and reliability in previous research in Thailand (Ross et al., 2005; Ratanasiripong et al., 2015; Charoenpaitoon et al., 2012) with alphas of .80 to .91. It is comprised of 20 items. Each item has four response categories on how often the respondents have experienced the depression symptoms during the past week: (0) never (less than 1 day), (1) sometimes (1-2 days), (2) frequently (3-4 days) and (3) always (5-7 days). Total scores were calculated. The cut-off point of other studies varied depending on objectives of each study; for example, the study for evaluating the effects of physical exercise on depression among Thai nursing students, used a cut-off point of 16.

In this study, a cut-off point of 16 was used based on the original scoring criteria (Radloff, 1997). Respondents with the total score of 16 and more were defined as having depression symptoms.

Health behaviors

To evaluate health behaviors, five items using a three-point Likert scale was used in which 0 points was “disagree”, 1 point was “neutral”, and 2 points was “agree”. The items were: concern about health, eating healthy food, observing

abnormal physical or mental symptoms, doing sanitary care to house environment and annual checkup.

Family relationships

The family relationships were developed based on the family relationship theory of Friedman (Friedman, et al., 2003). They consisted of ten items. A three-point Likert scale was used in which 0 points was “disagree”, 1 point was “neutral”, and 2 points was “agree”. The items were: love and care (i.e., get a close and warm caring expression, showing love), family relaxation (i.e., using leisure time together, doing the same interest together), mutual respect (i.e., concerning problems of family, showing respect or concern for each other) and cohesion or harmony in the family (giving and sharing, knowing the favorite things of members).

Coping patterns

Coping patterns were developed based on the stress coping concepts (Folkman & Lazarus, 1980; Carver et al., 1989). They consisted of nine items. A three-point Likert scale was used in which 0 points was “disagree”, 1 point was “neutral”, and 2 points was “agree”. They measured emotional-focused coping (i.e., talking about problems to close ones), problem-focused coping (i.e., solving the problem completely by oneself), and social support (i.e., feeling hesitant to ask for help from others, interest of family in talking with me and having someone to consult with).

Social network and participation in community activities

These items were developed based on the perceived social support concepts (Lowe, 2015; Cutrona & Russell, 1987) and partially modified to support Thai culture. They consisted of nine items. A three-point Likert scale was used in which 0 points was “disagree”, 1 point was “neutral”, and 2 points was “agree”. They measured attachment (having community integration and having conflict with neighbors), social integration (joining the community activities and being the member of a group or the volunteer for the community), reliable alliance (getting information from the community and having the leisure time with others in the community), reassurance of worth (being accepted in the community) and assistance/guidance (getting the assistance or guidance support from the community and getting help from the community).

Working conditions

Working conditions consisted of seven items. They were: duration of work as rice farmers, accidents from work, chemical substances used and ways of exposure to chemical substance (mixing, spraying, in area using chemical, washing chemical containers or spraying equipment).

Working environments

Items on working environments consisted of 20 items. A three-point Likert scale was used in which 0 points was "disagree", 1 point was "neutral", and 2 points was "agree". Physical environments (5 items) were appropriate lighting, loud noise machines, dust and smog, hot or heat environment and awkward positions. Biological environments (5 items) were hand washing, using boots, poisonous animals and poisonous weeds. Chemical environments (5 items) consisted of health risks of chemical poisoning at the worksite, health protecting behaviors for chemical hazards, and health risks for chemical poisoning in the living environment. Psychosocial environments (5 items) consisted of job demand and control, uncertain external conditions, work-related financial hardship, being honored and being appreciated by society and having support from related governmental organizations to improve the products.

Content validity: A panel of 4 experts (Appendix A) measured the content validity of the questionnaires. The experts included 2 policy makers for workers' health (occupational health = 1 person, mental health = 1 person), 1 psychiatric specialist and 1 occupational health nurse. If any item was rated with the score of less than 3 by any expert, that item was cut from the questionnaire and if any item was rated with the score of 3 by any expert, that item sentence was revised in accordance to the main concept of measure and made easier to understand. Content validity testing, Content Validity Index (CVI) was analyzed, it was 0.91 (Appendix B).

Reliability: A preliminary test was done to examine the validity and reliability using 30 rice farmers with similar characteristics as the participants. The purpose was to check the correctness of the statements and to evaluate the time used for answering the questionnaires. They accepted and understood the question items. For internal consistency reliability testing, Cranach's alpha coefficient was analyzed. All scales had good levels of internal consistency as presented below.

Table 3-2. The reliability of research instruments Phase I

Instrument Phase I	Items	Reliability (α)
1.Depressive symptoms (CES-D)	20	0.85
2. Health behaviors	5	0.85
3. Family relationships	10	0.86
4. Coping patterns	9	0.72
5. Social network and participation in community activities	9	0.73
6. Work condition	5	0.79
7. Work environments		
Physical environment	5	0.75
Biological environment	5	0.87
Chemical environment	5	0.71
Psychosocial environment	5	0.71

Data Collection process

The researcher will collect the data manually. The data collection processes are described as follows:

1) The research project started to collect data after receiving approval from the Committee of Human Ethical Research, Faculty of Public Health, Mahidol University.

2) Submitted the permission letter to the administrator of the Provincial Health Office and the sub-district health promoting hospital board. To clarify the purpose of the research study and attached questionnaires in consideration for permission to collect data. Liaison officers and hospital board to seek cooperation and appropriate timing of data collection.

3) The factors related to the depression symptoms questionnaire and CES-D questionnaire were used by the researcher and two trained research assistants, who are nurses and have served the community for at least one year with the knowledge and skills to work with the community to assist in data collection. The researchers collected data in the eight sub-districts. A random sampling technique was used for selecting farmers, both men and women, in the villages. The number of participants

will be 135 people per sub-district (eight sub-districts), totaling 1,080 people. Then set the meeting and introduce the research study to the participants, explaining the purposes of the research and requesting their cooperation in answering the questionnaires and the activities later on (if they were selected to be participants in the program). Also the consent and rights of research participants were described with an opportunity to ask what was not fully understood.

Analyzing results of prevalence and factors related to depression symptoms

In this cross-sectional phase, Chi-square statistics analysis was used to test the degree of association between depression symptoms and factors. The variables were divided into two groups based on cut-off score by mean or median. The variables using the Likert scale were divided into "No" (neutral + disagree) or "Yes" (agree) considering the frequency of each item. The dependent variables were "no depression symptoms" and "having depression symptoms" based on the cut-off score of CES-D.

The potential factors for predicting depression symptoms were selected from the variables that showed the results of the univariate analysis indicated statistically significant difference in the prevalence of depression symptoms at mild and more (CES-D score at 16 and more) with males or females.

Multiple linear regression analysis was used to examine the factors associated with depression symptoms.

Phase II: Program development, preparation and planning

This phase consisted of the program development with experts and stakeholders, the preparation for entering the field and program planning. The methods, participants, instruments, data collection and data analysis are described in detail as follows:

Program development

Program development was developed by selecting the best predictor and changeable factors among the results of Phase I, findings of the review literature, drafting the proposal program and its necessity to integrate the voices and participation

of all sectors in selecting the changeable factors and formulating the proposal program. Effective depression prevention intervention should include the target group and community education through local health workers and volunteers who are familiar with community culture and experiences in available support services and facilities for the appropriate prevention and management of the program. The in-depth interview and focus group discussion were organized and undertaken for 26 participants to develop core contents and strategies on the depression prevention program.

Participants

In-depth interviews: Subjects totaled 12 people. Methods to acquire a specific random sample will divide into 3 groups.

1. Top management policies and planning for mental health service. One person is chief of the Department for Promotion of Mental Health at the Center for Mental Health Service 9. One person is an expert occupational health nurse at the Maharat Nakhon Ratchasima Hospital. Two people are directors of Sub-district health promoting hospitals (one per each hospital).

2. The public health nurse works on the home visit team and provides health care services to serve farmers in the community which are selected by two PHN by using purposive sampling (one person each from a health promoting hospital).

3. Rice farmers who have a depression score between 16-29 points to include six people (three people per village), selected by using purposive sampling.

Focus group discussion totaled 14 people, divided into two groups.

Group 1: Public health providers who provided home visits and health services for working groups in the community. Selected by using purposive sampling and a combination of 4 members representative from Sub-district health promoting hospitals (2 per each hospital).

Group 2: Stakeholders who are involved in mental health service in the community including two representative farmers in the community whose level of depression is normal (<16 points), two representative community leaders, two representative village health volunteers, two representative active people in the

community, one official environmentalist and one community developer, totaling 10 people, selected by using purposive sampling.

Instruments

Questions guideline for focus group discussion among stakeholders

The questions guideline for assessing congruent problems is found in Phase 1 for current mental health services and concludes with a major activity that fits with the area problem, 1 activity per each program (work-related program and life style-related program). There are 2 groups for focus group discussions, therefore the questions guideline for each group includes:

1). Questions guideline assesses public health nurses. To assess mental health problems of their population and their current mental health service in the community and to make the consensus conclusion for 1 activity per 1 program that is suitable and applicable for the context of their community based on the results of the cross-sectional study in Phase 1.

2). Questions guideline for assessing stakeholders who are involved in a mental health service in the community. The questions consist of the community concern, the situation of depression in the community, management systems such as barriers, and supporters if the program will be implemented. To make the consensus conclusion for 1 activity per 1 program that is suitable and applicable for the context of their community based on the results of the cross-sectional study in Phase 1.

Questions guideline for in-depth interviews

The questions guideline consists of the community concern, the situation of depression in the community, management systems such as barriers, and supporters if the program will be implemented.

Data collection processes

1). In-depth interviews

Asking the Graduate School Officers for the permission letter and send it to related organizations to conduct research and collect related information for the depression prevention from participants. In-depth interviews with key stakeholders of 12 members comprising of:

Group 1: Top management policies and planning for mental health service. One person is chief of the Department for Promotion of Mental Health at the Center for Mental Health Service 9. One person is an expert occupational health nurse of Maharat Nakhon Ratchasima Hospital. Two people are directors of Sub-district health promoting hospitals (one per each hospital).

Group 2: The public health nurse works on the home visit team and provides health care services to serve farmers in the community which are selected by two PHN by using purposive sampling (one person from each health promoting hospital).

Group 3: Rice farmers who have a depression score between 16-29 points to include six people (three people per village), selected by using purposive sampling.

In-depth interviews aim to analyze the situation of mental health and depression among rice farmers for both the lifestyle-related factors and working-related factors. They assess the problems encountered in the area of the research study and whether it is consistent with the official findings of the mental health services in the area. Interviews show the consistency of the problem and its causes are found in accordance with the policy and activity plan for mental health services and gaps in the provision of mental health services in the past for informal workers, particularly rice farmers in the community. The information was used to develop a preventive depression program for rice farmers. In the situation where it was not easy to interview a participant face-to-face, the researcher used a telephone interview. In the interview, the researcher conducted interviews on their own. The in-depth interviews were conducted in a private place at the work office or community unit and each interview lasted between 30-45 minutes. The participants in the research had the purpose and interview process clarified, and had voluntarily provided such information and rights of the participants in research interviews, including permission to record the interview to analyze data.

2). Focus group discussion

Asking the Graduate School Officers for the permission letter and send it to related organizations to conduct research and collect related information for the depression prevention from participants. Samples in the group total 14 people divided into two groups:

Group 1: Public health nurse practitioners who provided home visits and health services for working age groups in the community with discussion on evaluating operations and exchange problems encountered in step 1 of the cross-sectional study and evaluation of the public health nursing practice in the field of mental health promotion and prevention of depression among rice farmers, the problems and appropriate solutions in practice.

Group 2: Group of stakeholders in the community, including rice farmers at the normal level of depression (<16 points), community leaders, village health volunteers, one official environmentalist and a community developer. Discuss purposes to present the problem of depression found in the community and finding the appropriate solutions to solve the depression problem.

The participants in the research had the focus group discussion process clarified, had voluntarily provided such information and rights of participants in research discussions, including permission to record the interview to analyze data.

Analysis and interpretation of data

The data from the in-depth interview and focus group discussion results were also analyzed and interpreted by using a content analysis method. The in-depth interview and focus group discussion were the need assessments that were utilized in order to allow researchers to confirm the results of the cross-sectional survey and obtain more detailed information to develop the programs.

Procedures to develop the depression prevention program

The procedures to develop the depression prevention program were as follows:

1. The situation of depression symptoms prevalence, the magnitude and severity of the problem, and factors causing depression symptoms were reported to the two community stakeholders and rice farmers, the academic committee of the Center of Mental Health Service 9 and the occupational health and safety team of Maharat Nakhon Ratchasima Hospital. All participants agreed that depression has been an important problem for rice farmers and that this problem should be addressed then set as a priority of problems, and that predictive factors from Phase I results should be

changed to first consider each one of the work-related factors and lifestyle-related factors.

2. The first draft of the depression prevention program was developed by the researcher as a proposal and discussed by the academic committee of the Center of Mental Health Service 9 and the occupational health and safety team of Maharat Nakhon Ratchasima Hospital. They agreed with the depression prevention program.

3. Consulted on the depression prevention program with five experts from a mental health administration, mental health services, occupational health specialist, and mental health educator (Appendix A) in order to consider the contents and instruments for evaluation of the programs.

4. Rice farmers were identified to be included in the program because the data from the situation indicated that rice farmers were at risk for depression and rice farmers would obtain benefits from the depression prevention program. They agreed with the date, duration, and time for organizing the prevention and education program for prevention. Also, they agreed with the content of the project which consisted of both theoretical and practical parts.

5. After the researcher adjusted the draft of the depression prevention program according to the recommendations, the second draft of the programs were proposed and confirmed by the academic committee of the Center of Mental Health Service 9 and the occupational health and safety team of Maharat Nakhon Ratchasima Hospital. They all absolutely agreed with the program. Chief of the Department for Promotion of Mental Health at the Center for Mental Health Service 9 and the occupational health nurse of Maharat Nakhon Ratchasima Hospital stated in the same way that the depression prevention program was a suitable program for rice farmers and it was consistent with the policy of health services.

As prevalence and factors related to depression symptoms found to be different based on gender, two programs, work-related which is a predictive factor among males and lifestyle-related which is a predictive factor among females, were developed based on the voice of the community and feasibility. However, in the real situation, they both faced the same risk factors. The education program for both genders may benefit from participants learning the processes. In addition, two programs do not have contrary effects on each other. Each program can be useful for

male and female participants. Therefore, in Phase III of this study, two programs were intervened for both male and female participants using cross-over design.

Phase III: A randomized controlled trial (two-ways cross-over design)

Participants

Population of the study for this step are rice farmers who have a depression score between 16-29 points (risk group) in the two communities with a high prevalence for a depression risk group from the cross-sectional survey in Phase I. Two sub-districts from two districts in Nakhon Ratchasima Province, Thailand, where the rice farmers showed high prevalence of depression symptoms were selected based on our preliminary study (Hanklang et al., 2016).

A total of 568 recruited cases, whose age was at least 20 years, have a working duration of at least 5 years and were Thai, participated in a screening examination for depression symptoms using the Center for Epidemiologic Studies Depression Scale (CES-D) (measuring time E1). Cases of a depression state with a CES-D score of 30 or more were introduced to a primary care hospital for intensive screening. Thus, 203 subjects with a CES-D score of 16-29 were defined as having mild-to-moderate depression symptoms.

Participants in this study were also required to have a sufficient level of education to understand study procedures and be able to communicate with researchers or site personnel. They were excluded if they had a history of psychiatric diseases, had ever taken any anti-depressant medication, had symptoms or illnesses that limited activity or had participated in any education program for chemical intoxication prevention or improving communication skills during the previous 6 months. Consequently, 96 subjects agreed to participate in a trial of the program and signed a written informed consent.

The depression symptoms were re-evaluated and eventually confirmed just before starting the program (measuring time E2). Finally 92 rice farmers served as the participants.

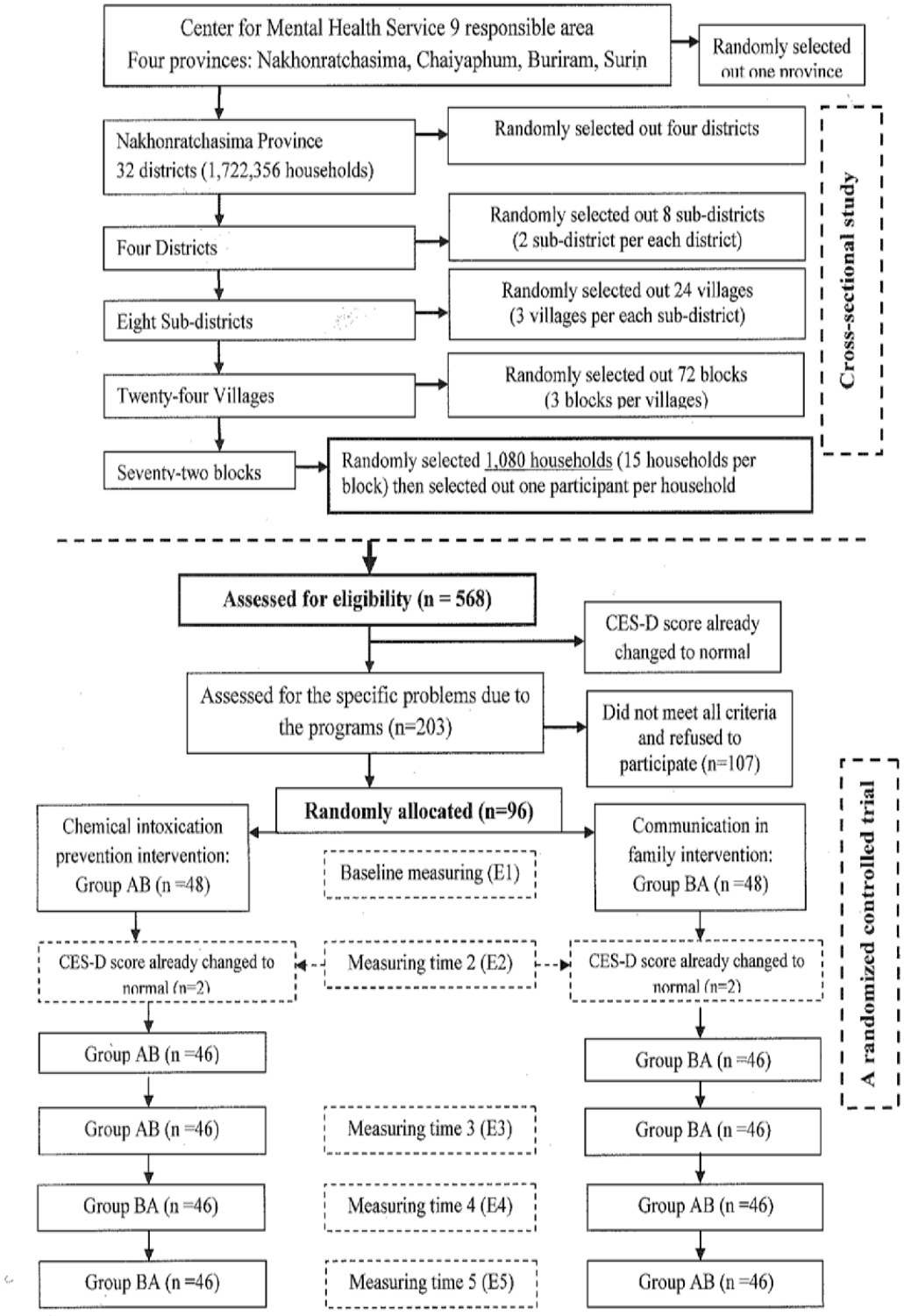


Figure 3-2. Flow chart of the study participants

There were two interventions in this study. The one was the chemical intoxication prevention intervention program and another was the improving communication skills in the family intervention program. The wash out period between two interventions is always necessary to avoid the effects of the first intervention program on the second intervention program. In this study, however, it was unethical to ask participants to cease the activity accustomed to in the first intervention after finishing it. Corresponding to this situation, the wash out period between the two interventions was not set in this study. This means that the second intervention program had the possibility to be effected by the activity in the first intervention program. However, there was a 1-week pause to measure variables at the end of the first intervention. The characteristics of the two groups were matched to allow direct comparison and minimize/control the effects of possible confounding factors, and thereby provide the study with a strong internal validity.

Two weeks before the implementation, participants in both groups were CES-D tested, and knowledge, attitudes and behaviors related to the program were tested also.

One week before the program, they were tested again for the baseline measure. The 1st week was an education session activity-based depression prevention program. Simple random for ordering the sequencing of the programs was used; for example, the Group A program to prevent depression focusing on preventive chemical risk factors (first) and the Group B program focusing on preventing depression by improving communication skills (first).

The village health volunteers followed up with the rice farmers in weeks 2nd–4th of the intervention to support activities and helped with any problems of the rice farmers during their practice at home or working in the field.

In weeks 5th–6th participants practiced the activities to prevent depression symptoms by themselves.

Week 7 was used to evaluate the results of the first program of each group by using the same set of questionnaires.

