OCCUPATIONAL AND WORK-RELATED ACCIDENT AND ILLNESS COST AMONG RUBBER TAPPERS

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
(INDUSTRIAL HYGIENE AND SAFETY)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY
2008

Thesis
Entitled

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OCCUPATIONAL AND WORK-RELATED ACCIDENT AND ILLNESS AMONG RUBBER TAPPERS

was submitted to the Faculty of Graduate Studies, Mahidol University
For the degree of Master of Science (Industrial Hygiene and Safety)
on

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ACKNOWLEDGEMENTS

First of all, I would like to thank every one who generously provided assistance and actively took part in the wonderful success of this research and whom I am confident I could not name all here.

My great appreciation is rendered to all thesis advisors, namely, Asst. Prof. Sara Arphorn, Assoc. Prof. Vichai Pruktharathikul, Assoc. Prof. Vajira Singhakajan and Assoc. Prof. Chalermchai Chaikittiporn. Special thanks is made to Asst. Prof. Preecha Loosereewanich, one of the Thesis Examination Committee and Dr. Plernpit Suwan-ampai, the chairperson of the Committee in providing beneficial recommendation making my research becomes more worth-reading and invaluable.

My heartfelt gratitude is willingly extended to my older sisters, namely, Mrs. Chusri Waeladee and Lieutenant Commander Tadda Niyomrat who I revere as my second mother and who had always taken care and given moral support to me throughout the difficult time of doing my research as well as fighting against cancer. Furthermore, I would also like to thank all medical doctors, nurses and officers at Gynecology Division, Siriraj Hospital who gave me an excellent healthcare, cordiality, and warm friendship throughout the treatment period. Once again, I would like to thank the Major advisor, Assist. Prof. Sara Arphorn who called me every time when I underwent the chemotherapy, as well as, all lecturers at the Occupational Health and Safety Department who followed up my health condition with kind concern.

Importantly, I feel very much obliged to the sample group of this research, all members of the 'Koh Pai' (Bamboo Bush) rubber group for their magnificent cooperation together with amiable friendship and sincerity extended and deeply touched by me every time I made a visit. I do wish that all of them would have a good mental health and physical health for good.

Eventually, I pray with my resolute heart whatever is a good deed and a benefit to our human friends and our society drawn from the conduct of this research, may all this good deed result in the blessing to my adored parents who passed away, namely, Flight Sergeant First Class Chairach Chaonasuan and Mrs. Salee Chaonasuan.

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OCCUPATIONAL AND WORK-RELATED ACCIDENT AND ILLNESS COST AMONG RUBBER TAPPERS

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ABSTRACT

The purposes of this research were to study the cost of occupational health and safety and to reduce work-related health problems, accidents, injuries and illnesses in rubber tappers by implementing a health promotion model for rubber tappers. The model consists of training and education in healthcare and prevention of accidents, injuries and illnesses including strengthening leadership and care among the study samples. It was implemented from January to September, 2007.

The subjects were 49 rubber tappers who lived in Klong Piya Sub-District, Jana District, Songkla Province. Data were collected by questionnaire interviews. Statistical analyses used were Wilcoxon signed matched-pairs ranks test, Two-proportion test and Spearman Correlation test.

Results revealed that there was no relationship between the amount spent on healthcare and the prevention of work-related accidents, injuries and illnesses and the amount spent on the treatment of work-related accidents, injuries and illnesses. The proportion of the injured subjects after the model implementation was significantly less than that before the model implementation (p-value<0.001). The level of pain in each body part after the model implementation was significantly less than that before the model implementation (p-value<0.05). The treatment cost incurred after the model implementation was significantly less than that incurred before the model implementation (p-value<0.001).

The findings demonstrated that the amount spent for healthcare and the prevention of work-related accidents, injuries and illnesses by the subjects did not help reduce their treatment cost of work-related accidents, injuries and illnesses. It was also demonstrated that the model was successful.

KEY WORDS: RUBBER TAPPERS/THE HEALTH PROMOTION MODEL FOR RUBBER TAPPERS/OCCUPATIONAL AND WORK-RELATED ACCIDENT AND ILLNESS COST

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การศึกษาต้นทุนอุบัติเหตุและการเจ็บป่วยที่เกิดจากการทำงานและที่เกี่ยวข้องกับการทำงานในกลุ่มผู้ประกอบอาชีพกรีดยางพารา
(OCCUPATIONAL AND WORK-RELATED ACCIDENT AND ILLNESS COST AMONG RUBBER TAPPERS)

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ เพื่อศึกษาต้นทุนด้านอาชีวอนามัยและความปลอดภัยและลดปัญหาสุขภาพ อุบัติเหตุ การบาดเจ็บและการเจ็บป่วยที่มาจากการทำงานในกลุ่มผู้ประกอบอาชีพกรีดยางพารา โดยการนำรูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราไปใช้ รูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราประกอบด้วยการอบรมและการให้ความรู้ในเรื่องการดูและสุขภาพ การป้องกันอุบัติเหตุ การบาดเจ็บ และการเจ็บป่วยที่มาจากการทำงานรวมถึงการสร้างความเป็นผู้นำและการดูแลซึ่งกันและกันในกลุ่มตัวอย่าง รูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพารา ถูกนำไปใช้ตั้งแต่เดือนมกราคมถึงเดือนกันยายน พ.ศ. 2550

กลุ่มตัวอย่างได้แก่ผู้ประกอบอาชีพกรีดยางพารา จำนวน 49 คน ที่อาศัยอยู่ในตำบลคลองเปียะ อำเภอจะนะ จังหวัดสงขลา การเก็บข้อมูลใช้วิธีการสัมภาษณ์โดยใช้แบบสอบถาม การวิเคราะห์ทางสถิติที่ใช้ได้แก่ Wilcoxon signed matched-pairs ranks test, Two- proportion test and Spearman Correlation test.

ผลการศึกษาพบว่า ไม่มีความสัมพันธ์ระหว่างค่าใช้จ่ายที่ใช้ไปในการดูแลสุขภาพและการป้องกัน การเกิดอุบัติเหตุ การบาดเจ็บ การเจ็บป่วยจากการทำงาน และค่าใช้จ่ายที่ใช้ไปในการรักษาพยาบาล เมื่อมีอุบัติเหตุ การบาดเจ็บ และการเจ็บป่วยจากการทำงาน สัดส่วนของตัวอย่างที่ได้รับอุบัติเหตุและการบาดเจ็บหลังจากการนำรูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราไปใช้ น้อยกว่า สัดส่วนของตัวอย่างที่ได้รับอุบัติเหตุและการบาดเจ็บก่อนการนำรูปแบบส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราไปใช้อย่างมีนัยสำคัญ($p\text{-value}<0.05$) ค่าใช้จ่ายที่ใช้ในการรักษาพยาบาลที่เกิดขึ้นหลังจากการนำรูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราไปใช้น้อยกว่า ค่าใช้จ่ายที่ใช้ในการรักษาพยาบาลที่เกิดขึ้นก่อนการนำรูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราไปใช้อย่างมีนัยสำคัญ ($p\text{-value} <0.001$)

จากการศึกษาพบว่าค่าใช้จ่ายที่กลุ่มตัวอย่างใช้ไปในการดูแลสุขภาพและป้องกันอุบัติเหตุ การบาดเจ็บ และการเจ็บป่วยจากการทำงานไม่สามารถช่วยลดค่าใช้จ่ายที่ใช้ไปในการรักษาพยาบาล เมื่อเกิดอุบัติเหตุ การบาดเจ็บและการเจ็บป่วยจากการทำงาน ผลการศึกษายังแสดงให้เห็นว่ารูปแบบการส่งเสริมสุขภาพสำหรับผู้ประกอบอาชีพกรีดยางพาราได้ถูกนำไปใช้อย่างประสบความสำเร็จ

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CHAPTER I
INTRODUCTION

1.1 Background and rationale

The livelihood of people is associated with rubber from birth to death. For example, from birth, a newborn is put on a rubber sheet. Thereafter, a during a childhood, the child uses a pacifier and learns as it plays with toys, many of which are made of rubber products.