In weeks 8st–13th the program was switched from the first group to the second group; the second group was given the program that was used in the first group.

Week 14th measured the total program.

The groups in each community had the interventions in a different order. The first intervention was randomized in each group. This is demonstrated in the following table.

Table 3-3. Implementation of 2-group cross-over design

Community 1 (AB)	Community 2 (BA)
Chemical intoxication prevention program (A, time 1)	Improving communication skills in family program (B, time 1)
Improving communication skills in family program (B, time 2)	Chemical intoxication prevention program (A, time 2)

Measures at the end of the first intervention program

Measures at the end of intervention 1 were conducted within 1 week after completing the chemical intoxication prevention program for community 1, and the improving communication skills in the family program for community 2. The variables were the same as the ones collected at the baseline. This allowed for measuring the effects of the individual intervention programs by comparing data at the end of intervention 1 with ones at the baseline. Using the matched-pair groups allowed for comparing the effectiveness of the intervention program between the two groups easily.

Measures at the end of the 2 intervention programs

These measures were conducted within 1 week after completing the improving communication skills in the family program for community 1, and the chemical intoxication prevention program for community 2. The variables were the same as the ones at the collected baseline. This provided information to assess the effects of the combined intervention programs and also any effects related to the order of an individual intervention. The overall study design and measuring time was presented in the next table.

Table 3-4. The implementation and measuring time of programs

Phase	Pre-interventions			Interventions									Post-intervention
Week	1	2	3	1 (First day)	1	2	3	4	5	6	7	8 (First day)	8	9	10	11	12	13	14
Group 1					Implementation of the chemical intoxication prevention program (A)				**Practice by themselves**				Implementation of the improving communication skills in family program (B)				**Practice by themselves**		
Group 2					Implementation of the improving communication skills in family program (B)								Implementation of the chemical intoxication prevention program (A)						
Measuring time for CES-D	Baseline measure (E1)			Just before implement: Measuring time 2 (E2)							End of the first intervention: Measuring time 3 (E3)	Just before implement: Measuring time 4 (E4)							End measure of both Interventions: Measuring time 5 (E5)
Measuring time for Knowledge Attitude Behavior	Baseline measure (E1)			Just before implement: Measuring time 2 (E2)							End of the first intervention: Measuring time 3 (E3)	Just before implement: Measuring time 4 (E4)							End measure of both Interventions: Measuring time 5 (E5)

Instruments for program evaluation

There is no suitable scale to evaluate the change in knowledge, attitude and behavior of farmers. In order to clarify the effectiveness of the programs, we have made the question items on chemical intoxication prevention and on communication skills in the family in this study.

Personal, working and communicating factors

Personal factors included 6 items. They were gender, age, marital status, highest education, diseases and family income.

Working factors included 6 items. They were frequency of using chemical substances, ways of exposure by mixing, spraying, and being in the area using chemical substances, using PPE and chemical poisoning symptoms. In this study, long sleeve shirts, long pants, masks and gloves were determined as the PPE.

Communication factors were both good and bad communication in the family. The question item, "How do you think about your communication in the family?" was asked. The respondents were allowed to select multiple answers from the examples. For the good communication, 4 examples, with satisfaction, joyfully, understandingly, and in kind terms, were provided. For the bad communication, 4 examples, with unsatisfactorily, joylessly, heartlessly, and in negative terms, were provided. In this study, the number of good communication and one of the bad communication were used as indices of the communication.

Depression symptoms

The depression symptoms were measured using the Thai version of CES-D-20 items; the same questionnaire in the first phase.

Chemical intoxication prevention

The chemical intoxication prevention scale was developed based on the Social Cognitive Theory (Bandura, 2004), and relevant review literature on farmers' risks on chemical use in terms of knowledge, attitude and behavior was measured.

Knowledge of chemical intoxication prevention was measured using 17 items including: characteristics of chemical substances (3 items), entry route to the body (3 items), chemical toxicities (3 items), chemical intoxication prevention (4 items) and fitting test for PPE use (4 items). The answers had 3 choices; correct, wrong and don't know.

Attitude on chemical intoxication prevention was measured using the following 10 items; the expectation of a good outcome for health if they do a good behavior for chemical intoxication prevention (for example, use of PPE). The answers used 3 Likert scales; disagree, neither agree nor disagree, and agree.

Behavior of chemical intoxication prevention was measured using 16 items including: reading the chemical instruction (1 item), following the chemical instruction (1 item), checking the equipment for chemical substances (1 item), wearing thick plastic hand gloves, chemical mask, long sleeve shirt/trousers, long boots, goggles against chemical substances (8 items), doing the fitting test (1 item), washing hands (1 item), taking a shower (1 item), washing the clothes separately from ones used for chemical substances (1 item), and no entry to the area where chemical substances were used (1 item). The answers used 3 Likert scales; never, sometimes, and always.

Communication skills in the family

The communication skill on the family scale was developed based on the Social Cognitive Theory (Bandura, 2004), and relevant review literature on the farmers' communication behaviors in the family in terms of knowledge, attitude and behavior was measured.

Knowledge of communication skills in the family was measured using 15 items: significance of communication in the family (3 item), active listening (2 items), appreciation/admiration in the family (4 items), good questioning (3 items) and assertiveness for communication in the family (3 items). The answers had 3 choices: correct, wrong, don't know.

Attitude on communication in the family was measured using 15 items: active listening (5 items), appreciation/admiration in the family (4 items), good questioning (5 items), and assertiveness for communication in the family (1 item). The answers used 3 Likert scales: disagree, neither agree nor disagree, and agree.

Behavior on communication in the family was measured using 16 items: the frequency of behaviors on active listening (3 items), appreciation/admiration in the family (5 items), good questioning (5 items), and assertiveness for communicating in the family (3 items). The answers used 3 Likert scales: disagree, neither agree nor disagree, and agree.

Validity and reliability of research instruments

Content validity: A panel of 4 experts measured content validity of the programs and evaluation program questionnaires. The experts included two occupational specialists, one psychiatric specialist and one mental health nurse specialist. For content validity testing, CVI was analyzed; for chemical intoxication the scale was 0.90, and for communication skills in the family the scale was 0.87 (Appendix B).

Factor analysis (principle component analysis) was used to extract factors in each scale for reduction of an unnecessary item. The standardized factor loading value of 0.4 and more was used to select the items (Hair, 1998; Tabachnick & Fidell, 2007).

Table 3-5a presents the results of component analysis using 43 items on chemical intoxication prevention. There were 3 components. The first component was comprised of 16 items. They were the items on behavior and had a standardized factor loading value of 0.4 and more in the first component. The scale on behavior was then made using 16 items included in the first component. The second component was comprised of 12 items. There were two items on knowledge and 10 items on attitude. Although the 10 items on attitude had a standardized factor loading value of 0.4 and more, the two items on knowledge did not have such values. Thus, the scale of attitude was made using 10 items on attitude included in the second component. The third component was comprised of 15 items. They were the items on knowledge. Because three items had the standardized factor loading value of less than 0.4, the scale on knowledge was made using 12 items on knowledge included in the third component.

Table 3-5b represents the results of the component analysis using 46 items on communication skills in the family. There were 3 components. The first component was comprised of 5 items on attitude and 16 items on behavior. Although the 16 items on behavior had a standardized factor loading value of 0.4 and more, the two items on attitude did not have such values. Although the remaining 3 items on attitude certainly had the standardized factor loading value of 0.4 and more, they were asking the ability to exhibit a behavior. Because our items on practice were asking the frequency of exhibiting a behavior, these 3 items were not included for making the scales on behavior. Thus, the scale on behavior was made using 16 items on behavior included

in the first component. The second component was comprised of 15 items on knowledge. Because 5 items had the standardized factor loading value of less than 0.4, the scale of knowledge was made using 10 items on knowledge included in the second component. The third component was comprised of 10 items on attitude. Because 1 item had the standardized factor loading value of less than 0.4, the scale of attitude was made using 9 items on attitude included in the third component.

Table 3-5. Results of component analysis on question items

a) Question items on chemical intoxication prevention

Content	Component		
	1	2	3
Meaning of chemical substances (K)	.154	-.030	.399
Types of chemical substances (K)	-.165	.003	.694
Type of chemical toxicity (K)	.167	-.008	.563
Entry routes of chemical substances to the body (K)	-.039	-.092	.671
Spraying downwind makes entry of chemical substances easier (K)	.118	-.099	.501
Eating during work causes of chemical substances (K)	-.025	-.160	.402
Acute (30 minutes/more) poisoning depends on amount of entered substance (K)	.237	-.243	.171
High dose and direct exposure cause acute poisoning (K)	.081	-.381	.348
Signs and symptoms of chemical poisoning (K)	-.133	-.277	.453
Using PPE prevents enter of chemical substances to body (K)	-.103	.024	.540
Requiring thick plastic hand gloves to prevent chemical intoxication (K)	-.152	-.103	.632
Separately washing clothes for using chemical substances with detergent (K)	-.226	.036	.489
Washing hands (K)	-.067	.014	.472
Doing fitting test is important (K)	.197	-.026	.386
Checking the air leakage from the mask is a fitting test (K)	.116	-.320	.536
Doing fitting test before using chemical substances (K)	-.073	-.052	.762
Appropriate PPE size is important (K)	-.047	.083	.325
Following the chemical instruction reduces the risk of chemical exposure (A)	.117	.606	-.092
Wearing a long sleeved shirt/ pants to protect the skin (A)	.110	.538	-.045
Wearing thick plastic hand gloves to prevent entry of chemical substances from skin (A)	-.143	.560	-.048
Wearing a gas protective mask to protect the respiratory tract (A)	.111	.678	.078
Using PPE during all working processes to reduce risk against chemical exposure (A)	-.031	.629	-.225

Table 3-5. Results of component analysis on question items (cont.)

a) Question items on chemical intoxication prevention

Content	Component		
	1	2	3
Using PPE to prevent poisoning symptoms (A)	-.047	.590	-.001
Using PPE to reduce entry of chemical substances to interfere neurotransmitters (A)	-.004	.783	-.110
Washing hands to reduce entry of chemical substances to interfere neurotransmitters (A)	-.046	.720	.069
Doing fitting test to prevent entry of chemical substances into the body (A)	-.080	.773	-.096
Using correct PPE reduce depression (A)	.147	.599	-.015
Reading chemical instruction (B)	.731	.145	-.122
Following the chemical instruction (B)	.752	.204	.015
Checking the equipment for chemical substances (B)	.670	.050	-.175
Wearing gas mask during preparing substances (B)	.785	.064	-.006
Wearing thick hand gloves during preparing substances (B)	.721	.072	-.135
Wearing long sleeve shirt (B)	.496	.104	-.347
Wearing long trousers (B)	.794	.002	-.103
Wearing long boots (B)	.784	-.121	-.021
Wearing gas mask during spraying (B)	.653	.006	.023
Wearing thick plastic hand gloves during spraying (B)	.671	-.085	.173
Wearing goggles (B)	.646	.133	.203
Doing fitting test of PPE (B)	.707	.003	.173
Washing hands (B)	.806	-.025	-.040
Taking a shower (B)	.703	-.157	-.117
Washing the clothes separately from ones used for chemical substances (B)	.610	-.033	-.014
Not entering the area where using chemical substances (B)	.548	-.143	-.033

Table 3-5. Results of component analysis on question items (cont.)

b) Question items on communication skills in the family

Content	Component		
	1	2	3
Not talking with the family or no understanding family causes depression (K)	.082	.245	-.097
Frustration happens by not talking to each other (K)	-.027	.536	.023
Good communicate makes everyone living together happily (K)	.080	.303	-.027
Active listening is talking with opening ears, eyes, brain and mind (K)	.045	.512	-.153
Active listening is catching up important points (K)	.009	.698	-.058
Saying a good word makes family feel good and proud (K)	-.066	.355	-.174
Admiration for others is the way to be an optimistic person (K)	.045	.534	-.185
Good relationship begins from appreciation of each other (K)	.030	.689	-.006
Appreciation demonstrates a good view toward others (K)	.067	.587	.016
Understanding the implications by good questions (K)	-.223	.604	-.054
Open-ended questions for clearer extension (K)	-.053	.784	-.127
Closed-ended questions for conclusion (K)	-.112	.597	-.070
Saying denials without troubles of others is an assertiveness (K)	-.306	.393	.009
Speaking openly with ignoring the others' feelings causes conflict (K)	-.132	.190	.033
Accepting different opinions is an assertiveness (K)	-.075	.542	.058
Listening actively to what the family said (A)	.334	.033	.485
Recognizing the feelings and needs of the family (A)	.311	.071	.422
Expressing in response to listening or eye contact (A)	.363	-.332	.279
Observing expressions, gestures, tone of speech of others (A)	.539	.074	.273
Catching up the main point of talk (A)	.326	-.139	.353
Admiring the success capabilities and good actions (A)	.400	-.155	.206
Seeing good habits or good things of members (A)	.476	-.178	.378
Improving family relationships by appreciation (A)	.287	-.051	.455
Appreciating others sincerely and consistently (A)	.106	-.271	.745
Using good questions makes understand in family better (A)	-.029	.025	.789
Using open-ended questions to understand in family (A)	-.037	-.214	.632
Using open-ended questions for others to explain thinking (A)	.024	-.125	.682
Using closed-ended questions for clarity or conclusion (A)	-.043	-.246	.666
Taking courage to let others recognize the idea or feeling (A)	-.171	.117	.664
Having ability to deny without breaking relationship (A)	.166	-.016	.051
Listening actively and showing understanding (B)	.648	.109	-.008
Showing respect for the speaker (B)	.571	.074	-.014
Concentrating on listening (B)	.458	-.086	.070

Table 3-5. Results of component analysis on question items (cont.)

b) Question items on communication skills in the family

Content	Component		
	1	2	3
Seeing the pros and expressing the recognition to him/her (B)	.564	.156	-.055
Speaking good words in family (B)	.662	.135	-.115
Admiring both word and manner (B)	.664	.059	-.144
Seeing good self after appreciation in family (B)	.613	.010	-.150
Feeling good and happy admiration in family (B)	.720	.255	-.079
Using open-ended questions to understand in family better (B)	.509	-.048	.160
Using closed-ended question to confirm answer (B)	.467	-.039	.125
Waiting for others to say more before question-out (B)	.598	-.125	.116
Using questions to understand family better (B)	.442	-.041	.086
Balancing closed and open-ended questions (B)	.456	-.211	.046
Taking courage to ask for help if necessary (B)	.493	-.200	.062
Daring to say problems to the family members (B)	.573	-.078	-.015
Listening and accepting the different opinions of others (B)	.572	-.083	.096

Reliability: The questionnaires were tried out for reliability with 30 rice farmers having similar characteristics to the samples. The purpose was to check the correctness of the statement and to evaluate the time used for answering the questionnaires. For internal consistency reliability testing Cranach's alpha coefficient was analyzed. For the knowledge scale KR-20 was analyzed. All scales had good levels of internal consistency as presented below.

Table 3-6. The reliability of research instruments Phase III

Instrument Phase III	Items	Reliability (α)	KR-20
1.Depressive symptoms (CES-D)	20	0.85	-
2. Knowledge of chemical intoxication prevention	12	0.80	0.75
3. Attitude on chemical intoxication prevention	10	0.85	-
4. Behaviors on chemical intoxication prevention	16	0.93	-
5. Knowledge of communication skills in the family	10	0.81	0.61
6. Attitude on communication skills in the family	9	0.82	-
7. Behaviors on communication skills in the family	16	0.87	-

Data collection

Asking the Graduate School Officers for the permission letter and send it to related organizations to conduct research and collect related information on the depression prevention from participants. The purpose and process of activities in the research program were described to the participants.

This is a randomized controlled trial (two-ways cross-over design). After confirming the depression symptoms, subjects were randomly divided into two groups (group A, n = 46; group B, n = 46) and assigned to a 13-week program. In the first phase, group A started a 6-week program on chemical intoxication prevention and group B started a program on improving communication skills in the family. Participants were then crossed over to the alternate programs for an additional 6-week period after a 1-week period for measurement. Subjects were not instructed to quit the behaviors acquired during the first program at the beginning of the second program. Evaluations were measured five times: at baseline, immediately before implementing the first intervention, post-first intervention, immediately before implementing the second intervention, and post-second intervention.

Data analysis

1) Descriptive statistics. Mean, standard deviation, frequency and percent distribution was calculated to describe demographic characteristics and other backgrounds of the participants.

2). Chi-square statistics analysis was used to test the degree of association between depression symptoms and factors. Items answered by 3 Likert scales were allocated 1 to 3 points. The total scores were computed from all items of each scale. Items on knowledge were re-coded by allocating "1" for the answer "correct," and "0" for the answers "wrong" and "don't know." After that the total scores were computed.

3). Two-way repeated measures ANOVA was used to analyze the difference in the total scores of CES-D between two groups across times of measure.

4). One-way repeated measures ANOVA was used for analyzing the difference in the total scores of knowledge, attitude and behavior in each group between measuring time.

5). Multiple linear regression analysis was used to examine the factors associated with depression symptoms. A multiple linear regression analysis (enter method) was used to examine the relationship between the decreased CES-D scores and the changed scales for chemical intoxication prevention and ones for communication skills in the family. Based on the research hypothesis, the two groups were made. The independent variables were gender, age, family income, exposure by spraying and the number of use of the PPE in the chemical intoxication prevention intervention group. The other ones were gender, age, family, the number of good communication, and the number of bad communication in the communication intervention group. The dependent variable was the changed CES-D score during each program.

All statistical analyses were performed using SPSS ver. 18 for windows (SPSS Software). The levels of statistical significance in these analyses are set up at $P < 0.05$.

Ethical consideration

The study was approved by the Committee of Human Ethical Research, Faculty of Public Health, Mahidol University. Prior to data collection, participants were informed of the objective of this study, data collection process and time to use for data collection. Additionally, they were informed of their right to decline or to withdraw from this study at any time and for any reason. Written consent forms were obtained from participants prior to data collection. There is no harm or risk for participating in this study. The participant's information will be anonymous. If the researcher found rice farmers with the case of CES-D 30 and higher scores, they were referred for diagnosis to a physician in the secondary care and tertiary care following the guidelines of system service for treatment.

This study was approved by the Ethical Committee for Human Research of the Faculty of Public Health, Mahidol University (No.MUPH2014-149 and Protocol No.86/2557). The study was performed in accordance with the Declaration of Helsinki.

CHAPTER IV
RESULTS

The results of this study were divided into three parts as follows:

Part I: Cross-sectional study

Part II: Program development

Part III: A randomized controlled trial

Part I: Cross-sectional study

Characteristic of participants

One thousand-fifty-one questionnaire sheets were collected. Four sheets were not suitable to be analyzed because of many incomplete items and duplicated sheets. Finally, 1,047 (459 males and 588 females) respondents were analyzed in this study (response rate: 96.9%).

Characteristics of the participants are shown in Table 4-1. More than half of the respondents were between 41-60 years (62.4%). The average age was 52.6 (SD 11.0) years in males and 49.5 (SD 10.1) years in females. Most of them were married. Two-thirds of them obtained education at the primary school. Two-thirds of both males and females had no diagnosed diseases. Most of them had no family history of psychiatric disorder. Twenty percent of them had prescribed medicines (male 19.2%, female 24.0%). Thirty percent of them had four family members (male 31.0%, female 31.3%).

Forty percent of males had consumed alcohol (39.7%) compared to 6.5% of the females. Thirty-seven percent of males had a smoking habit (37.3%) and only 2% of females had a smoking habit. Almost half of them (male 47.3%, female 36.2%) had sleeping hours less than eight hours per night. About two thirds of the males (63.8%) and over half of females (52.0%) did not exercise.

Table 4-1. Characteristics of participants

Demographic	Male (n = 459) n (%)	Female (n= 588) n (%)	Total (n= 1,047) n (%)
Age (years)			
20 – 40	70 (15.3)	120 (20.4)	190 (18.2)
41-60	266 (58.1)	387 (65.8)	653 (62.4)
61 and more	122 (26.6)	81 (13.8)	203 (19.4)
Marital status			
Single	19 (4.1)	30 (5.1)	49 (4.7)
Married	413 (90.0)	503 (85.5)	916 (87.5)
Widowed/divorced	27 (5.8)	55 (9.4)	82 (7.8)
Highest Education			
No education or below primary school	27 (5.9)	35 (6.0)	62 (6.0)
Primary school	294 (64.1)	321 (54.6)	615 (59.3)
Secondary school	73 (15.9)	103 (17.5)	176 (17.0)
High school and higher	55 (14.2)	129 (22.0)	184 (17.7)
Diseases			
Don't know (never check)	77 (16.8)	73 (12.4)	150 (14.3)
No	278 (60.6)	360 (61.2)	638 (61.0)
Yes	104 (22.7)	155 (26.4)	259 (24.7)
Psychiatric disorders in family history			
Yes and no treatment	9 (2.0)	9 (1.5)	18 (1.7)
Yes and continuing treated	10 (2.2)	19 (3.2)	29 (2.8)
No	440 (95.9)	560 (95.2)	1,000 (95.5)
Prescribed medicines			
Yes	88 (19.2)	140 (23.8)	228 (21.9)
No	371 (80.8)	448 (76.2)	819 (78.1)
Number of family members			
<4	120 (45.6)	404 (68.7)	524 (50.2)
≥4	59 (30.1)	184 (31.3)	343 (32.8)

Table 4-1. Characteristics of participants (cont.)

Demographic	Male (n = 459) n (%)	Female (n= 588) n (%)	Total (n= 1,047) n (%)
Alcohol consumed			
Yes	182 (39.7)	38 (6.5)	220 (21.0)
No	277 (60.3)	550 (93.5)	827 (78.9)
Smoking habit			
Yes	171 (37.3)	12 (2.0)	183 (17.5)
No	288 (62.7)	576 (98.0)	864 (82.5)
Sleeping hours			
< 8	217 (47.3)	213 (36.2)	430 (41.1)
≥ 8	242 (52.7)	375 (63.8)	617 (58.9)
Exercise			
Yes	166 (36.2)	282 (48.0)	448 (42.8)
No	292 (63.8)	306 (52.0)	598 (57.2)

Working conditions

Table 4-2 shows the working conditions. More than two-thirds of respondents (73.1%) worked more than ten years for both males (72.9%) and females (73.2%) with the average of 23.8 years in males and 23.3 years in females. Few of them (2.4%) had accidents due to their work (male 2.6%, female 2.2%). They mostly (86.6%) used chemical substances in their work (males 91.7%, females 82.8%). There were many ways of exposure to chemical substances including by mixing (male 31.4%, female 14.7%), spraying (male 68.2%, female 17.2%), in area using chemicals (male 67.4%, female 87.1%) and others (male 88.2%, female 80.9%).

Table 4-2. Working conditions

Work condition factors	Male (n = 459) n (%)	Female (n= 588) n (%)	Total (n= 1,047) n (%)
Working period (years)			
<10	124 (27.1)	157 (26.8)	281 (26.9)
≥10	334 (72.9)	429 (73.2)	763 (73.1)
Accident from work	12 (2.6)	13 (2.2)	25 (2.4)
Chemical substances used	421 (91.7)	486 (82.8)	907 (86.6)
Ways of exposure			
Mixing	132 (31.4)	72 (14.7)	204 (19.5)
Sprayings	287 (68.2)	84 (17.2)	371 (35.4)
In area using chemicals	292 (67.4)	445 (87.1)	737 (70.4)
Other (washing chemical equipment)	372 (88.2)	403 (80.9)	775 (74.0)

Depression symptoms

Figure 4-1 shows the distribution of the CES-D scores. The scores were not normally distributed. Females had significantly higher scores than males (median: male 13, female 15) (p-value < 0.001).

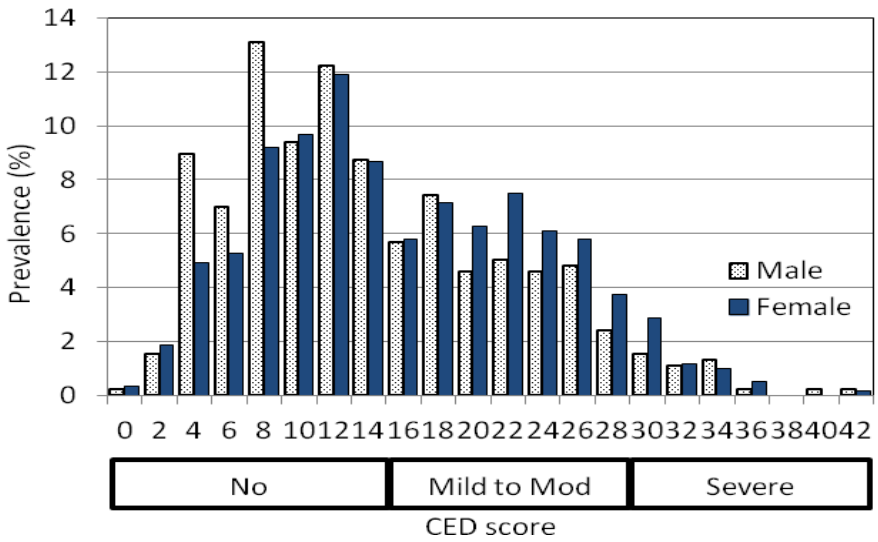


Figure 4-1 the distribution of the CES-D scores.

Table 4-3 shows the classification of depression symptoms. Forty-four percent of participants had depression symptoms. Thirty-nine percent of males and forty-eight percent of females had mild-to-severe depression symptoms. Females had mild-to-moderate depression symptoms, significantly more than males (p-value < 0.05). Females had severe depression symptoms more than males, but there was no statistically significant difference.

Table 4-3. Classification of depression symptoms

Depression symptoms	Male (n = 459) n (%)	Female (n= 588) n (%)	Total (n= 1,047) n (%)
Severe (score 30 and more)	21 (4.6)	34 (5.8)	55 (5.2)
Mild-to-Moderate (score between 16 - 29)	158 (34.4)	249 (42.3)	407 (38.9)
No (score<16)	280 (61.0)	305 (51.9)	585 (55.9)

Factors associated with depression symptoms.

Table 4-4 indicates the items that showed significant difference in prevalence of depression symptoms at mild and more among personal factors. The younger males were more likely to be depressed. Lower educated females were more likely to be depressed. The males who had a disease, who had the number of family members less than four, were more likely to be depressed. The males and females who had sleeping hours equal or more than 8 hours were more likely to be depressed.

Table 4-4. Items showing significant difference in prevalence of depression symptoms at mild and more among personal factors

Personal factors	Depression Symptoms					
	Male		Female		Both genders	
	n (%)	F	n (%)	F	n (%)	F
Age						
< 53	106 (47.5)	13.04**	169 (48.6)	0.06	275 (48.9)	9.00*
≥ 53	73 (31.1)		114 (47.5)		187 (39.7)	
Education						
No education and primary school	121 (31.7)	0.76	189 (53.1)	8.89*	310 (45.8)	2.15
High school and higher	58 (42.0)		94 (40.5)		152 (41.1)	
Diseases						
No	58 (32.0)	6.07*	109 (47.8)	0.02	359 (45.6)	2.65
Yes	121 (43.5)		174 (48.3)		103 (39.8)	
Number of family members						
< 4	120 (45.6)	9.55*	183 (50.3)	1.76	303 (48.3)	11.18**
≥ 4	59 (31.2)		100 (44.6)		159 (37.9)	
Sleeping hours						
<8	58 (26.7)	26.05**	89 (41.8)	5.39*	145 (33.9)	30.25**
≥8	121 (50.0)		194 (51.7)		315 (51.1)	

*=p-value <0.05, **=p-value<0.01

As to the health behaviors (Table 4-5), the items “Concerned about health”, and “Eating healthy food” were associated with depression in males. The item “Doing the sanitary care to the house environment” was associated with depression in females.

Table 4-5. Items showing significant difference in prevalence of depression symptoms at mild and more among health behaviors factors

Health Behaviors	Depression Symptoms					
	Male		Female		Both genders	
	n (%)	F	n (%)	F	n (%)	F
1. Concerned about health		4.68*		.24		
No	189 (64.7)		84 (49.7)		273 (59.1)	2.45
Yes	103 (35.3)		199 (47.5)		302 (65.4)	
2. Eating healthy food		3.96*		.07		
No	158 (65.3)		133 (48.7)		291 (63.0)	2.16
Yes	84 (34.7)		150 (47.6)		234 (50.7)	
3. Doing sanitary care to the house environment		2.04		6.92*		
No	61 (34.9)		66 (39.5)		127 (27.5)	10.07*
Yes	118 (41.5)		217 (51.5)		335 (72.5)	

*=p-value <0.05, **=p-value<0.01

Regarding family relationships (Table 4-6), the items “Family members did not know about their favorite things”, and “Using leisure time with family members” were associated with depression in both genders. In addition, the item “Concerned problems of your family member” was associated with depression in males.

Table 4-6. Items showing significant difference in prevalence of depression symptoms at mild and more among family relationships

Family relationship	Depression Symptoms					
	Male	F	Female	F	Both genders	F
	n (%)		n (%)		n (%)	
1. Family members do not know about your favorite things		5.03*		6.79*		10.70**
No	23 (28.0)		212 (45.4)		235 (50.9)	
Yes	156 (41.4)		71 (58.7)		227 (49.1)	
2. Concerning problems of your family members		14.61**		.92		9.38*
No	97 (49.0)		112 (50.7)		209 (45.2)	
Yes	82 (31.4)		171 (46.6)		253 (54.8)	
3. Using leisure time together		9.84*		12.86**		25.46**
No	37 (27.8)		36 (32.7)		73 (15.8)	
Yes	142 (43.6)		247 (51.7)		389 (84.2)	

*=p-value <0.05, **=p-value<0.01

With respect to the coping patterns (Table 4-7), the item “Feeling hesitant to ask for help from others” and the item “Preparing to prevent the problem” were associated with depression in males. The items “Interest of family in talking with me” and “Positive thinking to the problem” were associated with depression in females.

Table 4-7. Items showing significant difference in prevalence of depression symptoms at mild and more among coping patterns

Coping patterns	Depression Symptoms					
	Male n (%)	F	Female n (%)	F	Both genders n (%)	F
1. Feeling hesitate to ask for help from others even if necessary		4.47*		1.69		5.91*
No	125 (36.2)		198 (46.5)		323 (69.9)	
Yes	54 (47.4)		85 (52.5)		139 (30.1)	
2. Interest of family in talking with me		1.19		8.61*		7.51*
No	102 (41.3)		153 (54.4)		255 (55.2)	
Yes	77 (36.3)		130 (42.3)		207 (44.8)	
3. Preparing to prevent the problem		10.12*		2.50		1.54**
No	135 (44.1)		208 (50.2)		343 (74.2)	
Yes	44 (28.8)		75 (43.1)		119 (25.8)	
4. Positive thinking to the problem		2.22		4.19*		6.47*
No	67 (43.8)		109 (54.0)		176 (38.1)	
Yes	112 (36.6)		174 (45.1)		286 (61.9)	

*=p-value <0.05, **=p-value<0.01

As to the social network and participation in community activities (Table 4-8), the items “Having community integration”, “Being the member of group or the volunteer for the community” and “Getting help from the community” were related to the depression symptoms in males. The items “Having the conflict with neighbor” and “Being accepted in community” were related to the depression symptoms in females.

Table 4-8. Items showing significant difference in prevalence of depression symptoms at mild and more among social network and participation in community activities

Social network	Depression Symptoms					
	Male n (%)	F	Female n (%)	F	Both genders n (%)	F
1. Having community integration						
No	125 (45.0)	10.55*	174 (50.3)	1.57	299 (64.7)	9.00**
Yes	54 (29.8)		109 (45.0)		162 (35.1)	
2. Being the member of group or the volunteer for the community		6.51*		2.78		26.93**
No	129 (35.9)		204 (46.2)		309 (66.9)	
Yes	50 (50.0)		79 (54.1)		153 (33.1)	
3. Being accepted in community		3.26		15.75**		16.39**
No	96 (43.2)		150 (57.3)		246 (53.3)	
Yes	83 (35.0)		133 (40.8)		216 (46.8)	
4. Getting help from the community		4.34*		0.35		1.54
No	103 (35.4)		147 (49.3)		250 (54.1)	
Yes	76 (45.2)		136 (61.3)		212 (45.9)	
5. Having the conflict with neighbor		3.11		4.81*		71.21**
No	152 (37.5)		245 (51.2)		230 (49.8)	
Yes	76 (45.2)		38 (61.3)		232 (50.2)	

*=p-value <0.05, **=p-value<0.01

Regarding the working environments (Table 4-9), work with loud noise machines was significantly associated with depression symptoms in both males and females. Appropriate lighting was associated in males and dust or smog was associated in females. Both males and females who use boots and exposure to poisonous animals were significantly associated with the depression symptoms, only females had washing hands and exposure to poisonous weeds as significantly associated with depression symptoms. Both males and females who were continuing to use the chemical substance were more likely to be depressed. About half of the respondents did not use the PPE during work with chemical substances. Using the PPE during work and following the chemical instructions were related to the depression symptoms. About half of the respondents had work-related financial hardship. Females who faced work-related financial hardship were more likely to be depressed. Females who had no support from related government organizations to improve the products were more likely to be depressed.

Table 4-9. Items showing significant difference in prevalence of depression symptoms at mild and more among working environments

Work-related factors	Depression Symptoms					
	Male	F	Female	F	Both genders	F
	n (%)		n (%)		n (%)	
Loud noise machine						
No	65 (27.4)	27.58**	109 (37.5)	26.28**	174 (33.0)	53.92**
Yes	114 (51.4)		174 (8.6)		288 (55.5)	
Appropriate lighting						
No	82 (34.0)	5.28*	245 (46.9)	2.66	232 (40.3)	7.39*
Yes	97 (44.5)		38 (57.6)		230 (48.7)	
Dust						
No	52 (33.8)	2.66	87 (42.0)	4.76*	139 (30.1)	5.69*
Yes	127 (41.6)		196 (51.4)		323 (69.9)	

Table 4-9. Items showing significant difference in prevalence of depression symptoms at mild and more among working environments (cont.)

Work-related factors	Depression Symptoms					
	Male	F	Female	F	Both genders	F
	n (%)		n (%)		n (%)	
Hand washing						
No	34 (33.0)	2.0	49 (34.5)	13.92**	83 (18.0)	17.78**
Yes	145 (40.7)		234 (52.5)		379 (82.0)	
Using boots						
No	118 (45.6)	10.76*	197 (51.8)	5.93*	315 (68.2)	1.47
Yes	61 (30.5)		86 (41.3)		147 (31.8)	
Poisonous animals						
No	118 (45.6)	10.90*	197 (51.8)	26.16**	315 (68.2)	37.00**
Yes	61 (30.5)		86 (41.3)		147 (31.8)	
Poisonous weeds						
No	35 (32.1)	2.85	66 (40.7)	4.89*	101 (21.9)	6.97*
Yes	144 (41.1)		217 (50.9)		361 (78.1)	
Continue using chemical substances						
No	44 (31.7)	4.52*	77 (40.3)	6.92*	121 (36.7)	10.88**
Yes	135 (42.2)		206 (51.9)		341 (47.6)	
Using the PPE during work with chemical substances						
No	94 (45.4)	6.52*	141 (53.2)	4.98*	408 (46.2)	9.47*
Yes	85 (33.7)		142 (44.0)		54 (33.1)	

Table 4-9. Items showing significant difference in prevalence of depression symptoms at mild and more among working environments (cont.)

Work-related factors	Depression Symptoms					
	Male	F	Female	F	Both genders	F
	n (%)		n (%)		n (%)	
Following chemical instructions						
No	114 (34.5)	9.78*	176 (44.6)	6.15*	172 (53.4)	16.28**
Yes	65 (50.4)		107 (55.4)		290 (40.0)	
Work-related financial hardship						
No	105 (36.7)	1.67	136 (41.0)	15.68**	221 (51.5)	16.10**
Yes	74 (42.8)		147 (57.4)		241 (39.0)	
Government support						
No	43 (39.4)	0.01	91 (54.8)	4.15*	328 (42.5)	3.20
Yes	136 (38.9)		192 (45.5)		134 (48.7)	

*=p-value <0.05, **=p-value<0.01

In prior results of the study, factors associated with depression were different by gender. Therefore, to find the predictive factors this researcher decided to separate the analysis by gender.

Table 4-10 shows the results of the multiple logistic regression analysis. The independent predictors of depression symptoms in males were: concerning health, eating healthy food, preparing to prevent the problem, having community integration, loud noise machines and using PPE during work with chemical substances. Factors predicting depression symptoms in females were: interest of family in talking with me, being an accepted person in the community, loud noise machines and work-related financial hardship.

Table 4-10. Factors associated with depression symptoms

a) male

Risk factors	P-value	OR	95% CI for OR	
			Lower	Upper
Concerning health	.004	.287	.123	.672
Eating healthy food	.032	.439	.207	.934
Preparing to prevent the problem	.004	.350	.172	.711
Having community integration	.008	.412	.213	.796
Loud noise machines	.044	1.954	1.019	3.749
Using the PPE during work with chemical substances	.009	.399	.201	.792

OR: Odds ratio, CI: Confidence interval

Independent variables: age, diseases or illnesses, number of family members, sleeping hours, concerning health, eating healthy food, preparing to prevent the problem, feeling hesitant to ask for help from others, having community integration, being the member of a group or the volunteer for the community, getting help from the community, appropriate lighting, loud noise machines, continuing using the chemical substance, using the PPE during work with chemical substances and following chemical use instructions.

Table 4-10. Factors associated with depression symptoms (cont.)

b) female

Risk factors	P-value	OR	95% CI for OR	
			Lower	Upper
Interest of family in talking with me	.006	.485	.290	.812
Being accepted person in community	.001	.430	.255	.724
Loud noise machines	.000	2.745	1.676	4.497
Work-related financial hardship	.019	1.805	1.101	2.960

OR: Odds ratio, CI: Confidence interval

Independent variables: highest education, sleeping hours, doing sanitary care to house environment, positive thinking of the problem, interest of family in talking with me, being accepted in community, having conflict with neighbor, loud noise machines, dust or smog, continuing use of the chemical substance, using the PPE during work with chemical substances, following chemical use instructions, work-related financial hardship and support from related government organizations to improve the products.

Part II: Depression prevention program development

An intervention program was developed by selecting the best predictor and changeable factors among the results of Phase I and by the results of the in-depth interview and focus group discussions. Phase I results showed the predictive factors among work-related factors and lifestyle-related factors. Thus, the aims of the interventions were: enhancing protective factors and eradicating risk factors of depression among work-related and lifestyle-related factors of rice farmers.

The focus group discussions were held in a sub-district health promoting hospital of two selected districts. The focus group discussion for the community stakeholders' group discussion was comprised of 10 members. The questions consisted of community concern, the situation of depression in the community, barriers, and supporters. The participants made decisions for selecting an activity per 1 program suitable and applicable for the context of their community. One for health

care providers was comprised of 4 members in the Center for Mental Health Services 9 and the Department of Occupational Health and Safety, Maharat Nakhonratchasima Hospital and focused on mental health problems of their population and their current mental health service in the community. The participants made decisions for selecting an activity per 1 program suitable and applicable for the context of their community base and management system such as barriers and supporters when the program was implemented.

The focus group discussion revealed that most participants were aware of depression issues in their communities. However, many were not familiar with all the factors that contribute to depression or how to prevent them. They were also asked if there had ever been any depression prevention project in their communities, and they answered that no project had been implemented before. After presenting the results of Phase I, predictive depression factors among people in their communities, they thought it was very difficult to control all factors that may impact on the depression prevention program. However, they had consensus to select one from work-related factors and the other one from lifestyle-related factors. For chemical intoxication prevention, the skills they needed to learn if they were participants were: knowledge about depression, risk factors (from chemical substance exposure), management and prevention that people need to be trained in. The item, “Interest of family in talking with me” was selected from emotional-focused coping in the coping patterns dimension. For the necessary skills for chemical intoxication prevention, many mentioned that it was communication skills in the family; if we need to have good emotional-focused coping. Therefore, improving communication skills in the family was selected to promote in the depression prevention program of this study.

The in-depth interviews on the policy and services management system to support the programs were held in the Center for Mental Health Services 9 and the Department of Occupational Health and Safety, Maharat Nakhonratchasima Hospital. Community stakeholder interviews in sub-district health promoting hospitals in two selected districts focused on community concern, the situation of depression in the community, the barriers and supporters when the program was implemented. Interviews lasted for 30-45 minutes depending on the availability of the interviewee.

All those who were interviewed recognized that depression was an issue of concern. However, many thought that depression prevention activities should be planned, funded, implemented and evaluated by the Ministry of Health because the continued work needed the human resources to train people with the necessary skills. Nowadays, because of the lack of services in the depression prevention program, this study was then a good pilot project for their learning. There was not enough staff trained to be mental health promoters. However, they would support all activities of this study because this study may be beneficial for establishing a positive attitude toward mental health promotion. The changeable factors in the programs were chemical intoxication prevention and improving communication skills in the family because many confirmed that they had feasibility to make it happen and its usefulness.

Intervention program proposals were developed based upon the voices and participation of all sectors in formulating the program. The first draft of the depression prevention program developed by the researcher was proposed and discussed by the academic committee of the Center for Mental Health Service 9 and the Department of Occupational Health and Safety team of Maharat Nakhonratchasima Hospital. Finally, five experts from mental health administration, mental health services, an occupational health specialist, and a mental health educator were consulted on the depression prevention program (Appendix A) in order to consider content and instruments for evaluation of the programs. They agreed with the depression prevention program.

Two programs were established in order to solve the problems caused from lifestyle-related factors: improving communication skills in the family program, and from work-related factors: chemical intoxication prevention program.

This was a two-way cross-over design. After confirming the depression symptoms, subjects were randomly divided into two groups (group A, n = 46; group B, n = 46) and assigned to a 13-week program. In the first phase, group A started a 6-week program on chemical intoxication prevention and group B started a program on improving communication skills in the family. Participants were then crossed over to the alternate programs for an additional 6-week period after 1 week for a measurement period. Subjects were not instructed to quit the behaviors acquired during the first program at the beginning of the second program.