Rubber is a natural raw material used to produce an immense number of items, including medical devices, sciences, construction, communication, transportation plus, wide ranging day to day household appliances. The chemical property of rubber is its natural ability to be soft, elastic and also solid and in many cases may be an alternative to some alloys. Rubber products are manufactured into liquid sealing and insulating properties (non-conductors).

Rubber plantation enterprises have been underpinning the socio-economic security for Thailand for a century. Thailand is among the top rubber producers of the world, which the production is approximately 2.5 million tons per year. The exporting undertaken by Thai Rubber industries export rubber and rubber products accounting of more than Baht 100,000 million and employing more than 6 million rubber farmers. At the present, there are more than 5 million acres of rubber plantation. It is anticipated that in the next 20 years the rubber consumption of the world will be double. (1)

In 2006, the world rubber demand was foreseen to increase at 2.1 percent, and Thailand as a number one exporter was expected to export rubber products at the value of US$ 5,207 million in the same year or equivalent to 40.18 percent of rise. (2)

The rubber plantation takes lower risks than that of other plants. The rubber trees can yield the latex consistently throughout the year, and the harvest is as long as 20 years. In addition, the unproductive rubber trees which cannot produce latex

anymore can be cut for their trunks at the price around Baht 30,000-50,000 per 0.4 acres. The demand of rubber timbers for making furniture, building materials, toys, household materials is enormous.

The former plantation areas are located in 14 provinces within the South and the East, namely, Rayong Province, Chantaburi Province, and Trad Province. Recently, researchers have found that rubber trees can be cultivated in other new locations, the North and the North-East of the country where there are not fewer than 4 million acres suitable for the extension of the plantation.

The rubber tappers are the workforce from the informal employment sector. The “quality of life” for these workers is a hot issue at the present internationally. As highlighted by the International Labor Organization, all labor workers shall be ensured of fair and ethical employment as well as social protection.(3) In the same tune with the international philosophy, the strategy no. 3 of the Ministry of Labor (2005-2008) was targeted to provide protection to the workforce from both the formal sector and the informal sector, good quality of life at workplace and life assurance.(4) At the present, there are many organizations studying to develop a database of workforce from the informal sector. However, there is none acting as a focal point, thereby providing a definition of “workforce for the informal sector”, which can be referred as the conceptual or common definition. In addition, the workforce from the informal sector is now under the supervision of many agencies, such as, the Department of Labor Protection and Welfare, and the Social Security Office. As a result, this workforce is still in short of life assurance, the opportunity for health promotion, and vulnerable to work-related health problems, chemical hazards, and accidents from using equipment. As this workforce has the working patterns and the working hours different from the formal workforce, and to comprehend deeper, the livelihood of the workforce is wide-ranging. It is undeniable that the workforce from the informal sector shall receive care and attention the same as that from the formal sector in order to enable the informal workforce who has no work security to live in the society, considering the values and dignity of the human-being which cannot be measured or priced. This is a crucial concept, which is greatly influential on social stability and security.

Therefore, the aforementioned rationale directed my research to the study of the cost the rubber tappers spent for healthcare and the prevention of work-related accidents, injuries and illnesses in order to develop the feasible health promotion model for rubber tappers. The model is expected to solve the identified work-related health problems and reduce the work-related accidents, injuries and illnesses found in the group of rubber tappers effectively.

1.2 Research objectives

General objective

This research is aimed at studying the cost of occupational health and safety together with work-related health problems, accidents, injuries and illnesses in the group of rubber tappers in order to develop the health promotion model for rubber tappers which can be employed to solve the work-related health problems and reduce the work-related accidents, injuries and illnesses found in the group of rubber tappers.

Specific objectives

This research is specifically intended to:

1. Study personal factors, including, sex, age, length of work, a number of average daily working hours, and a number of sleeping hours which contribute to work-related health problems, accidents, injuries and illnesses in the group of rubber tappers;
2. Test the differences of the proportions of the rubber tappers having work-related accidents and injuries before and after the health promotion model for rubber tappers is implemented;
3. Identify the differences of pain on body parts before and after the health promotion model for rubber tappers is implemented;
4. Test the differences of the costs spent for treatment when having work-related accidents, injuries and illnesses before and after the health promotion model for rubber tappers is implemented;
5. Study the relationship between the costs spent for healthcare and the prevention of work-related accidents, injuries and illnesses and the costs spent for treatment when having work-related accidents, injuries and illnesses before and after the health promotion model for rubber tappers is implemented;

1.3 Hypotheses

1.3.1 The proportion of rubber tappers having work-related accidents and injuries after the health promotion model for rubber tappers implementation is less than that before the implementation

1.3.2 The pain on body parts after the health promotion model for rubber tappers implementation is less than that before the implementation

1.3.3 The cost spent for treatment when having work-related accidents, injuries and illnesses after the health promotion model for rubber tappers implementation is less than that before the implementation

1.3.4 The cost spent for healthcare and the prevention of work-related accidents, injuries and illnesses has inverse relationship with the cost spent for treatment when having work-related accidents, injuries and illnesses in the group of rubber tappers.

1.4 Variables

1.4.1 Independent variables

- Personal Factors
  - Sex
  - Age
  - Length of work
  - A number of average daily working hours
  - A number of sleeping hours
- The cost spent for health care and the prevention of work-related accidents, injuries and illnesses
- The health promotion model for rubber tappers

1.4.2 Dependent variables

- Work-related accidents, injuries and illnesses
- The proportion of rubber tappers having work-related accidents, injuries and illnesses
- The pain on body parts
- The cost spent for treatment when having work-related accidents, injuries and illnesses

1.5 Scope of this study

This research studies the cost of occupational health and safety and measures taken to solve work-related health problems, accidents, injuries and illnesses in the group of rubber tappers at Klong Piya Sub-District, Jana District, Songkla Province during January-September, 2007.

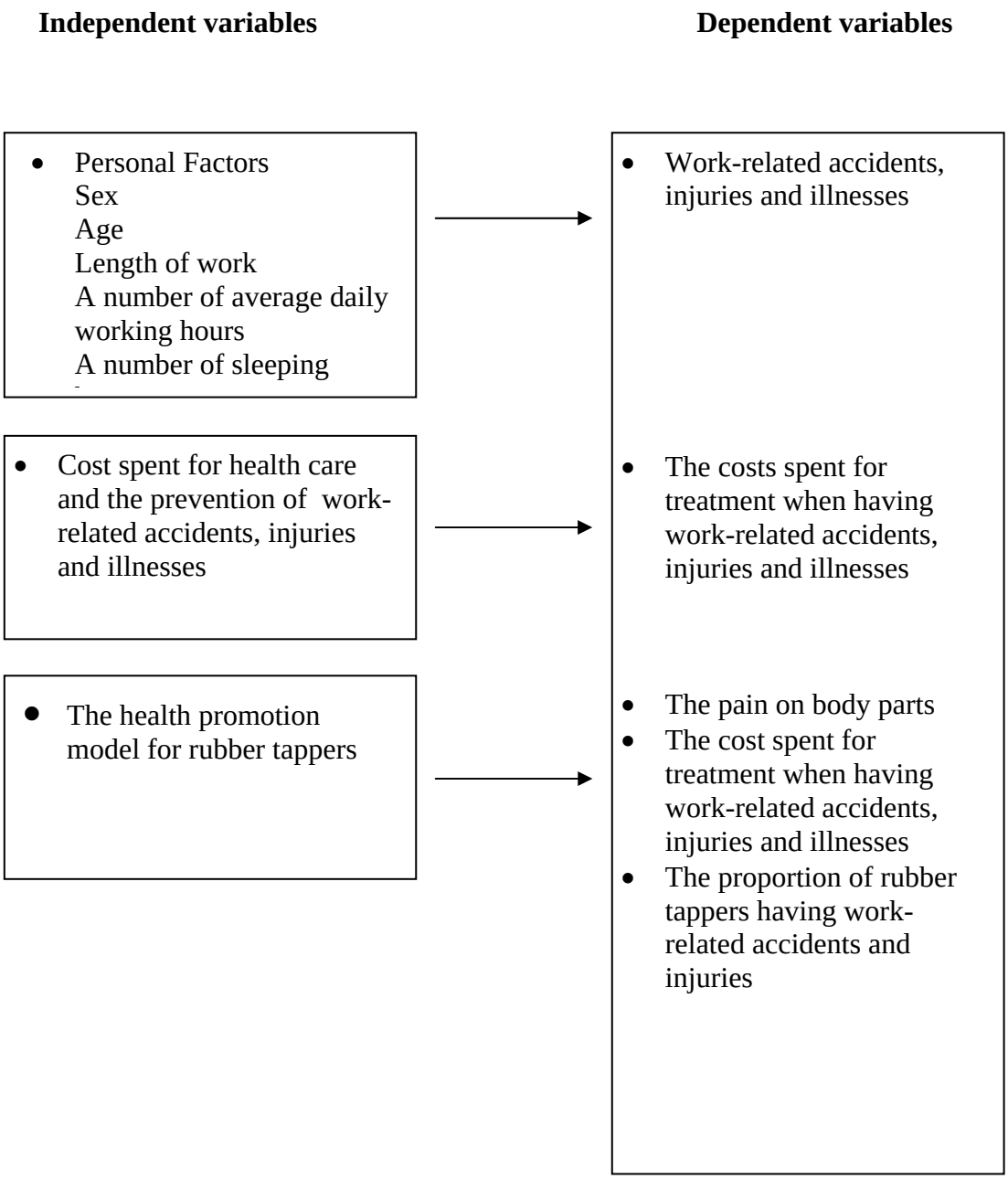
1.6 Expected outcomes

1.6.1 To identify personal factors including sex, age, length of work, a number of average daily working hours, and a number of sleeping hours which contribute to work-related health problems, accidents, injuries and illnesses in the group of rubber tappers;

1.6.2 To decrease and prevent work-related accidents, injuries and illnesses in the group of rubber tappers;

1.6.3 To know the cost spent for healthcare and the prevention of work-related accidents, injuries and illnesses;

1.7 Conceptual framework



1.8 Operational definitions

Rubber tapper means a rubber forest worker who taps rubber trees, extracting latex from the tree. Each night a rubber tapper cuts a thin, spiral layer of bark off the tree trunk from which the latex drips. (5)

A number of average daily working hours means the number of working hours is counted from which a tapper leaves home for tapping until arrives home from tapping after selling the latex.

Accident means an undesired event resulting in death, injury, damage to health, damage to property or other forms of loss. (6)

Hazard means potential for harmful effects. (6)

Risk means a quantifiable expression of the likelihood of injury or harm resulting from a hazard**.** (6)

Personal Protective Equipment means equipment/clothing which offers protection against risks to health and safety. (7)

Carpal Tunnel Syndrome is a chronic disorder of the hand and wrist possibly resulting from repetitive work involving repeated wrist flexion or extension. (7)

Injury means physical harm or damage to a person resulting from traumatic contact between body of a person and an outside agency, or from exposure to environment factors. (7)

Pain means an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. (8)

Health promotion means a powerful, cost-effective and efficient way to maintain a healthier community. It enables people to increase control over and improve their health. Rather than focusing on people at risk for specific diseases, health promotion involves the population as a whole in the context of their everyday lives. Activities are geared toward promoting health and preventing ill-health.

Health promotion strategies are not limited to a specific health problem, nor to a specific set of behavior. WHO applied the principles of and strategies for health promotion to a variety of population groups, risk factors, diseases, and in various settings Health promotion and the associated efforts put into education, community development, policy, legislation and regulation, are equally valid for communicable

diseases, injury and violence, and mental problems, as they are for prevention of noncommunicable diseases. (9)

Healthcare is the prevention, treatment, and management of illness and the preservation of mental and physical well being through the services offered by the medical, nursing, and allied health professions. Healthcare embraces all the goods and services designed for health, including "preventive, curative and palliative interventions, whether directed to individuals or to populations.(10) In this study, "Healthcare" means health promotion activities including health education or training, exercise, supplementary foods, and annual health check-up.

Occupational health and safety cost

- The cost spent for healthcare and prevention of work-related accidents, injuries and illnesses such as, training, personal protective equipment, conducting the health promotion activities, supplementary food products, herbal tonic and annual health check-up.

- The cost spent for treatment when having work-related accidents, injuries and illnesses, such as, self-treatment, conventional medicine and traditional medicine, transportation and income loss from sick leave

Training cost is spent for hosting the training or seminar for the study samples, including lecture fee, venue rent, food and refreshment, documentation, as well as, income loss from attending the training of the participants.

The cost for healthcare activities means the cost the study samples spent for doing any activity for health promotion, for example, exercise including exercise gears and equipment as well as income loss.

Visual Analog Scale is a pain assessment tool helping interviewees to describe their pain. The pain scale is one tool commonly used to describe the intensity of the pain or how much pain the interviewee is feeling. The pain scales include the numerical rating scale, the visual analog scale, the categorical scale, and the pain faces scale. On the numerical rating scale, the interviewee is asked to identify how much pain they are having by choosing a number from 0 (no pain) to 10 (the worst pain imaginable). The visual analog scale is a straight line with the left end of the line representing no pain and the right end of the line representing the worst pain. Interviewees are asked to mark on the line where they think their pain is. The

categorical pain scale has four categories: no plain, mild, moderate, and severe. Interviewees are asked to select the category that best describe their pain. The pain faces scale uses six faces with different expressions on each face. Each face is a person who feels happy because he or she has no pain or feels sad because he or she has some or a lot of pain. The interviewee is asked to choose the face that best describes how he or she is feeling. This rating scale can be used by people age 3 years and older. (11)

The health promotion model for rubber tappers is the model developed by the researcher specially for implementing in the study samples with the main objectives to reduce and prevent the work-related health problems, accidents, injuries and illnesses. The model characteristics incorporate following elements;