The program provides both individual and group activities. The details are as follows:

Programs

Program A: The chemical intoxication prevention program

Rice farmers are requested to participate in the health education session and participants are followed-up on their preventive behaviors. The education session had two parts; part 1 for rice farmers and village health volunteers and part 2 for the village health volunteers to follow-up and support rice farmers. The program on chemical intoxication prevention was comprised of lecture (including showing the good model to use PPE) and small group discussion (total 180 minutes) on preventing chemical intoxication on the starting day and home visits by village health volunteers for 4 weeks from the starting day. The health volunteers showed the good model; for example, fitting PPE, support, and advised and encouraged practices. The weekly events and contents are shown in Table 4-11.

Table 4-11. Activities of the chemical intoxication prevention program

Week	Topics	Main contents	Time (minutes)	Target subjects	Measurements
1	Chemical intoxication prevention health education (Total 180 minutes)	*Health effects of chemical substances*	***40***	1. Rice farmers (CESD 16 - 29) 2. Village health volunteers	1. Number of participants 2. Satisfactions on health education
		1. Kinds of chemical substances and worksite dealing with them	10		
		2. Route to enter the body	10		
		3. Symptoms & signs of the toxicity	20		
		Preventive methods	**130**		
		1. PPE & personal hygiene corresponding to routes	20		
		2. Demonstration of using PPE & training of fitting testing	90		
		3. Correct hand washing in workshop	20		
		8. Summary	10		
	Preparing for follow-up (Total 60 minutes)	1. Significance of volunteer for continuing the program	10	Village health volunteers	
		2. Explanation of checklist	10		
		3. Discussion on provisional problems of the farmers	30		
		4. Summary	10		
2-6	Volunteers visit	Support using PPE, discuss the barriers of using & doing chemical safety	30	Rice farmers	Chemical safety check-lists
7	Evaluation	1. CES-D 20 items 2. Knowledge, attitude and behavior on chemical intoxication prevention	30-40	Rice farmers	1. CES-D 2. Questionnaire on knowledge, attitude and behavior for chemical intoxication prevention

Program B: Improving communication skills in the family program

Rice farmers are requested to participate in the health education session and participants are followed-up in their communication skills. The education session had two parts; part 1 for rice farmers and village health volunteers and part 2 for the village health volunteers. The program on improving communication skills in the family was comprised of lecture (including showing the good model for conversations with family members) and small group discussion (total 180 minutes) on the communication skills on the starting day and home visits by village health volunteers for 4 weeks from the starting day. The village health volunteers advised on the topic of conversation with family members and encouraged participants. The weekly events and contents are shown in Table 4-12.

Table 4-12. Activities of the improving communication skills in the family program

Week	Topics	Main contents	Time (minutes)	Target subjects	Measurements
1	Communication skills (Total 180 minutes)	*Significance of communication (to mental health)*	20	1. Rice farmers 2. Village health volunteer	1. Number of all participants 2. Satisfactions on health education
		Coaching skills	***80***		
		1. Active listening	20		
		2. Admiring	20		
		3. Good question	20		
		4. Assertive communication	20		
		Scenario of good communication	20		
		Discuss how to use such skills to reach the good model	40		
		Summary	20		
	Preparing for follow-up (Total 60 minutes)	1. Significance of volunteer for continuing the program	5	Village health volunteers	
		2. Explanation of checklist	15		
		3. Discussion on provisional problems of the farmers	30		
		4. Summary	10		
2–6	Volunteers visit	Support for using appropriate communication skills, discuss the barriers against using communication skills	30	Rice farmers	Communication check-lists
7	Evaluation	1. CES-D 20 items 2. Knowledge, attitude and behavior on communication skills	30-40	Rice farmers	1. CES-D 2. Questionnaire on knowledge, attitude and behavior for communication skills

Remark: After the first program was implemented in both groups, depression symptoms and the knowledge, attitudes and practices related to the prevention of depression program were assessed with all participants. The next week both group of participants started the second program from week 8st-13th.

The village health volunteers were instructed to review the work with pesticides and communication in the family for one week before starting the program and on the starting days of the first and second programs. They were also instructed to advise on the consistent and correct use of PPE during work; positive conversation with family members, such as admiring, questioning and asserting; to check the frequency of behaviors; to discuss problems and barriers in changing behaviors; and to encourage continuing the practices.

Phase III: A randomized controlled trial (two-way cross-over design)

Characteristics of participants

All 92 participated subjects had completed the program. Thus, data analysis was performed using 92 subjects.

In the comparison of groups at baseline (E1), shown in Table 4-13, the gender, the mean age, the married subjects, highest education, and having disease(s) showed no significant difference between the two groups. However, income showed the significant difference.

As to the factors on chemical substances, frequency of using the chemical substances, chemical poisoning symptoms and using PPE showed no significant difference. However, the exposure by spraying showed the significant difference.

As to good communication, those who selected 3 examples were highest in both groups. This factor showed no significant difference between the two groups. As to bad communication, those who selected 3 examples were highest in group A. In group B, those who selected 2 examples were highest. There were, however, no significant differences between the two groups.

In the program, the village health volunteers visited the participants in the evening at least once a week and had conversation to advise and encourage using PPE

or having good communication skills in the family. The conversation time varied 20 to 60 minutes.

Table 4-13. Personal, working and communicating factors of participants at the baseline (E1)

Demographic data	Group A (n=46)		Group B (n=46)	
	Number	Percent	Number	Percent
Gender				
Male	22	47.8	21	45.7
Female	24	52.2	25	54.3
Age (years) (mean ±SD)	48.5±10.5		49.5 ± 12.3	
Marital status				
Married	46	100	43	93.5
Widowed/divorced	0	0	3	6.5
Highest Education				
No education	1	2.2	0	0
Primary school	21	45.7	26	56.5
High school	19	41.3	19	41.3
Higher	5	10.9	0	0
Disease (s)	6	13.0	10	21.7
Income**				
Enough & have saved money	2	4.3	3	6.5
Enough & no saved money	4	8.7	19	41.3
Not enough	40	87.0	24	52.2
Frequency of using chemical substances				
Rarely	17	37.0	18	39.1
Sometimes	17	37.0	13	28.3
Often	12	26.1	15	32.6
Exposure to chemical substances				
Mixing	10	21.7	6	13.0
Spraying*	20	43.5	9	19.6
In area using chemical substances	7	15.2	0	0

Table 4-13. Personal, working and communicating factors of participants at the baseline (E1) (cont.)

Demographic data	Group A (n=46)		Group B (n=46)	
	Number	Percent	Number	Percent
Using Personal Protective Equipment (PPE)				
Long sleeve shirt	35	76.1	29	63.0
Long pants	34	73.9	30	65.2
Mask	22	47.8	26	56.5
Gloves	20	43.5	24	52.2
Chemical poisoning symptoms				
Never	23	50.0	25	54.3
Sometimes	13	28.3	14	30.4
Always	10	21.7	7	15.2
Number of good communication in the family				
1	0	0	2	4.3
2	8	17.4	17	37.0
3	23	50.0	18	39.1
4	15	32.6	9	19.6
Number of bad communication in the family				
1	8	17.4	10	21.7
2	16	34.8	22	47.8
3	20	43.5	12	26.1
4	2	4.3	2	4.3

SD: standard deviation, *p<0.05, **p<0.01

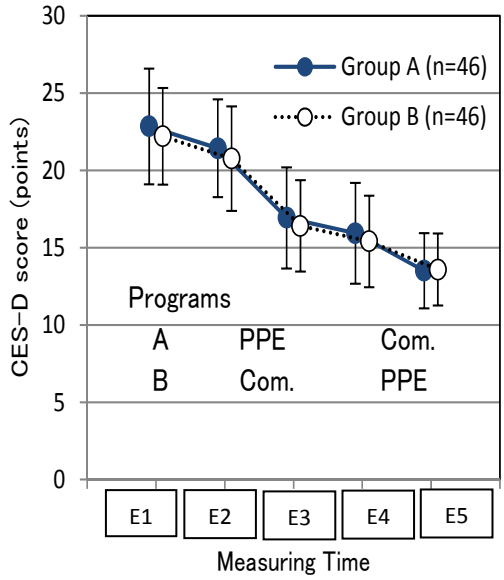
Depression symptoms

Those who had the mild-to-moderate depression symptoms were 30 (65.2%) in group A (Chemical intoxication prevention program first) and 31 (63.0%) in group B (Communication skills in the family program first) at the end of the first program (Table 4-14). There were 11 (23.9%) in group A and 8 (17.4%) in group B at the end of the second program.

Table 4-14. Numbers (%) of participants who had the mild-to-moderate depression symptoms baseline, after the first program and after the second program

Program	CES-D score ≥16		
	Confirmed baseline	After first program	After second program
Group A	46	30	11
	(100)	(65.2)	(23.9)
Group B	46	31	8
	(100)	(63.0)	(17.4)

Figure 4-2 shows the mean scores for CES-D across time for both groups. The difference in CES-D scores at measuring time E1-E2 was not significant. The difference in CES-D scores for individual programs (at measuring time E2-E3) was significant. This may mean the individual program decreases CES-D scores in both groups. The CES-D scores were continuing to decrease after finishing the first program but the difference was not significant. The difference in CES-D scores for the combined programs (at measuring time E4-E5) was significant.



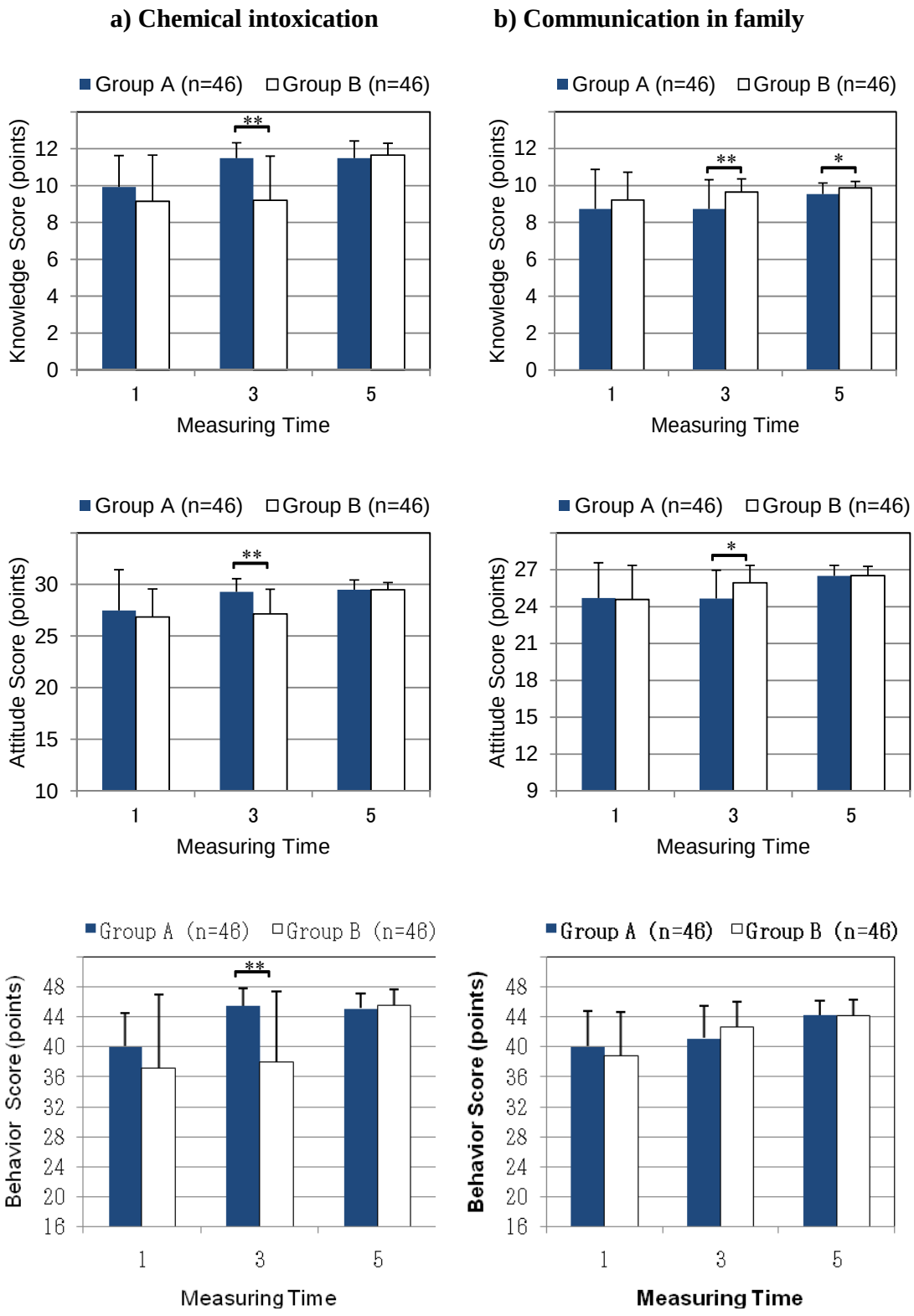
Measuring time	Difference in mean scores	p-value
E1-E2	0.90	0.436
E2-E3	4.42	<0.001
E3-E4	1.00	0.254
E4-E5	2.13	<0.001

Figure 4-2. Time course of CES-D Scores

Scales on knowledge, attitude and behavior

Corresponding to the component analysis, we calculated the total scores of the scales. Figure 4-3a shows the time course of the total scales for chemical intoxication prevention. The total scores of three scales showed a significant increasing tendency. The total scores of the three scores in group A (the chemical intoxication prevention program first) were significantly higher than those in group B at E3. However, there was no significant difference between the two groups at E5.

Figure 4-3b shows the time course of the total scores of scales for communicating skills in the family. The total scores of the three scales showed a significant increasing tendency. The total scores of the three scores in group B (the improving communication skills in the family program first) were significantly higher than those in group A at E3. Although the total score of knowledge in group B was still significantly higher; those of the attitude and behavior showed no significant difference between the two groups at E5.



*p<0.05, **p<0.01

Figure 4-3. Time course of total scores on knowledge, attitude and behavior

Factors related to change in the CES-D score

Table 4-15 shows the results of multiple linear regression analysis for the relationship between the decreased CES-D score and the changed scales using the two combined groups.

The change in the CES-D score in the PPE intervention group was significantly related to the change in the total scores of behavior for chemical intoxication prevention even after being adjusted for using personal and working factors (Table 4-21a).

The change in the CES-D score in the improving communication skills in the family intervention group was significantly related to the change in the total scores of knowledge, attitude and behavior for communication skills in the family even after adjusting for using personal and communicating factors (Table 4-21b).

Table 4-15. Results of multiple linear regression analysis for the relationship between the decreased CES-D score and the changed scales using the two combined groups

a) Chemical intoxication prevention intervention group

Variable	Beta	t	P-value
Knowledge of chemical intoxication prevention	-0.147	-1.376	0.173
Attitude on chemical intoxication prevention	-0.181	-1.705	0.092
Behavior on chemical intoxication prevention	-0.268	-2.117	0.037

a constant= -0.485, $R^2 = 0.190$, Adjusted $R^2 = 0.110$

Independent variables: gender, age, family income, exposure by spraying, the number using PPE

Table 4-15. Results of multiple linear regression analysis for the relationship between the decreased CES-D score and the changed scales using the two combined groups
b) Improving communication skills in the family intervention group

Variables	Beta	t	P-value
Knowledge of communication skills in the family	0.361	3.116	0.003
Attitude on communication skills in the family	-0.375	-2.810	0.006
Behavior on communication skills in the family	0.475	3.929	0.000
a constant= -4.226, R^2 = 0.221, Adjusted R^2 = 0.146			
Independent variables: gender, age, family income, the number of good communication at E1, the number of bad communication at E1			

Conclusions: The hypotheses testing of this study were tested and the findings were presented as follows:

Table 4-16. The results of hypotheses testing

Hypotheses	**Accepted**	**Excepted**
1. Prevalence of depression symptoms among rice farmers is high	Accepted	
2. Factors related to depression symptoms resulted from ones related to working as workers and ones related to lifestyle as people in the community.	Accepted	
3. The developed and tested intervention programs from work-related and lifestyle-related depression prevention programs decrease depression symptoms.	Accepted	
4. Knowledge, attitude and behavior were the predicting actual behavior changes in relation to depression prevention behavior and change in depression symptoms score.	Accepted	

CHAPTER V
DISCUSSION

This study used intervention. Its plan had two steps; step 1 used a cross-sectional study to find the prevalence of depression symptoms and their related factors. Step 2 was a program developed by using the information from step 1, selecting the predictive and changeable factors to design, implementation and evaluation of the program. Discussion was had on the demographics and characteristics of the participants. Research methodology and the findings are as follows:

Part I: Cross-sectional study

Participants' characteristics

More than half of the rice farmers were aged between 41-60 years (male 58%, female 66%) with an average age of 51 years. This study is congruent with the survey of national statistics that found the majority of farmers were aged 40 and more and this trend is increasing in the aging workers in the agricultural sector of Thailand (National Statistical Office, 2013). The Epidemiologic Catchment Area Study reported the prevalence of depression disorder; 2.3% for people aged 45 to 64 years and 3.9% for people aged 30 to 44 years (Chapman & Perry, 2008). In China, the same as with Thailand, ages 35 to 49 years had a higher risk (1.34 times) for depression than other age groups (Jianmin et al., 2009).

Most of them obtained an education until primary school (male 64%, female 55%). People with no education in high school had a higher risk (1.4 times) of depression (Chapman & Perry, 2008). There were a higher number of severe depression cases in the group of lower level of education than other groups (Beekman et al., 2002; Blazer et al., 2002). However, in 2013, Thai Labor Statistics reported the

farmers' trend of educational level were higher than before (increase number of farmers who graduated from a vocational school and a university) that would be good for the long term learning and developing their effective work processes and products (Tansri, 2014). Most of them were married (male 90%, female 85%). Marital status such as unmarried, single, divorced and widowed (Hybels, 2002; Minicuri et al., 2002), loneliness (Adams et al., 2004; Bisschop et al., 2004), and no satisfaction with friendship, and problems with the spouse (Strawbridge et al., 2002) were also risk factors for depression from a previous study associated with depression. Those in a rural area usually live as couples and do not have as many separated problems. However, it doesn't mean that they have no problems in their family.

As to the monthly family income, half of them did not have enough and had debts (male 43%, female 46%) and almost one-third of them had adequate income without saving money (male 33%, female 27%). There were evidences that lower income and living conditions were associated with depression symptoms (Strawbridge et al., 2002; Siegel et al., 2004; van der Wurff et al., 2004). But in this study there was no statistically significant relationship between family incomes with depression symptoms.

Most of them had no family history of psychiatric disorders (male 96%, female 95%). Depression disorder is easily found in patients who have a history of family illness, family history of psychiatric disorder and co-factors such as stress. There was an association between some genotype and higher levels of depression symptoms but the specific gene for causing depression is still unknown (Nebes et al., 2002). In this study we also have not found the association between a family history of psychiatric disorders and depression symptoms.

Older adults without chronic illnesses were less likely to have depression symptoms (7.5%) than were those with various chronic medical conditions (Department of Mental Health Thailand, 2013). Chronic illness was independently associated with depression disorders (Niti et al., 2007). In this study, as to their health status, it was found that about two-thirds of both males and females had no personal illnesses. Among male farmers it was found that medication use was statistically significantly associated to depression symptoms.

Regarding their health behaviors and lifestyle, it was found that most females had no alcohol consumption (94%) but more than half of the male workers had alcohol consumption (60%). Same as the alcohol drinking habit, most females did not smoke (98%). On the other hand, about two-thirds of male workers smoked (63%). About two-thirds of the male workers had no exercise (64%), more than half of the females (52%). For their sleeping hours, male and female workers, more than half of them (53% and 64% respectively) had adequate sleeping hours equal to and/or more than eight hours per night. The habits which are risk factors for depression are alcohol problems, and smoking (Jorm et al., 2005; Almeida, 2005).

People who consumed alcohol every day or almost every day had a higher risk of depression than those who never used it by 1.29 times (Chapman & Perry, 2008). The same significant risk factors for depression are sleep disturbance (Henderson, et al. 1997), low exercise level or lower number of activities (Kritz et al., 2001; Biderman et al., 2002). All those risky lifestyles, such as alcohol drinking, smoking and no exercising, were vulnerable risks for mental health problems among workers; although, in this study we found no statistically significant association between those factors and depression symptoms.

Regarding their work, it was found that more than two-thirds of them worked more than ten years (73%) and most of them had no accidents from work (97%). They mostly used chemical substances in their work (male 92% and female 83%). There were many ways to be exposed to chemical substances from their work including by mixing (male 31%, female (15%), spraying (male 68%, female 17%), exposure by being in the area using chemical substances (male 67%, female 87%) and other ways such as hiring others to use it but they are still exposed, and washing the equipment that contains chemical substances (male 88%, female 81%). Most of them had exposure during the rice farming season (male 93%, female 84%). After chemical exposure, more than half of the male workers had abnormal symptoms (58%), while about 40% of the females had abnormal symptoms. Among male workers we found a statistical significance between abnormal symptoms from chemical use and depression symptoms congruent with a previous study such as a large population-based study of anxiety and depression in relation to occupations. We found that male agricultural workers had the highest level of depression of all occupation groups (Sanne et al.,

2004). A similar study about pesticide poisoning and depression symptoms among farm residents found that farm residents who were exposed to pesticides had a higher risk of depression than those who were not exposed by 5.87 times (Stallones & Beseler, 2002). The use of agricultural chemicals in large quantities by many different types of toxic chemicals in both acute and cumulative exposure to chemicals in agriculture is associated with the occurrence of depression disorders (Beseler & Stallones, 2008). In Thailand, a study found that pesticide poisoning was related to depression among male farmers from mango orchards and pineapple fields, and found that exposure to pesticides at a high enough concentration to cause self-reported poisoning symptoms associated with high depression symptoms independently of other known risk factors for depression among farm residents (Klinsrisook et al., 2013). A recent study from Korea found occupational pesticide poisoning in the previous year was positively associated with the risk of depression symptoms among male farmers (Kim et al., 2014).

Regarding work-related factors from biological, psychological and psychosocial factors associated with depression, rice farmers have all these risk factors and also have their specific work stressors that increased risks for depression. This study found risk factors among their work associated to depression symptoms.

Prevalence of depression symptoms

The discussion on hypothesis testing is as follows:

Hypothesis 1: Prevalence of depression symptoms among rice farmers is high.

Thirty-nine percent of males and 48% of females had depression symptoms. When considering prevalence of depression in Thailand from the previous survey, depression is projected to become the major mental health problem in Thailand. A survey of mental health problems, the Department of Mental Health in 2011, showed 20 percent of Thai people with mental health problems and found that the number of patients with psychiatric disorders under service continuously increased in the years of 2007-2010. Particularly with depression, the data from the Clinical Depression Center of Thailand, Department of Mental Health in 2011, showed that depression patients aged 15 years and over to be 1.5 million people, or about 2 percent

of the total population. The prevalence of depression symptoms was 27.5% in male and 37.8% in female agricultural workers who farmed vegetables and fruits in the other provinces in Thailand in 2012 (Klinsrisook et al., 2013). Our study showed a higher percentage of individuals with depression symptoms than those in the previous study. This may be partly due to the different types of crops and personal factors. In addition, the cut-off scores for depression symptoms were different. The earlier study used 19 as the cutoff point, but in this study we used 16 based on the original report (Radloff, 1997). When compared to the same cut-off point, we found that the prevalence of depression is almost the same; there was 28.8% in males and 38.8% in females in this study. Females had significantly more depression symptoms than males. This result corresponded to the earlier studies (Klinsrisook et al., 2013; Mejia & McCarthy, 2010).

The prevalence of depression among working ages, each occupation had varied prevalence; for example, the study among Thai female workers in the electronics industry was 28.8% (Charoenpaitoon et al., 2012); the study among Korean female workers found 20% prevalence of depression in the manufacturing, finance, and service fields (Cho, et al., 2013); depression among males migrant workers in the USA found 25.1% (Maskari et al., 2011). This study's results confirmed the hypothesis that depression among Thai rice famers was high when compared with other occupations.

The prevalence of depression symptoms among rice farmers were different between males and females. Female workers had more depression symptoms than male workers in both groups of symptom levels; severe depression symptoms were 5.8% (higher than male 1.2%) and mild-to-moderate depression symptoms were 42.3% (higher than male 4.9%). Most males would not express those feelings which shows their weakness. This is also unexpected by society. In contrary, these males would show their frustration, temper, egression, forcefulness and refuse treatment (Jaffee & D'Zurilla, 2009); the difference of gender has too many depression-related phenomena. Therefore, it is not well understood but is probably related to a combination of biological and genetic factors including the hormone changes from the menstrual state, pregnancy, being postpartum, and menopause, as well as from stress from the work life, family responsibility, and social role (Kennedy et al., 2004).

From the review literature, females had a higher prevalence rate of depression than males in many studies, as females had a higher risk of depression than males 4.64 times (Chapman & Perry, 2008). A complex combination of biological, social, environmental, cultural, hormonal, and psychological factors may explain why women experience depression at a higher rate than men. According to WHO, there is evidence that gender is a social construct for men and women's role (WHO, 2009). Consistent studies with previous studies found that role internalization has a high risk for depression disorder in Thai women (Rungreangkulkij et al., 2012). They identified the five themes related to the causes of depression were: drinking and having an affair, which is considered common for men; continuous family responsibilities; mother-child attachment; unable to let it go; and the norm that women should stay home. Many women face the additional stresses of work and home responsibilities, caring for children and aging parents, abuse, poverty, and relationship strains (Rungreangkulkij et al., 2012). This study confirmed depression in women is more than in men. It describes by gender sensitivity and support knowledge about the association between social networks and activities in the community, relationships, coping with problems, work conditions and work environments.

Factors associated with depression symptoms

Hypothesis 2: Factors related to depression symptoms result from ones related to working as workers and ones related to lifestyle as people in the community.

Depression resulted from a complex interaction of multiple risk factors within the personal, cognitive domains, environmental, family, social economic, cultural, psychological and heredity factors (WHO, 2013). The risk factors for depression among farmers can be grouped into two major sources. The first one, which is particularly vulnerable, is related to work-related hazards as they worked as farmers and another one which is particular to their daily living as a person in the community. Discussion on predictive factors of depression symptoms that were found from our preliminary study are following:

1). A concern about health was negatively associated with depression symptoms in males. The ability to recognize common physical symptoms may give an opportunity to manage them. Common protective factors, such as concern about health

and eating healthy foods, improved both mental and physical health (Jacka et al., 2014; Cramm & Neiboer, 2012). Among male workers the item “Concern about health” in health behaviors was negatively associated with depression symptoms. Individuals with depression, as well as their families and health care professionals, often overlook the physical signs and symptoms of depression. It is important to be aware of the possibility of depression, especially when a person is suffering from some health problems or illnesses.

The difficulty is that some of the key symptoms in depression are very common in these conditions; for example, sleep troubles, fatigue or tiredness, poor appetite and worries about health are reliable indicators of depression. Many of the physical changes caused by depression, such as insomnia or a lack of deep sleep, are thought to weaken your immune system. This can make existing illnesses worse. In turn, physical changes caused either by depression or chronic disease can trigger or worsen depression. All these changes can lead to a vicious cycle that's tough to break without treatment for both depression and any other diseases (Thomas, 2010). This supports that the health concern in this study showed a negative association with depression symptoms which means people who had initiatively proactive health concerns were more likely to reduce their depression symptoms.

2). Eating healthy food was negatively associated with depression symptoms. This result corresponded to the earlier studies that lower scores on the healthy dietary pattern and higher scores on the unhealthy dietary pattern independently predicted the increased depression symptoms (Jacka et al., 2014). Among male workers the item “Eating healthy food” in health behaviors was negatively associated with depression symptoms. The results were congruent with a previous study that a healthy Japanese dietary pattern characterized by high intake of vegetables, fruits, mushrooms and soy products was associated with fewer depression symptoms (Nanri et al., 2010). Recent research suggested that diet quality influences depression risk. A longitudinal community study from south-eastern Australia found that lower scores on the healthy dietary pattern and higher scores on the unhealthy dietary pattern independently predicted increased depression symptoms (Jacka et al., 2014). In this study we showed that eating healthy food may reduce depression symptoms among rice farmers.

3). Preparing to prevent the problem, one of the coping styles, was negatively associated with depression symptoms. Coping enables an individual to regain emotional equilibrium after a stressful experience (Folkman & Lazarus, 1980). Our result corresponded to an earlier study that, if the preparations are unsuccessful, it may induce prolonged negative emotional states such as depression. Coping behavior refers to coping strategies including active coping, planning to cope, seeking instrumental support, seeking emotional support, religion, acceptance, humor, self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame (Carver et al., 1989). Preparing to cope or planning to cope is a very important factor that enables an individual to regain emotional equilibrium after a stressful experience. Planning is thinking about how to cope with a stressor. Planning involves coming up with action strategies, thinking about what steps to take and how best to handle the problem. This activity clearly is problem-focused that tends to predominate when people feel that something constructive can be done (Folkman & Lazarus, 1980). The previous study found relationships between participants' beliefs about the cause, controllability and duration of depression symptoms were mediated as a strategy to cope with depression (Brown et al., 2007). These beliefs and coping behaviors are potentially modifiable and could be the target of interventions to decrease functional impairment in depressed patients.

4). Having community integration was negatively associated with depression symptoms in males. Community integration can be defined as a combination of actual participation in the community and a sense of connectedness with the community (Steger et al., 2009). One of the most common causes to become depressed is the loss of relationships or social life (Cooper et al., 2010). The feeling of having the community integration thus prevents the depression symptoms. Social integration within a community can be defined as a combination of actual participation in the community and a sense of connectedness with the community (Herrero & Gracia, 2004). There are so many ways one would be able to become depressed, but the most common and most prevalent way, thus far, would be the interpersonal relationships of a person and their family, and social lives (Beattie, 2005). The growing sense of social isolation is particularly important since depression and other mental disorders cannot be dissociated from the environmental contexts, therefore the

positive effects of community integration should not be underestimated. Indeed, the more integrated with communities, the less likely to experience a whole range of serious illnesses. A proper support network consists of a reinforcing family and friends who can help the affected individual to work through any problems (Lowe, 2015). An under-developed social network cannot handle the pressure of an individual looking for support, and a negatively framed social network can actually reinforce thoughts of hopelessness, failure, and being worthless. Without this support, it is more likely for that individual to develop symptoms of depression (Bianco & Wells, 2001). Therefore the integration with community was important to people to overcome the problem with a sense of belonging to their community and society.

5). Using the PPE during work with chemical substances was negatively associated with depression symptoms in males. Chemical substances such as pesticides, are commonly used on farms. Appropriate PPE and precautions are necessary to protect farmers from pesticide poisoning. Exposure to pesticides or chemical substances is one of the risk factors for depression. Consequently, using PPE was a protective factor in this study. We found with rice farmers suffering from chemical poisoning at work, especially among male workers, the association between abnormal symptoms from chemical use and depression symptoms. Exposure to organophosphate may have chronic, long term effects, and has been linked to delayed-onset peripheral neuropathies, primarily affecting the extremities, neuropsychological and neurobehavioral changes (Koureas et al., 2012). The small-scale farmers who were evaluated for pesticide use patterns in Pitsanuloak, Thailand, during 2007–2009 showed that farmers did not use pesticides according to the instructions, did not use appropriate personal protection, and did not discard waste safely (Plianbangchang et al., 2009). In the present study, depression was associated with chemical poisoning, therefore using PPE correctly may reduce the chemical exposure of the rice farmers during their work with chemical substances and can also prevent depression symptoms.

6). Interest of family in talking with the respondent was negatively associated with depression symptoms in females. If people are depressed, they might need their family to listen and talk with them about what they are feeling (Mayo Clinic, 2015). Talking through particular concerns with someone who understands her

enables her to learn new coping skills to handle depression (Hayes, 2014). These concurs with our results. This emotion-focused coping is aimed at reducing or managing the emotional distress that is associated with or cued by the situation. Emotion-focused coping tends to predominate when people feel that the stressor is something that must be endured (Folkman & Lazarus, 1980). Work and family life stress can be major or minor stressors that may produce disturbances of mood including loss of attachment, major life events, role strain, and physiological changes (Stuart, 2009). Families also have a positive influence on their relatives when it comes to depression. When the family is there for the person, they can help reduce the person's stress and anxiety by showing their love (Martire et al., 2004). A family can help their relative by getting one the help one needs so that one does not fall into a deeper depression (Martire et al., 2004). This study showed that the evidence confirmed that there were different predominate coping patterns between male and female farmers. In this study, we found that, although most stressors need both problem-focused coping and emotion-focused coping, problem-focused coping tends to predominate among male workers while the emotion-focused coping tends to predominate among female workers.

7). Being accepted in the community was negatively associated with depression symptoms among females. A similar study showed that women with depression symptoms had significantly fewer specific forms of social support resources; for example, reassurance of worth or being accepted (Steger, 2009). This item refers to the reassurance of worth of that person in their community that means the person who is accepted or admired by the community is more likely to have fewer depression symptoms than others. This result was congruent with a study among middle-aged women in the USA, 2003, that found women with symptoms of depression have significantly fewer ($p < .001$) specific forms of social support resources (such as reassurance of worth, social integration, guidance, and attachment) and significantly lower ($p < .0001$) perceptions of control and commitment in their lives (Oman et al., 2003). On the other hand, excessive reassurance seeking is another characteristic which may play a factor in maintaining depression. In a person with depression, this behavior may be motivated by an effort to seek out reassurance about one’s self-worth. But because the pattern turns out to be repetitive, the people around

them become annoyed, thus leading to rejection and further fueling the depression (Pettit & Joiner, 2009). In the study of adult attachment, depression symptoms indicated that the capacity for self-reinforcement and need for reassurance from others partially mediated the link between attachment anxiety and depression (Larson & Zakalik, 2005). Those results suggest that provisional social support should be the focus of interventions for women with symptoms of depression.

8). Work-related financial hardship was positively associated with depression symptoms in females. Worrying about finances has been identified in several studies as the most important stressor in the farmers' life (Kearney et al., 2014). Work-related financial hardship may play a role as a risk factor. Farmers having day-to-day worries and acute stress with farming's intrinsic demands (such as disease and adverse weather conditions), external causes of tension (such as competition and regulation), together with worries about finances and family, were associated with more sustained anxieties (Sanne et al. 2004; Parry et al. 2005). Psychosocial environments such as social marginalization, and poor housing and living conditions have been associated with elevated depression and anxiety symptoms (Grzywacz et al., 2006). A previous survey of farmers found that in farmers who were experiencing financial problems, almost 80 percent worried about money, and were susceptible to financial problems (Simkin et al. 1998). The occurrence of different kinds of financial stressors effects the level of financial distress that an individual feels among African American women found that perceived financial distress was significantly associated with levels of depression symptoms (Starkey et al., 2013). This study confirmed that financial hardship may induce the depression symptoms among female rice farmers.

9). Loud noise machines were positively associated with depression symptoms in both genders. Noise is a stimulus, and when we have little control over the source, we often experience more stress and anxiety (Cooper, 2010). Studied on people living where they are constantly disturbed by noise pollution, e.g. near airports, suggest that these inhabitants may have poorer general health as a result (Job, 1999). There's also increasing evidence that noise has a negative effect on mental health of workers who have to work with loud noise machines, like rice farmers in this study.

In conclusion, depression symptoms among Thai rice farmers were associated with health actions and working styles in males and an accepting atmosphere in females. Using the PPE during work was specific for rice farmers using chemical substances in their work, but half of the respondents did not use the PPE during work. These factors have the possibility of introducing mental health issues to rice farmers. Although it is important to help farmers change their lifestyle-related factors, interventions on work-related factors should also be necessary to prevent the depression symptoms among rice farmers.

Part II: Program implementation and evaluation

Research methodology

We designed a randomized controlled trial of the program containing the chemical intoxication prevention and improving communication skills in the family against the rice farmers with mild-to-moderate depression symptoms. In Thailand, we have a very limited study for depression prevention programs, especially selected depression prevention that means the target group was selected from mild-to-moderate symptoms to intervene. The review literature found a study that used the same criteria for the selected target group and used a randomized control cross-over trial. Among nursing students the effects of physical exercise was tested for depression and the results found that physical exercise can reduce depression (Nabkasorn et al, 2005).

A cross-over trial is distinguished from such a parallel study group by each subject, receiving a sequence of experimental interventions. Typically, however, the aim is still to compare the effects of individual interventions, not the sequences themselves. The simplest design is the two-period/two-intervention or 2 x 2 design.

This study used this 2 x 2 design where each subject receives two different interventions which we conventionally labeled as A and B. Half the subjects receive A (chemical intoxication prevention program) first and then, after a suitably chosen period of time, cross over to B (communication skills in the family program). The remaining subjects receive B first and then cross over to A. The trial, which lasted 14

weeks, was divided into two intervention periods of 6 weeks with a 1-week wash-out period separating each pair of intervention periods.

The aim of this trial was to compare a chemical intoxication prevention program with a communication skill in the family program. The 46 subjects who took part in the trial had mild-to-moderate depression symptoms (CESD scored 16-29) and signed consent forms to participate. The feature that distinguishes the cross-over trial from other trials which compares interventions is that measurements on interventions are obtained from each subject. This feature brings with it advantages and disadvantages.

The main advantage is that the interventions are compared within subjects. That is, every participant provides a direct comparison of the interventions he or she has received. In this trial, each subject provides two interventions: one on A and one on B. The difference between these measurements removes any subject effect from the comparison and can estimate intervention differences where obtained from comparisons between the participant groups.

Although the use of repeated measurements on the same participant brings with it great advantages, it also brings a potential disadvantage. The disadvantage referred to is the possibility that the effect of an intervention given in one period might still be present at the start of the following period (carry-over effect). Formally, previous intervention allocation is a confounding factor for later periods and means that we cannot justify our conclusions about the comparative effects of individual interventions from the randomization alone. In this way the cross-over trial has aspects in common with an observational study. For ethical reasons a wash-out period is not possible in our study that may have carry-over effects, however, we increased the power of these tests by using baseline measurements taken during the run-in and wash-out periods. Then we can compare both individual intervention and combined intervention.

Programs

The programs were created to meet the findings of our previous report (Hanklang et al, 2016). We selected two main protective factors. They were the chemical intoxication prevention and improving communication skills in the family.

Knowledge, attitude and behavior were essential factors for the participants to change prevention and control behaviors and were the core contents of the study programs.

Because pesticides damage the human nervous system (Chen, 2012) pesticide exposure is related to depression (Pestizid, 2012). Some reasons of its unsafe use of farmers are erroneous belief about pesticide toxicity, lack of attention to safety precaution and lack of using protective gear and appropriate clothing during handling pesticides (Ajayi & Akinnifesi, 2008; Chalermphol & Shivakoti, 2009; Plianbangchang et al., 2009; Sosan & Akingbohungbe, 2009). These factors were included in the lecture.

Farmers suffer from lack of knowledge on safe use of chemical substances, and lack of appropriate training for PPE (Tritipsombut et al., 2014). The training for using PPE was also included in the lecture.

Knowledge rarely translates into safe practice. A study of a Brazilian agricultural community reported that 20% of subjects used the PPE against pesticides although 90% of them were aware of the harmfulness of pesticides (Recena et al., 2006). In this study, the volunteers supported the behavior.

Depression symptoms vary based on a household's composition, perceived social isolation stressors, and social supportive relationships in the local area (Clinical-depression, 2015; Good Therapy Organization, 2010; Segrin, 2006). The communication skills are the key to developing and keeping friendships and building a strong social support network (Segrin, 2006). A farmers' family has difficulties in communicating between members (Kolstrup, 2013). They lack in both knowledge and skills on communication (Kolstrup, 2013). The training for basic skills for communicating between family members, such as active listening, admiration, good questioning and assertiveness were included in the lecture. Because the earlier research suggested a greater likelihood of positive outcomes for self-help (Coote et al., 2012), the participants were encouraged and supported by the village health volunteers.

In the review literature for depression prevention it is difficult to determine whether individual components or the suit of intervention activities were required to achieve positive outcomes. Effective interventions for depression that appeared to be effective are: information, social support, access to treatment and advice, managerial

education, team-based approaches to improving work environments, addressing excessive workload and providing relief periods from heavy workloads (Cuijpers, 2012). Congruent with the importance of addressing risk factors for mental health disorders in agricultural sectors were promoting supportive work environments and promoting positive relationships (Roche et al., 2012).

This study shows the results that factors related to depression symptoms result from ones related to working as workers and ones related to lifestyle as people in the community congruent with the hypothesis.

Part III: The effectiveness of the programs

In this study, the effectiveness of a depression prevention program has evaluated the outcomes which were knowledge, attitude and behavior of communication skills in the family and chemical intoxication prevention. The discussion of this part is followed with hypothesis testing as follows:

Hypothesis 3: The developed intervention programs from work-related and lifestyle-related depression prevention programs decrease depression symptoms.

After the first program (group A: chemical intoxication prevention, group B: communication skills in the family), the total scores of the three scales for chemical intoxication prevention were significantly higher in group A than those in group B. These may support the effectiveness of the program directly. After the second program (group A: communication skills in the family, group B: chemical intoxication prevention), the total scores of the three scales for communication skills in the family showed no significant difference between the two groups. These also may support the effectiveness of the program.

After the first program, the total score of the three scales for communication skills in the family were significantly higher in group B than those in group A. After the second program (group A: improving communication skills in the family, group B: chemical intoxication prevention), the total scores of the three scales for communication skills in the family showed no significant difference between the two groups. These also may support the effectiveness of the program.