- Training on self-care is the training expected to help reduce and prevent work-related accidents, injuries and illnesses. The gained knowledge can be practiced continuously and transferred to others in the same profession.
- Open forum: the study samples is given a forum to talk and exchange ideas, experiences and information regarding healthcare, reduction and prevention of work-related accidents, injuries and illness, and the group is well aware of the benefits of the said activities.
- Strengthening leadership and care among the group members

CHAPTER II
LITERATURE REVIEW

Since this research is aimed at studying cost of occupational health and safety and work-related health problems, accidents, injuries and illnesses in rubber tappers, the researcher has reviewed all concerned documents on the following themes;

1. History of rubber
2. Rubber plantation
3. Timetable for rubber tapping
4. Rubber tapping
5. A number of workforce from the informal sector
6. Problems of the workforce from the informal sector and statistics of injuries or accidents
7. Factors contributing to work-related diseases or illnesses
8. Health problems of rubber tappers
9. Stretching exercise and its benefits
10. Job Safety Analysis
11. Researches relating to the cost of work-related accidents, injuries and illnesses
12. Relevant laws

1. History of rubber

Rubber had a very long history from the discovery of the America Continent by Columbus around 1493 or 509 years ago. After that, there were many explorer teams travelling to the continent and finding that the indegineous Indians played with a small rubber ball astoundingly bouncing up and down. The Indians call a rubber tree 'Caoutchoue' meaning 'crying tree' because when the tree is cut, it exudes the latex like dropping tears. The Indians used rubber to make a variety of things, for example, bottles or containers and shoes. The shoes were easily made by dipping feet in the latex and leaving them dry repeatedly. The shoes are tightly attached to the feet

giving the feeling like putting socks. On thier departure, the European explorers took rubber from the city called 'Para' which is located along the Amezon in the South America with them. When they arrived home, they accidentally found that it could erase pencil marks. Thereafter, para rubber became well known worldwide

The research and development on rubber industry in Europe has extensively advanced from making a rainproof sheet to motor gadgets, medical equipment, sport gears, and toys. Most importantly and most enormously the rubber is used in the tyre industry and with the highest technology for the plane tires. Moreover, rubber is also used to produce sofa, mattress, and furniture to provide comfort to human. The rubber is the blessing from God for the happiness of human.

The history of rubber in Thailand

Around 1899, Prayarattanupradit, the Trang Province Governor, imported a rubber tree from Malaysia to grow in Kantang District, Trang Province for the first time. At the present, the said rubber tree is still alive. In 1999, the governmental sector and private sector joined hand to host the festive festival to commemorate a century anniversary of the rubber plantation in Thailand, called ‘Amazing Thailand year 1999 and 100 years of Thai Natural Rubber’ (12)

2. Rubber plantation

2.1 Preparation of rubber plots

If the land is an old rubber plot or a forest or has trees, the rubber farmers must fell the trees, collect and make piles of wood residues along the edge of the land as a buffer zone, leave them dry and burn them.

2.2 Preparation of soil

Soil should be ploughed twice and loosened once.

2.3 Planting space

In the South and the East, planting space of trees is 2.5 meters and that of rows is 8 meters. This can accommodate 80 rubber trees per 0.4 acres

2.4 Preparation of growing pits

Generally, the growing pits for rubber are of width x length x depth at 50X50X50 centimeters. After the dug soil is left dry for about 10-15 days, it is mixed with rock phosphate at 170 grams per pit.

2.5 Rubber plantation in the South and the East

The soil mixed with rock phosphate is put at the bottom of the pit. The rubber seedling is taken off the potting bag of which one inch of the soil at the bottom of the bag is disposed. While the seedling is putting in to the pit, and the potting bag should be cut through from the bottom to the top . Then fill the soil in the pit until the pit is almost full. Do not tamp down the soil now. Gently pull out the cut plotting bag first, and then tamp down the soil. Lastly, have a strut tied with the tree to protect the wind.

2.6 Weed eradication

There are 3 means of weed eradication as below;

- hoeing or plowing by tractor
- growing cover crops
- using herbicide, such as, Paraquat

Paraquat widely used by the farmers must be diluted by water at the appropriate ratio before use, depending on the age of the rubber tree. (13)

3. Timetable for rubber tapping

The rubber farmers will start tapping at the sixth year of the plantation following the timetable below; (14)

January	Initially tap the trees and continue tapping until the trees shed leaves.
February	Initially tap the trees and continue tapping until the trees shed leaves. Stop tapping when the trees shed leaves.
March	Stop tapping when the trees shed leaves.
April	Stop tapping when the trees shed leaves. Continue tapping when the leaves are fully revived.
May	Continue tapping when the leaves are fully revived.
June	Continue tapping when the leaves are fully revived.
July	Continue tapping when the leaves are fully revived.
August	Continue tapping when the leaves are fully revived.
September	Continue tapping when the leaves are fully revived.
October	Continue tapping when the leaves are fully revived.
November	Continue tapping when the leaves are fully revived.
December	Continue tapping when the leaves are fully revived.

4. Rubber Tapping

Figure 2-1 Rubber Tapping

Rubber tapping is the process by which rubber is gathered. An incision is made in the bark of a rubber tree. The fluid then drains into a vessel. This industry is prevalent in areas of tropical rainforest, such as Brazil in the Roraima area or Malaysia. It is less destructive to the environment and rainforest and is legal. Each night a rubber tapper must remove a thin layer of bark along a downward half spiral on the tree trunk. If done carefully and with skill, this tapping panel will yield latex for up to 5 years. Then the opposite side will be tapped allowing this side to heal over. The spiral allows the latex to run down to a collecting cup. The work is done at night so the latex will run longer before dying out. For the rubber tappers to legally extract the latex, they much first buy land that contains rubber trees. Even on huge pieces of land there are usually very few of these trees, so the tapper must buy lots of unused trees.

Tapping tools

Figure 2-2 Tapping tools

1. Initial exposure tapping stick
2. Tapping knife
3. Collecting cup, drip track, and holder ring

Tapping time

Good breed rubber trees are not necessarily tapped before dawn and should be done after dawn around 6.00-8.00 hours exuding the same amount of latex as being tapped before dawn, but no later than 11.00 hours.(15)

Right work posture for tapping

At work of the workforce from the informal sector, it was found that they had a problem of pain mostly which stemmed from the wrong work posture. For each working process, for instance, sitting or standing, if the right work posture is not practiced, it may cause a chronic pain and fatigue. As for the group of rubber tappers, pain is detected at the lower back when tapping at the level lower than waist and at shoulders when tapping at the level higher than head. Accordingly, to tap at the level lower than waist, the tapper should kneel down or sit on his heels, keep his back straight and keep the distance between the tapper and the tree at 30 centimeters. He should not twist his wrist when tapping. To tap at the level higher than waist, the tapper should stand his body and back straight, open legs a little to be in balance with the width of his shoulders, and keep the distance between the tapper and the tree at 30 centimeters. He should not twist his wrist when tapping. For the level higher than head, the tapper should stand on a stool for tapping. The wrong work posture is a main cause of body pain; therefore, to work in a natural posture and to do stretching exercise regularly will help decrease the painful symptoms. (16)