An individual chemical intoxication prevention program or an individual improving communication skills in the family program can help to reduce depression symptoms among rice farmers.

Mean scores of CES-D between chemical intoxication prevention first group (A) and improving communication skills in the family first group (B) during the time course of the research were decreasing.

These results show that either the chemical intoxication prevention program or the improving communication skills in the family program were effective in decreasing depression symptoms among rice farmers.

Both programs increased knowledge, attitude and behavior for depression prevention and both individual programs can decrease CES-D scores. This may be the effect of the same intervention procedure we used. Discussion on these results is as follows:

Knowledge is considered as a variable in the cognitive domain. The analysis demonstrated significant increase after implementing the first intervention and the combined interventions in both groups. This finding indicated that after participating in the programs, a farmer recognizes and understands information about reducing the risk of chemical poisoning, how to use protective equipment during work time, learned from the chemical intoxication program about how to have positive conversation with family members such as admiring each other, good questioning, assertively communicate emotions or feelings to each other, and learned from improving communication skills in the family program. Some points may play a role in explaining this finding.

Firstly, in both interventions, there were activities aimed to enhance knowledge about ways to prevent depression symptoms which included lectures, question-answers sessions, presenting a good model, playing games and small group discussion to enable farmers to recognize and understand the meaning, the linkage between depression symptoms, chemical intoxication prevention and communication in the family, risk factors, health outcomes, prevention and importance of preventing depression. Thus, when knowledge about risk factors related to depression was measured after the programs, significant increase in recognition and understanding this information, which is the definition of knowledge about pesticides related to

depression and communicating problems in the family related to depression, in this study were exhibited. This is in accordance with the revised Bloom's Taxonomy (Krathwohl, 2002), suggesting that lectures, question-answers sessions, presenting a model or case study, and small group discussion is likely to enable learners to remember and understand concepts, which are the first and second levels of the learning objectives of Anderson and Krathwohl's Taxonomy, respectively.

Secondly, it may be due to manipulations in the environment, the instruction media/equipment and instruction format used in the programs. During the implementation of the program, an amiable environment was created. In addition, interesting instruction media, such as big and colorful pictures related to the content and real samples, were delivered to the farmers.

Moreover, interactive and cooperative learning techniques such as group processes and games were used to enhance the farmers' learning experience and enable farmers to clearly understand what they have learned by themselves. It is likely that these techniques made farmers pay attention, attempt to learn, and take part in activities, which thereby enhanced their recall and understanding. Low education levels of the rural population, lack of information and training on pesticide safety, poor spraying technology, and inadequate personal protection during pesticide use have been reported to play a major role in the intoxication scenario (Atreya, 2008).

In our program to educate farmers to overcome problems, it is likely that 1) activities aiming to develop the cognitive domain and 2) the arrangement of an amiable environment and using interesting instruction media to enhance farmers' learning experiences may result in significant increases in knowledge after both of the interventions.

Attitude changed after the first interventions and combined interventions were done. It was found that the mean score of attitude of chemical intoxication prevention and communication skills in the family significantly increased from the baseline. This result suggests that after participating in the first intervention programs (both groups), farmers were more confident that they could improve their communication in the family (positive conversation with family members such as admiring each other, good questioning, assertiveness to communicate emotions or feelings to each other) and could have some good outcomes for themselves from the

chemical intoxication prevention (use PPE, good sanitation behaviors such as hand washing). There have been some possible explanations for this.

The activities in the interventions have applied the sources for developing self-efficacy and good outcome expectation suggested by the literature (Badura, 1977; 2004); including mastery experience, modeling and verbal persuasion.

1) Mastery experience helped farmers gain direct experience from skills training, related to good communicating and appropriate using of PPE, and then developing belief in their competence. The activities were composed of lectures, question-answers sessions, playing games, rehearsal and role performing in good communication and PPE preparation, small group discussion, thinking practice at both individual and group level as well as using previous experience of farmers to provide feedback.

2). Modeling used through the activities composed of, firstly, presentation of successful role model to farmers such as showing the farmer who was successful in good communication in the family or the one who was able to behave in accordance with the instructions using PPE. These methods could convince farmers that if they really made attempts without feeling discouraged, they shall eventually achieve it. Secondly, role model demonstration of full options of PPE preparation and using good communication techniques stimulated learning new behaviors or skills for farmers from the demonstrators. Thirdly, learning from peers as role models, which was reinforced when they behaved positively, activated farmers to behave positively or curb the negative responses.

3). Verbal persuasion was both a direct and indirect encouragement in order to make farmers believe in their ability. The activities consisted of incorporating village health volunteers into the interventions, suggestions, exhortations and providing verbal encouragement on progress.

Education in knowledge about risk of depression from both risk factors (pesticide exposure and communication in the family). From this activity, farmers may perceive severity and negative circumstances of depression, and thereby increase awareness of self-control when using PPE or having good communication in the family.

Behavior changed after the first interventions were done. It was found that the mean score of behavior of chemical intoxication prevention and communication in the family significantly increased from the baseline, indicating that the individual of each intervention is effective in improving chemical intoxication prevention behaviors and communication in the family behaviors. This finding may be due to several possible explanations.

Firstly, it may be because of the increase in knowledge and attitude of chemical intoxication prevention and improving communication skills in the family; where knowledge and attitude are two components that could predict behavior, and was supported by a number of research studies in relation to depression prevention behaviors (Brumby et al., 2011; 2015).

Secondly, this finding may be due to methods of performing activities used in the program or delivery features. The program was developed using interactive and cooperative learning techniques such as games, and rehearsal of PPE use/good communication in the family. In addition, the amiable environment, working ages and fun were very much involved. These techniques probably influenced the farmers' attitude towards use of PPE and communication in the family behaviors which may lead to an increase in depression prevention behaviors.

Results from the self-report of overall satisfaction supported this explanation, indicating that the farmers were very happy, appreciative, and had fun with the program especially the PPE rehearsal. The program provided support with chemical preventive masks for them to use in the real situation. These results consistent with a meta-analysis of preventing the development of depression at work (Tan et at., 2014) found that most of the interventions tested required substantial amounts of face-to-face teaching or group training time, ranging from a single four-hour session to a year-long intervention of redesigning the work environment.

CES-D decreased

The results of this study showed that the CES-D scores were decreased in both groups after the two programs were implemented, and found significantly different CES-D scores in terms of the combined effect by the scores tendency to decrease from measuring time 3 (after finishing the individual programs) to measuring

time 5 (after finishing the combined programs). The CES-D scores had continuously decreased from E3 to E4 but had no significant difference. This may be because after the first individual program was finished, we started the second program by not asking the participants to stop the good health behavior that we supported in the first program. In addition, we supported them to continue to simultaneously promote the behavior of the second program. After finishing the combined programs, we found that the CES-D scores had decreased more with statistical significance ($p<0.001$). These showed the confirmation that the combined intervention had a greater effect to decrease depression than individual intervention. Even when the CES-D score after the first intervention had already significantly decreased, this indicated that the rest of the CES-D scores would be much more difficult to decrease. However, when we had added the second intervention for them (without asking them to stop the first one behavior) or combined the interventions, the results showed that the participants still had significant decreasing depression scores. From this, results may suggest that both lifestyle-related factors and work-related factors were important concerns when designing the intervention.

The effectiveness of the program on communication skills in the family is consistent with the earlier study. The coping course was effective among sub-clinically depressed adults (Dam et al., 2007) and communication skills of general practitioners augment the effectiveness of depression treatment (van et al., 2008). As to the psychosocial factors at work, the interventions using health education, stress management, and meditation, etcetera, were effective (Zoonen et al., 2014; Tan et al., 2014; Bonde, 2008).

On the contrary, the information on the effectiveness of the program on chemical intoxication prevention on depression symptoms was now limited. Earlier intervention of education on farming safety focusing on introducing the use of PPE failed to show the significant relationship between the intervention and a depression mood (Onwuameze, et al., 2013). This is partially because education changes the knowledge but hardly changes the behavior. Our intervention was effective due to including the encouragement and support by the health volunteers.

The trends of decreasing CES-D scores showed no significant difference between the two groups, even when we assigned a different ordering of the program to

implement. It means no different CES-D score in terms of ordering effect. This may be corresponding to the earlier study that used two intervention methods; a goal-setting and planning manual and a brief telephone call that crossed-over with a control group (waiting list group). These two activities showed no significant difference between the two groups (Coote et al., 2012). The lecture on the starting day may correspond to the goal-setting and planning manual, and visits by the health volunteer to the telephone call. In their study, a brief telephone call was performed once a week. The authors noted that more frequent telephone calls may potentially increase the effectiveness of the program. In our study, the health volunteers visited the subjects once a week. The conversation at the meeting is more effective than one by the telephone.

The ordering effect was not found in this study. In terms of improving communication skills in the family, the results of this study confirmed in general those of the standard mental health promotion program that focused on promoting the coping strategies or interpersonal relationships that can decrease depression even among rice farmers in our test. In addition, this study already introduced the new factor related to the rice farmers' working behaviors and can predict depression symptoms; chemical intoxication prevention. We established this new factor to intervention testing by improving the chemical intoxication prevention behaviors, especially focusing on PPE use. The results surprisingly showed the same effects of improving communication skills in the family in decreasing depression symptoms. In addition, the results confirmed that the score of chemical intoxication prevention behavior increased associated with the depression symptoms decreased. However, chemicals exposure data were not collected.

These results may support to confirm the literature that mentioned the risk of depression from exposure to pesticides and organophosphates (Onwuameze et al., 2013) and the scientific evidence of association between pesticide exposure and depression has been shown in farmers (Freire & Koiman, 2013).

Our results have demonstrated that such designed intervention significantly reduces depression symptoms. This finding would support the assumption that chemical intoxication prevention and/or improving communication skills in the family can promote the psychological conditions and may be beneficial in the primary care of rice farmers with mild-to-moderate depression symptoms.

Hypothesis 4: Knowledge, attitude and practice were the predicted actual behavior changes in relation to depression prevention behavior and change in the depression symptoms score.

The changed CES-D score in the improving communication skills in the family intervention group was significantly related to the change in the total scores of knowledge, attitude and behavior for communication skills in the family. The participants in the program (communication intervention) recognized the information on improving the communication skills in the family, became confident that they could improve their communication skills in the family, and then tried to change the behaviors for communication skills in the family. These changes in knowledge, attitude and behavior may be effective in decreasing the depression symptoms.

The changed CES-D score in the chemical intoxication prevention intervention group were significantly related to the change in the total score of behavior for chemical prevention. After participating in the program (chemical intoxication prevention intervention), rice farmers recognized the information on reducing the risk of chemical poisoning, became confident that they could have good outcomes from the chemical intoxication prevention because the scores for knowledge and attitude were increased. However, they were not significant predictive factors. In order to decrease the depression symptoms, it is necessary for rice farmers to change the behavior toward the chemical intoxication prevention, because the actual exposure to chemical substances should be decreased.

CHAPTER VI
CONCLUSION

This study used intervention. Its plan had three phases; Phase I was a cross-sectional study that was used to find the prevalence of depression and its related factors. Phase II was program development, and Phase III was implementation and evaluation of the program. The conclusion of this study presented the prevalence and associated factors of depression among rice farmers, implementation and evaluation of the program, and implications, limitations, and recommendations for further studies.

Conclusion

Phase I: Cross-sectional study

The prevalence of depression symptoms was high among Thai rice farmers. The depression symptoms were associated with health action and working styles in males and an accepting atmosphere in females. These results show a high possibility that it is important to help farmers change their lifestyles and working styles to address their mental health problems.

Phase II: Developmental program

The in-depth interview and focus group guidelines aimed to explore the feasibility of programs with stakeholders in two communities, Nakhon Ratchasima, Thailand. The findings of the in-depth interviews and focus group discussion found congruent opinions of stakeholders and results of our preliminary study in Phase I that rice famers faced with risk factors to depression symptoms such as chemical exposure and communication problems in the family. As a result, it was indicated that participants were concerned with depression problems from working conditions and family communication. Moreover, participants did not know the potential hazard of

chemical substances to depression problems and the way to have good communication skills in the family. Therefore, the result of this part and our preliminary study developed the depression prevention program through the application of the Social Cognitive Theory, including knowledge, attitude and behavior for depression prevention.

Feasibility of the depression prevention program implementation of this study involved stakeholders such as researchers, participants, health personnel, and leaders of the community in order to develop the program essence based on the preliminary study and feasibility of participant's context to make a sustainable change of depression prevention. The development of the depression prevention program was combined with both the result of quantitative data and literature reviews, the framework of concepts and principles of occupational health, mental health and applied Social Cognitive Theory as the guideline of research methodology.

Phase III: Implementation and evaluation program

Depression is popular among farmers. In the present study, we conducted a randomized controlled trial to investigate the effects of the program containing chemical intoxication prevention and improving communication skills in the family on depression symptoms in rice farmers with non-clinical, mild-to-moderate depression symptoms. Ninety-two rice farmers (mean age was 49 years old) with mild-to-moderate depression symptoms as measured by the CES-D, were randomly assigned for 6-weeks to either a program for chemical intoxication prevention or one for improving the communication skills in the family. The subjects were then crossed over to the alternate program for an additional 6-week period. Both programs consisted of lecture and small group discussion on the starting day and home visits by village health volunteers for 4 weeks from the starting day. The variables were CES-D scores and the scale for knowledge, attitude and behavior on chemical intoxication prevention or improving communication skills in the family.

After participation in the program, the CES-D score showed a significant decrease. No interaction was obtained between the two programs. The decreased CES-D score in the program for improving the communication skills in the family were significantly related to the changes in the scales for knowledge, attitude and behavior

on communication skills in the family even after adjusting for using personal and communication factors. The decreased CES-D score in the program for chemical intoxication prevention were significantly related to the change in the scale for behavior on chemical intoxication prevention.

Findings related to the hypotheses testing

1) After the improving communication skills in the family program, they had a significantly higher knowledge, attitude and behavior than before implementation (p- < .001).

2) After the chemical intoxication prevention program, there was a significantly higher knowledge, attitude and behavior than before implementation (p < .001).

3) After the improving communication skills in the family program, there was a significantly lower depression symptoms score among rice farmers than before implementation (p < .001).

4) After the chemical intoxication prevention program, there was a significantly higher knowledge, attitude and behavior than before implementation (p < .001).

5) After the chemical intoxication prevention program, there was a significantly lower depression symptoms score among rice farmers than before implementation (p < .001).

6) After the combination of improving communication skills in the family program and a chemical intoxication prevention program, there was a significantly lower depression symptoms score among rice farmers than before implementation (p < .001).

7) After the implemented two programs with different ordering, there was not a significantly different depression symptoms score. (p < .001).

8) Knowledge, attitude and behavior of communication skills in the family were the predicting actual behavior change in relation to depression prevention behavior and change in depression symptoms (p <.001). For the chemical intoxication prevention program, knowledge and attitude had a higher score after being

implemented but were not significant to be the predictor of depression symptoms. However, behavior was a good predictor for depression symptoms ($p < .005$).

The findings in this study suggest that the program containing the chemical intoxication prevention or improving communication skills in the family may be effective in improving the depression state of rice farmers with mild-to-moderate depression symptoms.

After participation in the program, the CES-D score showed a significant decrease. No interaction was obtained between the two programs.

Implications of this study

Based on the research findings, they can be applied to several implementations as follows:

1. Implication for individual level

Rice farmers should gain an educational program training on knowledge, attitude and behavior of chemical intoxication prevention and/or improving communication skills in the family by strong support from village health volunteers or health care providers who work in the community in order to perform effectively, efficiently and sustainably.

Moreover, chemical health risks especially on depression showed problems among rice farmers. Therefore, it is necessary to raise knowledge, awareness, and shift consciousness on their perception of chemical risks by increasing participants' ability to practice the behavior of chemical intoxication prevention by themselves, such as following chemical instructions, and using PPE. This program helps participants use protective equipment devices and other behaviors such as performing checks on their equipment, put on gas masks all the time while working with work-related chemical substances, cleaning tools and working clothes, cleaning their body after work and other sanitary behaviors. Therefore, the chemical intoxication prevention program can raise the knowledge, attitude and behaviors against chemical toxicity and can reduce the score of depression symptoms among rice farmers.

The improving communication skills in the family program can improve skills on how to have positive conversations with family members, such as admiring each other, good questioning, and assertiveness to communicate emotions or feelings to each other, learned from the improving communication skills in the family program. Providing a minimal support with identifying appropriate communication in the family for rice farmers can reduce depression symptoms.

2. Implication for community level

Leaders of the community should support the facilitators and resources for rice farmers in the community in order to promote occupational health, especially in chemical use in very high quantity and low safety behaviors in the community, such as providing a center of information of chemical instructions or awareness in order to get health information on occupational health and mental health monitoring in the community.

In addition, leaders of the community should be coordinating with environmentalists for measuring chemical exposure, coordinating with public health nurses for assessment and monitoring chemical toxicity disease, and collaborating networks with informal work centers for improving health and safety. In addition, communication skills in the family are also important for the mental health of people in the community; therefore the community leader, village health volunteers and public health personnel should be concerned about this issue. Our findings would lend support to the assumption that improving coping skills, increased skills of interpersonal relationship by improving the communication skills in the family can promote psychological conditions and may be beneficial in the primary care of rice farmers with depression symptoms in the community.

3. Implication for public health nursing service

Public health nurses, who are home visit nurses, should be prepared to qualify occupational health diseases and not ignore mental health dimensions, and transfer into practice regarding assessing skills specific to occupational health risks, such as chemical use and other risk factors from the lifestyles among rice farmers, such as chemical blood screening tests, family health assessments, coping patterns of

people in the community, depression symptoms screening tests in order to early-detect depression symptoms from both work-related risks and lifestyle-related risk factors.

Health practitioners or professional interventionists, who require decreased depression symptoms scores as a major outcome, should apply strategies aiming at improving chemical use behaviors and improving communication skills in the family in the depression prevention interventions; including the training for basic skills for communicating between family members, such as active listening, admiration, good questioning and assertiveness by set education sessions. In addition, they should have promoted rice farmers from depression symptoms, such as giving information on chemical safety use, screening chemical risks and promoting PPE use. The chemical intoxication prevention program is to reduce stressors to make healthy working conditions. In addition, the improving communication skills in the family intervention program is to promote the healthy lifestyle behaviors. Another key success is encouragement and support by the village health volunteers that should be considered when doing depression prevention programs in a primary care unit.

4. Implication of public health nursing education

Public health nurse educators should be concerned about the health and safety of rice farmers who are at a high risk for occupational health diseases and mental health, especially depression due to chemical exposure from work and also the communication skills in the family that will help rice farmers cope easily or overcome the trouble situations in life. In addition, nursing curriculum should add more on theoretical content on occupational chemical screening and performing mental health promotion intervention, especially screening depression and concerning risk factors of depression among farmers.

Nursing students should be prepared to practice with farmers who work in the community. Therefore, nursing curriculum should add the content and practicum experience within the framework of a co-operative inquiry learning concept and application of occupational diseases and not ignore mental health problems. In addition, public health nurse educators should be supported by conducting research on informal sectors in the community in terms of mental health and occupational health and safety, depression prevention and occupational health promotion in the work of

informal workers, for example rice farmers, in order to reduce the prevalence of depression disorder and increase the quality of life.

5. Implication of public health nursing administration

The public health nurse administrator should be concerned about the health and safety of informal workers in the community, especially rice farmers who are at a high risk for depression. In addition, administrators should set the plan and policy on prevention of depression, such as educational programs to promote preventive behaviors, depression screening, work conditions and improving environmental and communication skills to improve a good relationship within the family and community.

Those policies should be in concordance with the ILO and WHO guidelines. In addition, those policies should be an impact on the national health plan at the country response level in order to enforce them into the routine services of government and non-government officers. Moreover, they should support the resources such as facilities, structure, budget, and human resources in order to effectively put the policy into practice.

6. Implication of public health policy

The policy makers, such as the Ministry of Public Health, Ministry of Labor, and the Provincial Health Administration, should be addressed on the depression issue, occupational health policy, and a preventive mental health problems strategy for informal workers at the community level, especially among majority groups such as rice farmers. The policy should be linked between the policies at the practice level. In addition, those policies should include mental health risk assessment, occupational health risk screening, and monitoring the environment in the work setting. In addition, the workers' lifestyle should not be omitted from assessment, and should be taken care of with coping skills, and communication skills in the family of workers. All this would be helpful to promote healthy working styles, lifestyles and to improve the workers' quality of life.

In conclusion, the program containing the chemical intoxication prevention and/or improving communication skills in the family may, therefore, be

effective in improving the depression state of rice farmers with mild-to-moderate depression symptoms, and may be beneficial in primary care services in such farmers.

Strengths and limitations of the study

Cross-sectional study

The subjective area was selected using the highest prevalent area. This made the prevalence of depression symptoms higher. It is, therefore, difficult to generalize to the prevalence of the whole country. This study was focused only on the subjective area and then the statistical analysis had no weightage procedure for the adjusted design effect of the complex survey. However, we were concerned about this issue and plugged in a design effect to calculate our sample size process. Also, the questionnaire consists of many items which may have some variance in the answers.

Program implementation and evaluation

In this study there was not a psychiatric interview, but the CES-D was used to select the subjects. The CES-D is a questionnaire widely used as a screening tool, especially in primary care, but represents symptoms during the past weeks and may include temporary symptoms. However, we assessed the depression state of the subjects twice in order to carefully identify depression symptoms of the participants.

There was a significant difference in income between the two groups before starting the program, even after the participants were randomly divided. This difference seems to be related to the difference in exposure to the chemical substances by spraying. To reduce this effect on the results, we had supplied all participants with masks to prevent against chemical substances (3M Thailand, 9043) during the 13-week program.

The results obtained in this study may not be transferable to other farmers with different social and cultural contexts, because the use of chemical substances depends on the products and the circumstances of the insects.

This study shows the same tendency of decreasing depression among rice farmers in both programs. It may be confounded by a common factor of visits by

health volunteers. The researcher trained village health volunteers about their roles in the program: depression and prevention methods in each program. Then when visiting the participants, the village health volunteers may have emphasized checking only the depression prevention but did not emphasize the specific knowledge, attitude or practices for each intervention. Therefore, two programs have common factors on the volunteers' visits. Also this study did not separate the measures of the activities of volunteer visits from the program activities. Due to this the researcher cannot clearly clarify the effects of the program that may be affected by specific factors that the researcher had intervened or effects from the common factors of the village health volunteer visits.

For experimental design, a control group is needed to control random variables and to make sure that the effect measured is truly caused by the independent variable. However, the participants of this study have mild-to-moderate depression symptoms and because of ethical issues, the participants with depression symptoms should receive the prevention program in order to reduce the depression symptoms. Then the cross-over design was employed to implement it for all participants in order to prevent the progress of depression disorder. The cross-over design is useful in confirming the effect of both factors in the program at the same time and same subjects, and this design is suitable for controlling the confounding factors between the groups of participants. It is strengthening the internal consistency.

Recommendations for further studies

For the researchers who are interested in research related to depression prevention, mental health promotion and occupational risks reduction for rice farmers, they should pay attention to those issues in order to enhance the effectiveness of the intervention program in the following:

1.In further research, a longitudinal, randomized control trial is needed to confirm a possibility of the duration of chemical exposure and the exposure volumes associated to depression symptoms. Biochemical variables such as acetyl cholinesterase blood level and the blood/urinary cortisol hormone should be tested in order to obtain clear reduction in risk for chemical exposure and other complications

of depression symptoms as a biomarker indicator. Therefore, a longitudinal study can determine the cause and effect of chemical exposure and depression symptom changes among rice farmers in the community.

2. In this study, the depression prevention program for rice farmers emphasized only depression symptoms. Thus, further research should be implemented for the preventive program which centers on other mental health problems such as stress, anxiety, dementia, and other possible psychosocial problems due to many hazardous exposures in the work setting and risks from lifestyles.

3. Further study should be on other members who live in the same community if those people are at a high risk to exposure hazards and other work-related diseases. The communication skills in the family measured only the participants in this study, therefore the family members need to get involved in a further program.

4. The sustainable change of the program should be tested in a further study because the duration of evaluation is the indicator for an effective program. Therefore, the duration of implementation and evaluation should be extended, such as six or twelve months after implementation because depression symptoms can easily happen and relapse. Within 6 months and 1 year after the intervention follow-up, testing may be needed.

5. Intervention duration is important to consider because it is difficult to disseminate intensive programs in the community given the competing demands for their working time. Moreover, the long intervention duration also translates into higher dissemination costs because both training and delivery costs will be greater. Future studies should investigate the effect of the cost of the intervention.

6. As the results showed that visits by village health volunteers to encourage and support may be a key mediator between the behaviors for depression prevention and depression symptoms score decreasing in rice farmers. Future study might include an investigation to confirm this among rice farmers.

7. Since the factors associated to depression symptoms among rice farmers found gender differences, a further depression prevention program should intervene separated by gender.

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APPENDICES

APPENDIX A
LIST OF EXPERTS

Phase I: Cross-sectional study

1. Prof. Supa Pengpid

The Director of Asean Institute for Health Development (AIHD) and academic staff

2. Dr. Somkiat Siriruttanapruk

Bureau of occupational and environment disease, Department of control disease, Ministry of Public Health

3. Dr. Pitakpol Boonyamalik

Bureau of Mental Health Strategy, Department of Mental Health, Ministry of Public Health

4. Assoc. Prof. Dr. Ratchneewan Ross

Director of International Activities, College of Nursing, Kent State University, USA

Phase II: Program development and evaluation

1. Assist. Prof. Chatchai Ekpanyaskul

Head of Department of Preventive and Social Medicine, Faculty of Medicine, Srinakharinwirot University

2. Dr. Pitakpol Boonyamalik

Vice Director General of Department of Mental Health, Ministry of Public Health

3. Dr.Soisuda Kasornthong

Faculty of Public Health, Thammasat University

4. Assist. Prof. Dr. Wanpen Songkham

Faculty of Nursing, Chiang Mai University

5. Dr. Duangrat Kathalae

The Boromarajonani College of Nursing, Nakhonratchasima

APPENDIX B
QUESTIONNAIRES

Phase I: Cross-sectional study

Title: Factors related to depression symptoms

The objective of this questionnaire is to ask you about socio-demographic characteristics, depression symptoms and factors related to depression symptoms.

The questionnaire is divided into 3 parts:

Part I: Socio-demographic characteristics

Part II: Health behaviors and Lifestyles

Part III: Work-related factors

Remark: Your response will be kept confidential and will be presented as overall results.

Thank you very much for your cooperation

Miss Suda Hanklang
A doctoral student at the Department of Public Health Nursing, Faculty of Public Health, Mahidol University

Part I: Socio-demographic characteristics

Please answer the questions below by checking (√) in the ( ) or fill out your response in the blanks

1. At present, you are…….years old.
2. Sex ( ) 1.male ( ) 2.female
3. Marital status

   ( ) 1. Single ( ) 2. Married ( ) 3. Married but separate live because of work

   ( ) 4. Widow ( ) 5. Divorce/separate
4. Highest educational level

   ( ) 1. No education

   ( ) 2. Primary school

   ( ) 3. Junior high school/vocational certificate

   ( ) 4. Senior high school/high vocational certificate

   ( ) 5. Bachelor and/or higher
5. Family income (Baht per month)

   ( ) 1. Not enough and having debts

   ( ) 2. Not enough but no debts

   ( ) 3. Enough and no debts

   ( ) 4. Enough but no saving money

   ( ) 5. Enough and have saving money
6. Have you had disease diagnosed by physician?

   ( ) 1. Don't know ( ) 3. Yes……Diagnosed for……years

   ( ) 2. No
7. Have you had prescribed medication?

   ( ) 1.No ( ) 2.Yes
8. Family member……..person (s)
9. Have you had psychiatric disorder in your family history?

   ( ) 1. Yes but had no treatment

   ( ) 2. Yes, disease name …….

   ( ) 3. No

10. In the past 1 week, have you have alcohol consumption?

( ) 1. No

( ) 2. 1-2 times

( ) 3. 3-4 times

( ) 4. Every day

11. Have you ever smoking?

( ) 1. No ( ) 2.Yes, number of cigarette…….per day

12. Have you ever exercising?

( ) 1. No ( ) 2.Yes, type of exercising……Frequency…….per week

13. Sleeping …….. Hours start at ……to……

14. Work as a rice farmer…….years……..months

15. In the past one month, have you ever had an accident at work (please specify)..... .....Number…….per month

16. How did you expose to the chemicals substances such as pesticides? (Respondents could choose more than one choice)

( ) 1. By mixing

( ) 2. By spraying

( ) 3. In chemical using area

( ) 4. Other (please specify).....

17. In the past one year, have you ever used the chemicals substances for farming such as pesticides?

( ) 1. Pesticides

( ) 2. Herbicides

( ) 3. Chemical fertilizers accelerate the growth of plants

( ) 4. Other (please specify).....

18. When is the last time you were exposed to or used of chemicals substances? (Please specify).....

19. Do you have abnormal symptoms after exposure chemical substances?

( ) 1. Never

( ) 2. Sometimes

( ) 3. Always

Part II: Health behaviors and Lifestyles

Please answer the questions below by checking (√) in the table

Agree mean strongly agreed with the sentences or it match all your feeling and your opinions

Neutral mean partially agreed with the sentences or it only half match your feeling and your opinions

Disagree mean not agreed with the sentences or it not match your feeling and your opinions

No.	Items	Agree	Neutral	Disagree
	Health behaviors			
1	I always concern about my health			
2	…….			
3	…….			
4	…….			
5	…….			
	Family relationships			
6	My family member showing the love both verbal and doing for each other			
7	…….			
.	…….			
.	…….			
.	…….			
15	…….			
	Coping patterns			
16	I always talk about my problems to the closely one			
17	I always solve the problem completely by myself			
.	…….			
.	…….			
.	…….			
24	…….			
	Social network and participation in community activities			
26	My community had the integration or the unity			
.	…….			
.	…….			
.	…….			
34	…….			

Part III: Work-related factors

Please answer the questions below by checking (√) in the table

Agree mean strongly agreed with the sentences or it match all your feeling and your opinions

Neutral mean partially agreed with the sentences or it only half match your feeling and your opinions

Disagree mean not agreed with the sentences or it not match your feeling and your opinions

No.	Items	Agree	Neutral	Disagree
	Physical work environment			
1	I work with appropriate lighting			
2	…….			
3	…….			
4	…….			
5	…….			
	Chemical work environment			
6	I continuing used the chemical substance in my work more than 1 year			
7	…….			
8	…….			
9	…….			
10	…….			
	Biological work environment			
11	I directly expose to dirty water and mud during work			
12	…….			
13	…….			
14	…….			
15	…….			
	Psychosocial work environment			
16	I had pressured from external condition (such as drought, flooding)			
17	…….			
18	…….			
19	…….			
20	…….			

Center for Epidemiologic Studies Depression Scale (CES-D)

Instructions: Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way **during the past week**.

Items	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.				
2. I did not feel like eating; my appetite was poor				
3…….				
4…….				
5…….				
6…….				
7…….				
8…….				
9…….				
10…….				
11…….				
12…….				
13…….				
14…….				
15…….				
16…….				
17…….				
18…….				
19…….				
20. I could not get "going."				

Phase II: Development depression prevention program

In-depth interviews guideline

1. Are there has existing some policies related to mental health services for rice farmers? Are the policies can have applied in real situations and effective implementation?
2. What is the situation of mental health issues, especially depression in the area? In your opinion, would you set priority for depression prevention policy?
3. From the Phase I results of this study found that high prevalence of depression in this area. How do you think about the response policy of the services in order to management for this problem?
4. According to the situation of depression in this area, have you have any projects are already implemented and consistent with this problem issue?
5. If you can intervene to resolve the problem issue or would like to put activities in this depression prevention project, what will be filled in the plans, policies and why?
6. In your opinion and from conclusions of Phase I results of this study which project or activity that is the most necessary, changeable and feasible for the rice farmers in this study (please suggest the most important one factor per one program).
7. Do you have any suggestions or lessons learn from your past policies/past services to be beneficial to in this study?

Focus group discussion guideline

Focus group discussion guideline was developed by researcher based on literature reviews which focus on the need of stakeholders, feasibility, benefit, support, readiness and preparedness for depression prevention program in the community.

1. Would you please share your experiences about mental health issues that exist in your community, especially, depression?
2. Based on the information of Phase I results that I already presented, do you have any opinions about the problem issues?
3. In your opinion, are there any activities or mental health services that are currently available implement? What aspects are in line with this problem? And should we add any extra activity of depression prevention program into those existing services?
4. Would you please choose the activity that most appropriate to the context and the problems of your community encounter? Please priorities your needed topic and please select only one activity per one program.
5. Please specific proper time for your training, the place for workshop training and the expected outcome or benefit of training program
6. How is the feasibility, support, facilities and obstacle on the implementation?

Phase III: A randomized controlled trail evaluation

Questionnaires

The objective of this questionnaire is to evaluate the change in knowledge, attitude and behavior of farmers. In order to clarify the effectiveness of the programs, we have made the question items on chemical intoxication prevention and on communication skills in family in this study.

Title: Chemical intoxication prevention program evaluation

The objective of this questionnaire is to ask you about personal and working factors, depression symptoms and evaluate the change in your knowledge, attitude and behaviors of chemical intoxication prevention.

The questionnaire is divided into 4 parts:

Part I: Personal and working factors

Part II: Knowledge on chemical intoxication prevention

Part III: Attitude for chemical intoxication prevention

Part IV: Behaviors for chemical intoxication prevention

Remark: Your response will be kept confidential and will be presented as overall results.

Thank you very much for your cooperation

Miss Suda Hanklang

A doctoral student at the Department of Public Health Nursing, Faculty of Public Health, Mahidol University

Part I: Personal and working factors

Please answer the questions below by checking (√) in the ( ) or fill out your response in the blanks

1. Sex ( ) 1.male ( ) 2.female
2. At present, you are…….years old
3. Marital status

   ( ) 1. Single ( ) 2. Married ( ) 3. Married but separate live because of work

   ( ) 4. Widow ( ) 5. Divorce/separate
4. Highest educational level
5. Family income (Baht per month)
6. Have you had disease diagnosed by physician?

   ( ) 1. Yes (please specified)……. ( ) 2. No
7. How did you expose to the chemicals substances such as pesticides? (Respondents could choose more than one choice)

   ( ) 1. By mixing ( ) 2. By spraying

   ( ) 3. In chemical using area ( ) 4. Other (please specify).....
8. Do you have abnormal symptoms after exposure chemical substances?

   ( ) 1. Never ( ) 2. Sometimes ( ) 3. Always

Part II: Knowledge on chemical intoxication prevention

Please answer the questions below by checking (√) in the table

No.	Items	Correct	Wrong	Don't know
1	Types of chemical substances			
.	…….			
.	…….			
.	…….			
12	…….			

Part III: Attitude for chemical intoxication prevention

Please answer the questions below by checking (√) in the table

Agree mean strongly agreed with the sentences or it match all your feeling and your opinions

Neutral mean partially agreed with the sentences or it only half match your feeling and your opinions

Disagree mean not agreed with the sentences or it not match your feeling and your opinions

No.	Items	Agree	Neutral	Disagree
1	Following the chemical instruction reduces the risk of chemical exposure			
.	…….			
.	…….			
.	…….			
10	…….			

Part IV: Behaviors for chemical intoxication prevention

Please answer the questions below by checking (√) in the table

Never mean you have no behavior consistent with the sentences

Sometime mean you have done behavior more than half of the sentences

Always mean you have done behavior consistent with all of the sentences

No.	Items	Never	Sometime	Always
1	Reading chemical instruction			
.	…….			
.	…….			
.	…….			
16	…….			

Title: Communication skills in family program evaluation

The objective of this questionnaire is to ask you about personal and communicating factors, depression symptoms and evaluate the change in your knowledge, attitude and behaviors of communication skills in family.

The questionnaire is divided into 4 parts:

Part I: Personal and communicating factors

Part II: Knowledge on communication skills in family

Part III: Attitude for communication skills in family

Part IV: Behaviors for communication skills in family

Remark: Your response will be kept confidential and will be presented as overall results.

Thank you very much for your cooperation

Miss Suda Hanklang

A doctoral student at the Department of Public Health Nursing, Faculty of Public Health, Mahidol University

Part I: Personal and communicating factors

Please answer the questions below by checking (√) in the ( ) or fill out your response in the blanks

1. Sex ( ) 1.male ( ) 2.female

2. At present, you are…….years old

3. Marital status

( ) 1. Single ( ) 2. Married ( ) 3. Married but separate live because of work

( ) 4. Widow ( ) 5. Divorce/separate

4. Highest educational level

( ) 1. No education ( ) 2. Primary school

( ) 3. Junior high school/vocational certificate

( ) 4. Senior high school/high vocational certificate ( ) 5. Bachelor and/or higher

5. How many family members (please specify) ……..persons

6. How do you think about your communication in family? (allowed to select multiple answers)

( ) 1. Satisfaction ( ) 2. Joyfully

( ) 3. Understandingly ( ) 4. In kind terms

( ) 5. Unsatisfactionly ( ) 6. Joylessly

( ) 7. Heartlessly ( ) 8. In negative terms

Part II: Knowledge on communication skills in family

Please answer the questions below by checking (√) in the table

No.	Items	Correct	Wrong	Don't know
1	Frustrate happens by no talking to each other			
.	…….			
.	…….			
.	…….			
10	…….			

Part III: Attitude for communication skills in family

Please answer the questions below by checking (√) in the table

Agree mean strongly agreed with the sentences or it match all your feeling and your opinions

Neutral mean partially agreed with the sentences or it only half match your feeling and your opinions

Disagree mean not agreed with the sentences or it not match your feeling and your opinions

No.	Items	Agree	Neutral	Disagree
1	Listening actively to what the family said			
.	…….			
.	…….			
.	…….			
10	…….			

Part IV: Behaviors for communication skills in family

Please answer the questions below by checking (√) in the table

Never mean you have no behavior consistent with the sentences

Sometime mean you have done behavior more than half of the sentences

Always mean you have done behavior consistent with all of the sentences

No.	Items	Never	Sometime	Always
1	Listening actively and showing understanding			
.	…….			
.	…….			
.	…….			
16	…….			

Internal consistency of questionnaires of phase I: Cross-sectional study

1. CES-D

Reliability Statistics	
Cronbach's Alpha	N of Items
.847	20

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CESD1	17.2000	52.510	.642	.833
CESD2	16.9667	52.240	.633	.833
CESD3	16.9667	51.895	.572	.834
CESD4	15.5000	54.466	.230	.852
CESD5	16.4000	51.283	.545	.835
CESD6	16.9000	51.886	.638	.832
CESD7	15.8333	54.213	.253	.850
CESD8	15.6000	51.834	.391	.844
CESD9	17.2000	56.028	.324	.844
CESD10	17.4000	54.317	.666	.836
CESD11	16.7000	50.493	.683	.829
CESD12	15.9000	49.334	.504	.838
CESD13	17.1333	51.430	.563	.834
CESD14	17.0333	50.309	.716	.827
CESD15	17.2667	54.271	.506	.839
CESD16	15.5667	52.254	.408	.842
CESD17	17.3667	58.447	.011	.852
CESD18	17.3667	55.895	.328	.844
CESD19	17.3333	58.506	-.008	.854
CESD20	17.4000	56.869	.179	.849

2. Factors related to depression symptoms

Health behaviors

Reliability Statistics

Cronbach's Alpha	N of Items
.848	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Health behavior 1	4.5333	5.154	.432	.879
Health behavior 2	4.6333	4.585	.749	.794
Health behavior 3	4.5667	4.392	.728	.798
Health behavior 4	4.6333	4.516	.780	.785
Health behavior 5	5.3667	4.930	.639	.823

Family relationships

Reliability statistics

Cronbach's Alpha	N of Items
.858	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Family relationship1	12.9667	14.861	.582	.845
Family relationship2	12.7333	16.478	.570	.845
Family relationship3	13.0333	20.171	-.210	.898
Family relationship4	12.4667	18.051	.315	.861
Family relationship5	12.9333	15.375	.675	.835
Family relationship6	12.7667	16.599	.621	.843
Family relationship7	12.8000	15.338	.745	.830
Family relationship8	12.9000	15.059	.813	.824
Family relationship9	13.2333	14.047	.733	.828
Family relationship10	13.1667	13.661	.874	.813

Coping patterns

Reliability Statistics

Cronbach's Alpha	N of Items
.720	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Coping pattern1	11.8000	5.683	.716	.619
Coping pattern2	11.2333	8.323	.131	.729
Coping pattern3	11.7667	9.082	-.192	.799
Coping pattern4	12.0000	6.138	.565	.657
Coping pattern5	11.6000	7.007	.555	.670
Coping pattern6	11.8333	6.764	.386	.700
Coping pattern7	11.5000	6.810	.642	.656
Coping pattern8	11.4667	6.740	.682	.650
Coping pattern9	11.3333	7.885	.264	.715

Social network and participation in community activities

Reliability Statistics

Cronbach's Alpha	N of Items
.727	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Social network1	10.9333	4.616	.726	.640
Social network2	10.8000	4.993	.560	.674
Social network 3	10.8667	4.878	.502	.682
Social network 4	11.0667	5.237	.439	.696
Social network 5	10.9000	5.541	.277	.724
Social network 6	10.8000	5.062	.525	.680
Social network 7	10.9000	4.714	.676	.650
Social network 8	12.2667	7.375	-.514	.810
Social network 9	10.9333	5.099	.400	.703

Work conditions

Reliability Statistics

Cronbach's Alpha	N of Items
.749	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Work conditions1	4.9333	3.857	.701	.721
Work conditions2	5.2667	2.754	.766	.676
Work conditions3	5.4333	3.909	.467	.782
Work conditions4	5.4000	3.559	.686	.712
Work conditions5	4.9667	4.447	.301	.824