5. A number of workforce from the informal sector

The survey on the workforce from the informal sector in 2005 by the National Statistical Office, the Ministry of Information and Communication Technology found that from the population more than 15 years old at 50 million people, 36.3 millions were employed, of which 22.5 million were in the informal sector. The workforce from the informal sector was found mostly in the North-East at 9.5 millions, tantamount to 80.5 percent, in the Central at 4.3 millions or 46.9 percent, and in Bangkok at 1.1 million or 9.2 percent (17)

6. Problems of the workforce from the informal sector and statistics of injuries or accidents

Based on the said survey in 2005 by the National Statistical Office, from 22.5 million people of workforce from the informal sector, 19.7 millions never had injuries or accidents, 2.9 millions used to have injuries or accidents, most of which were cuts by sharp items at 1.8 millions. Second in number were falls/stumbles at 0.4 million, vehicle accidents around 0.2 million, burns of fire/hot water at 0.09 million, bumps/crashes with objects at 0.09 million, and chemical hazards at 0.07 million respectively as shown in Table 2-1 (17)

Table 2-1 Workforce from the informal sector categorized by types of injuries, accidents and sex

Type of injuries or accident	Total	Workforce	
		Informal Sector	
		Male	Female
		('000)	
Total	22,536.5	11,993.9	10,542.5
No experience	19,675.8	10,395.0	9,280.8
With experience of;	2,860.6	1,599.0	1,261.7
1. Falls/stumbles	419.6	218.5	201.1
2. Cuts/pierces by sharp objects	1,798.3	981.9	816.4
3. Burns by fire or hot water	91.5	32.8	58.7
4. Accidents from land transportation	193.1	150.2	42.9
5. Accidents from water and air transportation	4.2	3.2	1.0
6. Electric shock	20.1	16.5	3.6
7. Bumps/crashes by falling or flying objects	89.0	62.5	26.4
8. Chemical hazards	68.7	40.4	28.4
9. Others (identified)	176.2	93.0	83.2

7. Factors contributing to work-related diseases or illness

In general, factors contributing to work-related diseases or illnesses can be grouped into 3; (18)

7.1 Worker

7.2 Working condition

7.3 Working environment

7.1 Worker

The worker is vulnerable to diseases and injuries according to qualities of each person

7.1.1 Basic attributes, such as, sex, age, height, genetics, work experience, congenial disease

7.1.2 Health behavior of the worker, for example, the worker who smokes is more vulnerable to have lung diseases than those who do not; the worker who works carelessly has illness or dangers easier and more seriously than those who do not

7.2 Working condition

7.2.1 Work system management and work assignment; recruitment and selection procedures should be devised to find the right worker, or work should be assigned in accordance with the worker's qualification. Furthermore, job description, orientation relating to work and regulations shall be defined, and preventive actions for work-related illnesses and hazards shall be strictly practiced.

7.2.2 Normally, working period should not be more than 8 hours, or should be adjusted according to types of works, the intensity and risk of the works. Work shall be done during the day; however, many types of works have shifts and overtime rosters which increase risk to diseases and illnesses.

7.2.3 Work control and supervision; work should be well-managed. There should be notice or signs of warning as well as a check on inappropriate behavior at workplace. Do not ignore the damage of the equipment, buildings, corridors, so on which should be always maintained.

7.2.4 Basic facilities and welfares, such as, toilets which should be sufficient, located in the proper area, hygienic and well-maintained. Moreover, there should be

enough clean water, PPE (Personal Protective Equipment) and health promotion welfares and first aids as such.

7.3 Environment or hazardous factors at workplace

Environment or hazardous factors at workplace includes 5 items as follows (19)

7.3.1 Physical hazards; such as, heat, light, sound, temperature, moisture, vibration, air pressure, working space, and rays. Moreover, machines tightly located can easily cause accidents. Too high volume of noise at workplace can contribute to hearing impairment, deftness and so a hindrance of proper communication, stemming working errors. Adequate amount of light can help workers work safely and effectively. If the light is too low, the worker needs to focus more, causing headache and exhausted eyes. Meanwhile, too much light can be harmful to eyes and their retinas.

7.3.2 Chemical hazards; include all chemical substances used in work which may be pure single chemicals or mixed solutions which can be passed into the body according to the qualities of each chemical through eating, inhaling, or touching.

7.3.3 Biological hazards; cover organism that may create dangers to workers, for instance, diseases, pests, and parasites.

7.3.4 Psychological hazards; can be variables or situations that relate to working environment deriving tension and problems of relationship among people who work in the same place, for example, relationship between the employer and the employees, the bosses and subordinates, or among colleagues, as well as, remuneration, work security, work satisfaction and probably including each organizational culture.

7.3.5 Ergonomic hazards; mean working conditions consisting of materials, equipment, machine, colleagues and work procedures in physical, anatomical, psychological aspects that may bring about dangers at workplace, for instance, discomforts from inappropriate positions, such as, in working on too high or too low chairs, in moving or lifting objects, repetitive works, stressful works, urgent works, continuous hard working without rest for many hours which may cause backache.

In addition, work-related accidents can be one factor enhancing the occurrence of abnormalities found in workers' health. Causes of accidents include:-

- Unsafe act means the act or the work of people that causes unsafe situation to oneself and others, for example, careless and mindless work by not using protective equipment provided, lifting by abnormal measures, using tools not fit to the work, teasing among workers on duty.
- Unsafe condition means the plant condition, machines, as well as, production process which are not safe make the workers vulnerable to injuries or death, for example, incomplete factory design, malfunction of safety system, no first aid kids, lack of maintenance.

Additionally, co-factors inducing accidents can be personal physical condition, fatigue, deftness, bad eyesight, unfit physical condition, heart disease, incapacity of emotional control, being easily exited, bad attitude, lack of knowledge, as such.(20)

8. Health problems of rubber tappers

Narong Bensa-art, 2003 studied working condition and prevalence rate of musculoskeletal pain in a group of rubber tappers at Na-Kreu Sub-District, Kantang District, Trang Province, published on 27th December 2004. The research disclosed that the prevalence rate of pain most often found in 1 month was firstly the lower back (55.8 percent during hard work and 55.1 percent during light work). Second in number were at hands or wrists (29.9 percent during hard work and 23.8 percent during light work) and legs (13.6 percent during hard work and 10.3 percent during light work). The prevalence of painful body parts increasing significantly during hard work was found at hands, wrists and elbows. Meanwhile, the prevalence rate of the disease mostly found and increasing significantly during hard work was of Carpal Tunnel Syndrome (22.4 percent during hard work and 14.9 percent during light work). There was no difference on the severity of musculoskeletal pain at body parts between 2 different periods. Nevertheless, the prevalence rate of the pain at shoulders, elbows, hands or wrists increased during hard work significantly.(21)

The Thai Health Promotion Foundation highlighted in its work plan about the promotion of health of the workforce for the informal sector in agricultural sector

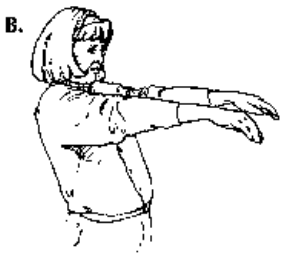
(2004-2006) that rubber tapping is the occupation that require human labor more than machine, and the work characteristics compel the worker to work at nighttime because the latex can exude better in cool temperature rather than in hot temperature. The tappers work in the same position for a long time. For 0.4 acres of about 60-70 rubber trees, the tappers need to walk for a long distance to tap the trees, collect the latex and carry heavy latex pails, leading interesting health problems as below;

- Pain especially backache because tappers need to bend and lift frequently and carry the very heavy pail.
- Eye problems because of focusing on tapping in the low light
- Sting and bite of poisonous insects/animals
- Problems derived from consuming too much alcohol, cigarette, coffee, as well as, Kratom leaves
- Exhaustion from insufficient rest and irregular sleeping pattern: the tappers need to sleep during daytime with which they are not familiar. Besides, they always have to do their personal business during the day.(22)

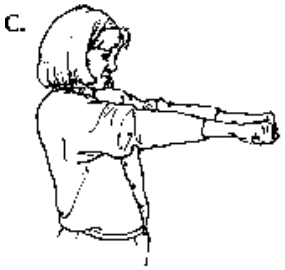
Carpal Tunnel Syndrome Exercises

The carpal tunnel exercise like the stretching exercise strengthens the wrist muscles and there by improving the flow of blood. (23)(24)

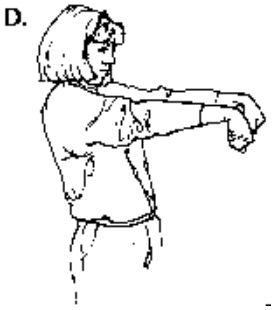
Extend and stretch both wrists and fingers acutely as if they are in a hand-stand position.
Hold for a count of 5.



Straighten both wrists and relax fingers



Make a tight fist with both hands



Then bend both wrists down while keeping the fist. Hold for a count of 5.

Straighten both wrists and relax fingers, for a count of 5.

Figure 2-3 Carpal Tunnel Syndrome Exercises

9. Stretching exercise and its benefits

Stretching exercise is very beneficial to any person who practices regularly and only 10 minutes a day. Examples of the said advantages are as following;

- Provides calming and relaxing
- Provides a sense of peace and well-being
- Lengthens muscles
- Helps to prevent accidents and injuries
- Improves tissue flexibility and elasticity
- Increases blood flow
- Makes muscles more supple
- Helps with balance and coordination
- Improves range of motion
- Improves circulation

Moreover, stretching exercise can often help alleviate the symptoms experienced in carpal tunnel syndrome.(25)(26)

10. Job Safety Analysis (JSA)

A Job Safety Analysis (JSA) is a method that can be used to identify, analyze and record the following;

- the steps involved in performing a specific job,
- the existing or potential safety and health hazards associated with each step, and
- the recommended action(s)/procedure(s) that will eliminate or reduce these hazards and the risk of a workplace injury or illness

The following hazards should be considered when completing the JSA.

- Impact of a falling or flying object
- Penetration of sharp objects
- Being caught in or between a stationary/moving object
- Falls from an elevated work platform, ladders or stairs
- Excessive lifting, twisting, pushing, pulling, reaching or bending
- Exposure to vibrating power tools, excessive noise, cold or heat, or harmful levels of gases, vapors liquids, fumes, or dusts
- Repetitive motion
- Electrical hazards
- Light (optical) radiation (i.e. welding operations, etc)
- Water (potential for drowning or fungal infections caused by wetness)

JSA should be conducted as the following steps

- Select jobs with the highest risk for a workplace injury or illness
- Select an experienced employee who is willing to be observed. Involve the employee and his/her immediate supervisor in the process
- Identify and record each step necessary to accomplish the task. Use an action verb (i.e. pick up, turn on) to describe each step
- Identify all actual or potential safety and health hazards associated with each task
- Determine and record the recommended action(s) for performing each step that will eliminate or reduce the hazards (i.e. engineering changes, job rotation, PPE, etc) (27)

11. Researches relating to the cost of work-related accidents, injuries and illnesses

J. Paul Leigh et al, 1992 classified cost of occupational injuries and illnesses as follows;

1. Cost of illness which is composted of; direct costs meaning the money spent for medical treatment, such as, medical service, medicine, doctor, nurses, ambulance, medical equipment. Direct costs also include administration costs, for example, medical insurance firm costs and government insurance costs. Secondly, indirect costs mean lost earnings, lost fringe benefits, and lost home production. Besides, indirect costs also cover the expenditure of the employer for retraining staff or re-staffing.

2. Cost for injuries which are divided into direct costs for injuries and indirect costs for injuries. The direct costs can be calculated by a number of injuries on average multiplied by the estimate of average costs. This calculation will cover cases of death, permanent total loss of organs, permanent partial loss of organs, temporary total and partial combined loss of organs, and only medical treatment. Medical treatment costs include the costs spent to the hospital, doctor, dispensaries, and others. Moreover, administrative costs on income loss can also be calculated, though more complicated than finding the medical treatment costs. Secondly, indirect costs for injuries are mainly lost wages for nonfatal injuries and fatal injuries.

3. Costs of diseases are consisted of direct costs for deadly diseases, indirect costs for deadly diseases, direct costs for nonfatal diseases, and indirect costs for fatal diseases. (28)

Paul M Richardson et al, 2002 explained costs of work-related accidents as following;

1. Time : that workers and executives spend for doing activities when the accidents take place and the wage the company spends without any work in return, time lost in production breakdown, and treatment costs the employee pays.

2. Materials and components : costs that are incurred by damages of raw materials and broken components of the machine due to accidents, as well as, the cost of the damaged products.

3. External services : costs that are lost in requesting external services when the accidents occur, such as, requests for consultants and legal consultant service.

4. Other costs : other costs which are not often seen, including, fine for restoration. (29)

Ted R. Miller et al, 1995 described costs of work-related injuries as follows;

1. Medical and emergency services : medical service by hospitals, medical service centers, doctor fee, medical treatment and therapy as well as other administrative services, such as, diagnosis of the laboratories, prescription, wheelchair, emergency service, police, fire engine and fire fighter, and autopsy service.

2. Wage and household work : loss of wage and benefits, and inability to do household works

3. Administrative and legal costs **:** costs for investigation, documentation, compensation and litigation

4. Workplace disruption **:** overtime payment, loss of capable workforce, product damage, new recruitment and training expenditure

5. Quality of life **:** worsening quality of life, anguish and difficulties from death or from being incompetent (being crippled) for a long time that affect workers and families as a result of dangerous workplace. The torture the workers need to put up with for the rest of their life cannot be priced. The worker whose work is risky will receive higher wage. The higher payment is considered the prepayment for loss that probably takes place in the future. The relation between the compensation by high income and risk of death can estimate the loss of quality of life of the worker. (30)

12. Relevant law

The laws which are pertinent to this research include; (31)

12.1 The Labor Protection Act B.E. 2541 (1998)

12.2 The Ministerial Regulation on Labor Protection for Agricultural Sector B.E. 2547

12.3 The Ministerial Regulation on the Weight Scale B.E. 2547

12.1 The Labor Protection Act B.E. 2541 (1998)

Section 5 under the Act defines the meaning of the employer and the employee as follows;

'Employer' means a person who agrees to accept an employee for work by paying him or her wages and includes;

- a person entrusted by the employer to act on his or her behalf;
- where an employer is a juristic person, a person authorized to act on behalf of the juristic person and a person entrusted by the authorized person to act on its behalf shall be included; or
- whereas an entrepreneur makes an arrangement, via a lump sum method of wage payment, with a person entrusted to supervise the performance of work and to be responsible for the payment of wages to an employee, or with a person, who is not in the employment service business, to produce employees on behalf of the entrepreneur, and such work is a part of or the whole of production process or business under responsibility of the entrepreneur, then the entrepreneur shall also be deemed to be an employer of the employee.