Physical work environments

Reliability Statistics

Cronbach's Alpha	N of Items
.749	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Physical work 1	5.7667	2.461	.248	.797
Physical work 2	6.3333	1.471	.737	.608
Physical work 3	6.1667	1.937	.651	.652
Physical work 4	5.4333	2.461	.492	.722
Physical work 5	5.5000	2.259	.564	.695

Chemical work environment

Reliability Statistics

Cronbach's Alpha	N of Items
.708	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Chemical work 1	4.1333	2.671	.367	.695
Chemical work 2	5.1667	2.282	.439	.673
Chemical work 3	4.8333	2.213	.484	.652
Chemical work 4	4.4333	2.392	.556	.627
Chemical work 5	4.6333	2.378	.499	.646

Biological work environment

Reliability Statistics

Cronbach's Alpha	N of Items
.874	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Biological work 1	5.5333	3.223	.855	.816
Biological work 2	5.6667	3.333	.720	.844
Biological work 3	6.2667	2.892	.661	.871
Biological work 4	5.6667	3.471	.632	.864
Biological work 5	5.6667	3.333	.720	.844

Psychosocial work environment

Reliability Statistics

Cronbach's Alpha	N of Items
.706	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Psychosocial work 1	4.9333	2.409	.623	.589
Psychosocial work 2	4.7000	2.907	.400	.681
Psychosocial work 3	4.7333	2.685	.441	.666
Psychosocial work 4	5.1000	2.507	.338	.731
Psychosocial work 5	5.8667	2.602	.584	.614

ผลการตรวจสอบความตรงตามเนื้อหาของเครื่องมือ (Content Validity Index)

ระดับความคิดเห็นของผู้เชี่ยวชาญ : แบบประเมินปัจจัยที่มีความสัมพันธ์กับภาวะซึมเศร้าในชาวนาไทย

ส่วนที่ 1: พิจารณาความเหมาะสมของเนื้อหา ภาษาที่ใช้ เช่น ข้อมูลทั่วไปของลักษณะประชากรที่ศึกษา

ส่วนที่ 2: ข้อมูลพฤติกรรมสุขภาพและวิถีชีวิต

ข้อความ	คนที่ 1	คนที่ 2	คนที่ 3	คนที่ 4
ด้านพฤติกรรมสุขภาพ 1. ท่านดูแลสุขภาพเป็นอย่างดีและถือเป็นเรื่องสำคัญสำหรับท่าน	4	4	4	4
……..	4	3	4	4
5…….	4	3	4	4
ด้านสัมพันธภาพในครอบครัว 6. สมาชิกครอบครัวใช้คำพูดและการกระทำที่แสดงว่ารักท่าน	4	4	4	4
……..	4	4	4	4
15…….	4	4	4	4
ด้านแบบแผนการเผชิญปัญหา 16. เมื่อท่านมีปัญหา ความคับข้องใจท่านมักระบายออกมาให้บุคคลใกล้ชิดรับฟัง	4	4	3	4
……..	4	4	3	4
25. ……..	4	4	4	4
ด้านเครือข่ายทางสังคมและการมีส่วนร่วมกิจกรรมในชุมชน				
27. ท่านไม่เคยเป็นสมาชิกหรืออาสาเข้าทำหน้าที่ในช่วยเหลืองานส่วนรวมของชุมชน	4	4	4	4
……..	4	4	4	4
35…….	4	2	4	4

ส่วนที่ 3: ข้อมูลด้านการทำงานของชาวนา

ข้อความ	คนที่ 1	คนที่ 2	คนที่ 3	คนที่ 4
36. ท่านมักมีปัญหาความไม่พร้อมของเครื่องมือ อุปกรณ์ในการทำงาน	4	3	4	4
……..	4	3	3	4
60. ……..	3	3	4	3

โดยคำนวณจากสูตร

$$CVI = \frac{\text{จำนวนคำถามที่ผู้เชี่ยวชาญทุกคนให้ความเห็นในระดับ 3 และ 4}}{\text{จำนวนคำถามทั้งหมด}}$$

$$= 53/60, CVI = 0.88$$

หลังจากพิจารณาตัดออก 2 ข้อคำถามที่เนื้อหาไม่เหมาะสมออก คำนวณค่าใหม่ ดังนี้ CVI = 53 /58 = 0.91

Internal consistency of questionnaires of phase III: A randomized controlled trail evaluation

Knowledge on communication skills in family

Reliability Statistics

Cronbach's Alpha	N of Items
.814	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
KCom1	8.0761	3.038	.297	.819
KCom2	8.0217	3.076	.415	.806
KCom3	8.0543	2.865	.537	.794
KCom4	8.0870	2.849	.458	.802
KCom5	8.0978	2.617	.666	.777
KCom6	8.1304	2.664	.543	.793
KCom7	8.0217	3.076	.415	.806
KCom8	8.0543	2.755	.664	.780
KCom9	8.1087	2.713	.541	.793
KCom10	8.0543	2.953	.439	.803

Attitude on communication skills in family

Reliability Statistics

Cronbach's Alpha	N of Items
.822	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ACom1	21.7717	6.991	.372	.819
ACom2	21.8587	7.024	.305	.826
ACom3	21.8804	6.964	.318	.825
ACom4	21.9457	5.942	.673	.785
ACom5	21.8696	6.071	.674	.786
ACom6	21.9022	5.957	.567	.799
ACom7	21.9348	5.974	.630	.790
ACom8	22.0109	6.055	.592	.795
ACom9	21.8696	6.334	.550	.801

Behavior for communication skills in family

Reliability Statistics

Cronbach's Alpha	N of Items
.869	16

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BehacCom1	36.9674	25.658	.569	.858
BehavCom2	36.8696	25.719	.494	.861
BehavCom3	36.9130	26.212	.439	.864
BehavCom4	36.9783	25.890	.459	.863
BehavCom5	36.8587	25.573	.568	.858
BehavCom6	36.8261	25.903	.512	.861
BehavCom7	37.0109	25.857	.510	.861
BehavCom8	36.9565	25.141	.617	.856
BehavCom9	37.0326	25.724	.476	.862
BehavCom10	37.0435	25.778	.450	.864
BehavCom11	37.0870	25.289	.564	.858
BehavCom12	36.9348	25.930	.434	.864
BehavCom13	37.1087	26.010	.408	.866
BehavCom14	37.1413	25.485	.488	.862
BehavCom15	36.9565	25.229	.536	.859
BehavCom16	37.0000	25.319	.543	.859

Knowledge on chemical intoxication prevention

Reliability Statistics

Cronbach's Alpha	N of Items
.799	12

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
KChe1	14.76	19.173	.608	.778
KChe2	14.43	18.051	.423	.787
KChe3	14.61	18.065	.561	.774
KChe4	14.51	18.472	.406	.788
KChe5	14.51	19.000	.320	.797
KChe6	14.45	18.426	.376	.792
KChe7	14.55	18.426	.475	.781
KChe8	14.63	19.071	.408	.788
KChe9	14.52	18.670	.375	.791
KChe10	14.20	17.610	.444	.786
KChe11	14.75	18.739	.670	.772
KChe12	14.64	18.628	.520	.779

Attitude on chemical intoxication prevention

Reliability Statistics

Cronbach's Alpha	N of Items
.854	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AChe1	24.25	10.036	.571	.842
AChe2	24.39	9.691	.487	.846
AChe3	24.54	9.372	.475	.849
AChe4	24.41	9.410	.604	.836
AChe5	24.45	9.590	.548	.841
AChe6	24.48	9.043	.657	.831
AChe7	24.52	9.351	.534	.842
AChe8	24.48	8.956	.688	.828
AChe9	24.43	9.281	.601	.836
AChe10	24.51	9.395	.476	.848

Behavior for chemical intoxication prevention

Reliability Statistics

Cronbach's Alpha	N of Items
.928	16

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BehC1	36.12	55.953	.691	.922
BehC2	36.21	56.276	.710	.922
BehC3	36.26	56.217	.685	.922
BehC4	36.33	55.827	.655	.923
BehC5	36.22	55.864	.735	.921
BehC6	36.22	57.842	.470	.928
BehC7	36.10	55.782	.747	.921
BehC8	36.15	56.021	.737	.921
BehC9	36.37	56.587	.594	.925
BehC10	36.43	56.314	.597	.925
BehC11	36.61	56.483	.589	.925
BehC12	36.36	56.057	.641	.923
BehC13	36.16	55.676	.753	.921
BehC14	36.05	56.579	.653	.923
BehC15	36.08	57.302	.577	.925
BehC16	36.45	57.722	.496	.927

ผลการตรวจสอบความตรงตามเนื้อหา (Content Validity Index)
เครื่องมือที่ใช้ในการประเมินโปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาไทย

ระดับความคิดเห็นของผู้เชี่ยวชาญ : แบบประเมินด้านสารเคมีทางการเกษตร

ส่วนที่ 1: ด้านความรู้

ข้อความ	คนที่ 1	คนที่ 2	คนที่ 3	คนที่ 4	คนที่ 5
1. สารเคมีกำจัดศัตรูพืชคือสารที่ทำลายพืชและสัตว์ที่รบกวนการเจริญเติบโตของพืช	3	4	3	4	4
…….....	4	4	4	3	4
17…….	4	4	3	4	4

โดยคำนวณจากสูตร

$$CVI = \frac{\text{จำนวนคำถามที่ผู้เชี่ยวชาญทุกคนให้ความเห็นในระดับ 3 และ 4}}{\text{จำนวนคำถามทั้งหมด}}$$

$$= 14/17, CVI = 0.824$$

ส่วนที่ 2: ทัศนคติต่อการป้องกันตนเองจากอันตรายของสารเคมีทางการเกษตร

ข้อความ	คนที่ 1	คนที่ 2	คนที่ 3	คนที่ 4	คนที่ 5
1. ถ้าฉันอ่านฉลากสารเคมีและใช้ตามคำแนะนำในฉลากจะลดความเสี่ยงต่ออันตรายจากพิษของสารเคมีทางการเกษตรได้	4	4	3	4	4
…… ……	3	4	3	4	4
10. …… …….....	3	3	3	4	4

โดยคำนวณจากสูตร

$$CVI = \frac{\text{จำนวนคำถามที่ผู้เชี่ยวชาญทุกคนให้ความเห็นในระดับ 3 และ 4}}{\text{จำนวนคำถามทั้งหมด}}$$

$$= 8/10, CVI = 0.80$$

ส่วนที่ 3: ด้านพฤติกรรมการป้องกันอันตรายจากการใช้สารเคมีทางการเกษตร

ข้อความ	คนที่ 1	คนที่ 2	คนที่ 3	คนที่ 4	คนที่ 5
1. อ่านฉลากแนะนำการใช้ก่อนใช้สารเคมีทางการเกษตรทุกครั้งให้เข้าใจ	4	4	3	4	4
…… ……	4	4	3	4	4
16. …… ……..	4	4	3	4	3

โดยคำนวณจากสูตร

$$CVI = \frac{\text{จำนวนคำถามที่ผู้เชี่ยวชาญทุกคนให้ความเห็นในระดับ 3 และ 4}}{\text{จำนวนคำถามทั้งหมด}}$$

$$= 15/16, CVI = 0.938$$

คำนวณรวมทั้งแบบสอบสอบด้านสารเคมี

$$CVI = \frac{\text{จำนวนคำถามที่ผู้เชี่ยวชาญทุกคนให้ความเห็นในระดับ 3 และ 4}}{\text{จำนวนคำถามทั้งหมด}}$$

$$= 46/53, CVI = 0.868$$

APPENDIX C
DEPRESSION PREVENTION PROGRAM

ตัวอย่าง

คู่มือการฝึกอบรม โปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาไทย **การดำเนินกิจกรรมอบรม** **ด้านการป้องกันตนเองจาสารเคมีทางการเกษตร**	**คำนำ** โรคซึมเศร้าเป็นการเจ็บป่วยทางจิตที่พบได้ทั่วโลก เป็นเหตุนำไปสู่การบกพร่องในความสามารถของบุคคลในการดูแลและรับผิดชอบตนเองในชีวิตประจำวัน รู้สึกทุกข์ทรมานอย่างมาก มีความบกพร่องในการทำงาน การเรียนหรือการใช้ชีวิตในครอบครัว ในรายที่เลวร้ายที่สุดคือนำไปสู่การฆ่าตัวตาย ในประเทศไทยเกษตรกรเป็นกำลังสำคัญที่สุดสำหรับการวางรากฐานทางเศรษฐกิจของประเทศ และประสบปัญหาโรคซึมเศร้าเป็นจำนวนมาก สาเหตุมาจากทั้งปัจจัยส่วนบุคคล เช่น การเผชิญปัญหา การเปลี่ยนแปลงในชีวิต การมีสัมพันธภาพกับบุคคลอื่น และอาการแพ้พิษสารกำจัดศัตรูพืช ปัญหาการใช้อุปกรณ์ในการป้องกันอันตรายจากสารเคมีกำจัดศัตรูพืชอย่างไม่เหมาะสมถูกต้อง สารเคมีทางการเกษตรกระจายตัวได้ดีในส่วนประกอบของอวัยวะในร่างกายที่มีไขมันเป็นส่วนประกอบ เช่น ระบบประสาท โดยออกฤทธิ์เฉพาะเจาะจงในการยับยั้งการทำงานของเอนไซม์อะเซติลคอลีนเอสเตอเรส และนอร์อะดรีนาลีน ซึ่งพบสารทั้งสองชนิดนี้ในระบบประสาทกลางและระบบประสาทอัตโนมัติ เป็นสาเหตุของการทำงานที่แปรปรวนของสารสื่อนำประสาทที่มีผลต่ออารมณ์และภาวะซึมเศร้า ดังนั้น การส่งเสริมให้มีการใช้อุปกรณ์ป้องกันร่างกายจากสารเคมีอย่างถูกต้องจึงมีความสำคัญยิ่งต่อการลดการสัมผัสและนำเข้าสารเคมีสู่ร่างกาย โปรแกรมการป้องกันการสัมผัสสารเคมีทางการเกษตรเป็นการให้ความรู้เพื่อส่งเสริมให้เกิดการปรับเปลี่ยนพฤติกรรมการป้องกันตนเองจากการใช้สารเคมีกำจัดศัตรูพืชอย่างถูกต้องในชาวนาต่อไป นางสาวสุดา หันกลาง ผู้วิจัย

สารบัญ	แผนการจัดการเรียนรู้
แผนการสอนที่ 1 แนะนำวิทยากร ผู้เข้ารับการอบรม หลักสูตรอบรมในโปรแกรมป้องกันโรคซึมเศร้า และกติกาการอบรม **แผนการสอนที่ 2** สารเคมีทางการเกษตร ผลกระทบที่สำคัญจากสารเคมีทางการเกษตรต่อสุขภาพ **แผนการสอนที่ 3** วิธีการป้องกันร่างกายจากสารเคมีทางการเกษตร **แผนการสอนที่ 4** สอนและสาธิตการใช้อุปกรณ์ป้องกันร่างกายจากสารเคมี และการล้างมืออย่างถูกต้อง **แผนการสอนที่ 5** สรุปสาระสำคัญจากการอบรมการป้องกันตนเองจากสารเคมีทางการเกษตร **แผนการสอนที่ 6** การเตรียมความพร้อม อสม. เพื่อติดตามเยี่ยม **แผนการสอนที่ 7** ติดตามเยี่ยมโดย อสม. **แผนการสอนที่ 8** ประเมินผล	**โปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาด้านการป้องกันตนเองจากสารเคมีทางการเกษตร** **คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล** **พื้นที่เป้าหมาย:** **1. ตำบลพันชนะ อำเภอด่านขุนทด จังหวัดนครราชสีมา** **2. ตำบลทัพรั้ง อำเภอพระทองคำ จังหวัดนครราชสีมา**

ตัวอย่าง

คู่มือการฝึกอบรม
โปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาไทย

การดำเนินกิจกรรมอบรม
ด้านการพัฒนาทักษะการสื่อสารในครอบครัว

คำนำ

โรคซึมเศร้ามีอาการสำคัญคือ อารมณ์เศร้า รู้สึกหดหู่ สะเทือนใจง่าย เบื่อหน่าย เหนื่อยเพลีย รู้สึกผิดหรือคุณค่าในตนเองลดลง มีปัญหาในการนอนหลับหรือความอยากอาหารลดลง และขาดสมาธิ บางครั้งกลายเป็นอาการเรื้อรังหรือกลับเป็นซ้ำ ซึ่งนำไปสู่การบกพร่องในการดูแลและรับผิดชอบตนเองในชีวิตประจำวัน การทำงาน การใช้ชีวิตในครอบครัว ที่สุดอาจนำไปสู่การฆ่าตัวตาย โรคซึมเศร้าพบทั่วโลก กว่า 350 ล้านคน และเป็นปัญหาสาธารณสุขซึ่งมีความสำคัญอย่างยิ่งในทุกประเทศทั่วโลก ประเทศไทยพบประมาณ 3 ล้านคน ผู้ประกอบอาชีพด้านการเกษตรรวมทั้งชาวนามีระดับภาวะซึมเศร้าสูงสุดกว่าทุกกลุ่มอาชีพอื่น เกษตรกรต้องเผชิญกับปัจจัยเสี่ยงในด้านพฤติกรรมและการดำเนินชีวิตประจำวันอื่นๆที่นอกเหนือจากด้านการทำงานอันจะส่งผลให้เกิดความเครียดเป็นสาเหตุทำให้เกิดอาการซึมเศร้าหรือพยายามฆ่าตัวตาย จากผลการศึกษาปัจจัยเสี่ยงที่มีผลต่อภาวะซึมเศร้าในเกษตรกรชาวนา ด้านวิถีชีวิตพบว่า ทักษะการสื่อสารในครอบครัวเป็นปัจจัยสำคัญต่อการเกิดภาวะซึมเศร้าในชาวนา

ดังนั้นผู้วิจัยจึงสนใจพัฒนาโปรแกรมการพัฒนาทักษะการสื่อสารในครอบครัวของชาวนา เพื่อป้องกันการเกิดภาวะซึมเศร้าของชาวนาต่อไป

นางสาวสุดา หันกลาง
ผู้วิจัย

สารบัญ	แผนการจัดการเรียนรู้
แผนการสอนที่ 1 แนะนำวิทยากร ผู้เข้ารับการอบรม หลักสูตรอบรมในโปรแกรมป้องกันโรคซึมเศร้า และกติกาการอบรม **แผนการสอนที่ 2** ความหมาย ความสำคัญของทักษะการสื่อสาร การฝึกทักษะการสื่อสาร และวิธีการใช้ทักษะการสื่อสารที่เหมาะสม **แผนการสอนที่ 3** การเตรียมความพร้อม อสม. เพื่อติดตามเยี่ยม **แผนการสอนที่ 4** ติดตามเยี่ยมโดย อสม. **แผนการสอนที่ 5** ประเมินผล	**โปรแกรมป้องกันโรคซึมเศร้าสำหรับชาวนาด้านการพัฒนาทักษะการสื่อสารในครอบครัว** **คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล** **พื้นที่เป้าหมาย:** **1. ตำบลทัพรั้ง อำเภอพระทองคำ จังหวัดนครราชสีมา** **2. ตำบลพันชนะ อำเภอด่านขุนทด จังหวัดนครราชสีมา**

APPENDIX D
CERTIFICATE OF ETHICAL APPROVAL
FOR HUMAN RESEARCH

Certificate of Approval
Ethical Review Committee for Human Research
Faculty of Public Health, Mahidol University

COA. No. MUPH 2014-149

Protocol Title :	A PREVENTIVE DEPRESSION PROGRAM FOR RICE FARMERS IN THAILAND
Protocol No. :	86/2557
Principal Investigator :	Miss Suda Hanklang
Affiliation :	Doctor of Public Health (International Program) Faculty of Public Health, Mahidol University
Approval Includes :	1. Project proposal 2. Information sheet 3. Informed consent form 4. Data collection form/Program or Activity plan
Date of Approval :	15 July 2014
Date of Expiration :	14 July 2015

The aforementioned project have been reviewed and approved according to the Declaration of Helsinki by Ethical Review Committee for Human Research, Faculty of Public Health, Mahidol University

S Nantha

(Assoc. Prof. Dr. Sutham Nanthamongkolchai)
Chairman of Ethical Review Committee for Human Research

(Assoc. Prof. Dr. Phitaya Charupoonphol)
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APPENDIX E
PICTURES OF ACTIVITIES

Phase I: Cross-sectional study






Phase II: Development of depression prevention program





Phase III: Program implementation and evaluation

Activities of the first chemical intoxication prevention program implementation

Activities of the first improving communication skills in family

Activities of the second chemical intoxication prevention program implementation

Activities of the second improving communication skills in family

BIOGRAPHY

NAME	Miss Suda Hanklang
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INSTITUTIONS ATTENDED	Faculty of Nursing, Khon Kaen University, Khon Kaen, Thailand, 2006: Bachelor of Nursing Science Faculty of Public Health, Mahidol University, Bangkok, Thailand, 2011: Master of Science (Public Health Nursing) Doctor of Public Health (Public Health Nursing)
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