'Employee' means a person who agrees to work for an employer in return for wages.

Section 22 in Chapter 1 : General Provision says that agriculture, marine fishing, loading or unloading the cargoes, home work, transport work, and other works as provided in the Royal Decree may be prescribed in the Ministerial Regulations for the protection of labor differently from the protection of this Act.

12.2 The Ministerial Regulation on Labor Protection for Agricultural Sector B.E. 2547

- Under the regulation, 'agricultural works' mean works relating to plantation, livestock, forestry, sea salt farming and fishing, except sea fishing.
- The employer who hires the employee to do the agricultural works throughout the year shall be subject to the Labor Protection Act B.E.2541.

- For agricultural works not requiring the employee throughout the year and not employing the employee for industrial works after agricultural works, the employer shall be subject to the Labor Protection Act B.E.2541 and as ascribed in the Ministerial Regulations.
- The employee who has been working for consecutive 180 days shall be eligible for taking a holiday not fewer than 3 working days by which the employer arranges timetable for the holiday for the employee in advance or as consent by both parties.
- The employer shall pay the employee for the holiday as if the employee came to work as usual.
- If the employer asks the employee to work during the holiday as in Paragraph 1, the employer shall pay the employee not less than 1 time as much as an hour wage rate of the working day according to the number of hours the employee works or not less than 1 time as much as the wage rate per unit of the working day according to the number of units the employee can complete. The payment is calculated by units.
- If the employer does not provide the holiday or less than as prescribed by this law, the employer shall pay the employee additionally not less than 1 time as much as the wage rate for the working day as if the employer asked the employee to work on the holiday.
- The employee can take sick leave as the leave shall be. For sick leave longer than 3 working days, the employer may ask a medical certificate of the first class hospital or the governmental hospital. If the employee cannot provide the certificate, he/she shall report it to the employer.
- The employer shall pay the employee on his/her sick leave the same amount of the working day wage rate throughout the period of sick leave, not exceeding 15 working days.
- The employer shall not employ young people below 15 years old.
- The employer may employ young people complete 13 years of age to work during school holiday or after school time only for the work that is not harmful to them or against the development and the promotion of their quality of life and with the consent from their parents.

- The employer shall provide clean drinking water sufficiently for the employee.
- If the employee stays with the employer, the employer shall provide clean, hygiene, and safe place for the employee.
- The employer shall provide other welfare beneficial to the employee as prescribed by the Notifications of the Director-General.
- Item 10 under this Regulation shall be enforced after 90 days from the date of announcement in the Royal Gazette.

12.3 The Ministerial Regulation on the Weight Scale B.E. 2547

- The employer shall ask the employee to lift, carry, load, pull, or push the item in accordance with the average weights per one employee as defined below;
  - 20 kilograms for the employee, female from 15 – less than 18 years old
  - 25 kilograms for the employee, male from 15 – less than 18 years old
  - 25 kilograms for the female employee
  - 55 kilograms for the male employee

If the item weight is over the weight scale as specified, the employer shall provide and allow the employee to use supporting equipment not dangerous to health and safety of the employee.

CHAPTER III
MATERIALS AND METHODS

3.1 Research methods

This study is a Quasi Experiment aimed at studying the cost of healthcare and prevention of work-related accidents, injuries and illnesses in the group of rubber tappers.

Population and study samples

Target population were rubber tappers who lived in Klong Piya Sub-District, Jana District, Songkla province.

The study samples were one group of rubber tappers who lived in Klong Piya Sub-District, Jana District, Songkla province, in which the whole members of the selected group became subjects**.**

3.2 Research process

3.2.1 The researcher called for a meeting to introduce herself, explain the objectives of the research as well as benefits the members would gain, and asked for basic information with regard to costs of occupational health and safety, and work-related health problems, injuries and illnesses.

3.2.2 The researcher conducted a field survey to observe and take photos of rubber tapping from the beginning till the end. The data collected was then used to devise Job Safety Analysis (JSA) (See Appendix A) in order to ensure that the analysis of potential hazards includes all activities. After that, the researcher conducted the Risk Assessment (See Appendix B) to figure out the risk level of each activity as well as the recommended prevention control. This data was used to formulate the safety guidance for rubber tappers (See Appendix C) afterwards.

3.2.3 The questionnaires(See Appendix D and Appendix E) were developed, based on the data collected by items 3.2.1 and 3.2.2, review of literatures and other relevant journals. Thereafter, the said questionnaires were tried out in the

3.2.4 groups of farmers and home workers who attended the project of the Thai Health Promotion Foundation entitled “the work plan for the development of quality of life for the workforce from the informal sector”. Having been tried out, the questionnaire was improved again to be used in a group of this research subjects. The questionnaires can be divided into 4 parts;

Part 1 Personal factors covering general details including age, sex, a number of the average daily working hours, a number of sleeping hours and length of work

Part 2 Cost spent for healthcare and the prevention of work-related accidents, injuries and illnesses

Part 3 Cost spent for treatment of work-related accidents, injuries and illnesses

Part 4 Pain on body parts by using the Visual Analog Scale

3.2.5 The study samples were called for interview by using the questionnaire. The data collected was from January-April, 2007. Later on, all questionnaires were gathered and summarized so as to have data on the cost of occupational health and safety and work-related health problems, accidents, injuries and illnesses.

3.2.6 The data received from the interview was used to create the health promotion model for rubber tappers as said in item 1.8 of Chapter 1.

3.2.7 The study samples were called for group meeting in order to implement the mentioned model according the following steps;

3.2.6.1 The group was provided training on self-care in order to reduce and prevent work-related accidents, injuries and illnesses. The researcher also promoted better communication by providing, such as, pictures and demonstration by specialists to help the group members to understand and providing a chance for some group members to participate in the practice with specialists, for example, the body stretching exercise with the physical therapists. For the reduction of work-related accidents and injuries, the researcher invited the members to share their experience of work-related accidents and injuries to their group members and trained them to analyze causes and corrective action to prevent the recurrence of the accidents.

3.2.6.2 The study samples were divided into 8 small groups, each of which had 4-10 members, based on voluntary and proximity basis in which their

houses should be located in the same vicinity in order to facilitate the gathering. The group leaders were appointed. The researcher explained the advantage of the group division to be easier for implementing assigned activities and to enhance the sharing of experience among group members more effectively. The researcher allowed group members to apply the gained knowledge in practice for 4 months under the supervision of the group leaders afterwards.

The main duty of the group leaders was to call a meeting at least once a month and to conduct the following activities;

- Ask the group members regarding work-related health problems, illness, as well as, self-care. Then record the data in the data sheet (See Appendix F) provided by the researcher

- Request group members to share about work-related accidents or injuries to other members and have brainstorming on causes and corrective action for the problems. Record the data of work-related injuries or accidents in the form (See Appendix G) provided by the researcher.

- Do the stretching exercise altogether.

- Exchange new idea on healthcare.

Later on, the group leaders recorded all details of the meetings in the form (See Appendix H) provided by the researcher.

During the 4 months in which the health promotion model for rubber tappers was being implemented, the researcher followed up the progress by having random interviews with one member of each group and a group leader of each group every group, once a month, and 3 times in total.

Knowledge on self-care in order to reduce and prevent work-related accidents, injuries and illnesses includes;

- Stretching Exercise (See Appendix J)
- Knowledge on Peptic Ulcer (See Appendix K)
- How to Lift Safely (See Appendix L)
- Safety guidance for rubber tappers

3.2.6.3 The study samples were called for group meeting in order to have a questionnaire-based interview after the model had completely been

implemented for 4 months. The data interviewed was from June-September, 2007 and analyzed for the research findings.

Figure 3-1 Training activity

Figure 3-2 Follow-up activity

3.3 Data analysis and statistical methods

The data collected was analyzed by the statistical programs, called SPSS as following;

3.3.1 Personal factors contributing to work-related health problems, accidents, injuries and illnesses were analyzed by Descriptive Statistics.

3.3.2 The difference of proportion of people having work-related accidents, injuries and illnesses before and after the health promotion model implementation was tested by Two-proportions test.

3.3.3 The difference of pain on body parts before and after the health promotion model implementation was tested by Wilcoxon signed matched-pairs ranks test.

3.3.4 The difference of the costs spent for treatment when having work-related accidents, injuries and illnesses before and after the health promotion model implementation was tested by Wilcoxon signed matched-pairs ranks test.

3.3.5 The relationship between the cost spent for healthcare and the prevention of work-related accidents, injuries and illnesses and the cost spent for

treatment when having work-related accidents, injuries and illnesses before and after the health promotion model for rubber tappers was implemented was analyzed by Spearman Correlation test.

Table 4-2 in Chapter IV, Nominal scale data is transformed to Interval scale data by giving score as 0,1 and 2, for example, ‘0’ is for ‘never practice’, ‘1’ is for ‘practice sometimes’ and ‘2’ is for ‘always practice’.

3.4 Cost study of occupational health and safety

For this research, the cost of occupational health and safety is studied by the test on the relationship between the cost spent for healthcare, the prevention of work-related accidents, injuries and illnesses and the cost spent for treatment when having work-related accidents, injuries and illnesses. The test shows the negative relationship between the 2 mentioned costs.

3.5 Implementation of the health promotion model for rubber tappers

The results of implementation of the health promotion model are described by;

3.5.1 Cooperation of the study samples in having group activities

3.5.2 Cooperation of the study samples in the implementation of the health promotion model for rubber tappers

3.5.3 The result of the assumption test which shows that the cost spent for treatment when having work-related accidents, injuries and illnesses after the model is implemented must be less than that before the model is implemented**.**

3.5.4 The result of the assumption test which shows that the proportion of rubber tappers having work-related accidents, injuries and illnesses after the model is implemented must be less than that before the model is implemented.

3.5.5 The result of the assumption test which shows that pain on body parts after the model is implemented must be less than those before the model is implemented**.**

3.5.6 Satisfaction of the study samples

CHAPTER IV
RESULTS

This research is aimed at studying the cost of the healthcare and the prevention of work-related accidents, injuries and illnesses, as well as, work-related health problems, accidents, injuries and illnesses in the group of rubber tappers for the period of January-September 2007. The research findings are presented in 8 sections;

Section 1 General information of the study samples

Section 2 Data of the healthcare and the prevention of work-related accidents and injuries before and after the implementation of the health promotion model for rubber tappers

Section 3 Data of work-related health problems before and after the implementation of the health promotion model for rubber tappers

Section 4 Data of pain on body parts before and after the implementation of the health promotion model for rubber tappers and the implementation of stretching exercise

Section 5 Data of work-related accidents and injuries before and after the implementation of the health promotion model for rubber tappers

Section 6 Data of the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses

Section 7 Data of the cost spent for the treatment of work-related accidents, injuries and illnesses

Section 8 Outcomes of the implementation of the health promotion model for rubber tappers by means of group work

Section 1 General information of the study samples

The study samples participating in this research are the rubber tappers at Klong Piya, Jana District, Songkla Province at 49 subjects in total, of which 40 are female (81.6 percent) and 9 are male (18.4 percent). They were in the range of 22-72 years of age, and the average age was 50.2 years. A majority of subjects aged between 41-50 years of age (30.6 percent). Their length of work experience ranged from 1-55 years and 28.1 years on average. The daily working hours were between 2-12 hours and 6.7 hours on average. A number of working days per week were at 3-7 days and 5.3 days on average. Most subjects worked 5 days a week. A number of sleeping hours were between 4-9 hours and 5.9 hours on average. Most subjects slept around 5-6 hours. As for the survey on daily income during January-April 2007, it was found that their daily income was about Baht 80-1,500 and Baht 241.8 on average. A majority of subjects earned Baht 201-500 per day. Meanwhile, for the income survey during June-September 2007, it was shown that their daily income was Baht 100-2,000 and Baht 346.5 on average. Most of the subjects earned Baht 201-500 per day. The said data can be tabulated as in Table 4-1 below

Table 4-1 Number and percentage of the study samples sorted by personal characteristics (n=49)

Characteristics	n	%
Sex		
Male	9	18.4
Female	40	81.6
Age (year)		
≤ 30	5	10.2
31-40	6	12.2
41-50	15	30.6
51-60	10	20.4
61-70	11	22.5
> 70	2	4.1
Mean (SD)	50.2 (13.1)	
Min – Max	22-72	
Length of work experience (year)		
≤10	7	14.3
11-20	10	20.4
21-30	12	24.5
31-40	12	24.5
41-50	4	8.2

Table 4-1 Number and percentage of the study samples sorted by personal characteristics (n=49) (continued)

Characteristics	n	%
> 50	4	8.2
Mean (SD)	28.1(14.7)	
Min – Max	1-55	
Daily working hours		
≤ 2	2	4.1
3-5	18	36.7
6-8	18	36.7
> 8	11	22.5
Mean (SD)	6.7(2.7)	
Min – Max	2-12	
Weekly working days		
3	3	6.1
4	2	4.1
5	29	59.2
6	5	10.2
7	10	20.4
Mean (SD)	5.3(1.1)	
Min – Max	3-7	
Sleeping hours		
≤ 4	9	18.4
5-6	22	44.9
7-8	16	32.7
> 8	2	4.1
Mean (SD)	5.9(1.4)	
Min – Max	4-9	
Daily income (From January-April 2007)		
≤ 200	18	36.7
201-500	21	43.0
501-800	7	14.3
>800	3	6.0
Mean (SD)	241.8(83.6)	
Min – Max	80-1500	
Daily income (From June-September 2007)		
≤ 200	10	20.4
201-500	27	55.1
501-800	2	4.1
801-1100	7	14.3
>1100	3	6.1
Mean (SD)	346.5(132.4)	
Min – Max	100-2000	

Section 2 Data of the healthcare and the prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers

Before the health promotion model was implemented, 100 percent of the subjects had been educated with regard to the right work posture of rubber tappers by watching CD made by the Thai Health Promotion Foundation which is about 10 minutes long. The CD contents encompass 2 main topics which are right work posture for lifting and right work posture for tapping. 14 subjects (28.6 percent) also attended the training called 'Safety Officer for Supervisor' hosted by the Provincial Labor Operation Center for 12 hours.

The numbers and percentages of the healthcare and the prevention of work-related accidents and injuries before and after the health promotion model for rubber tappers was implemented shown in Table 4-2 can be described as below

1. Use of Personal Protective Equipment

Before the health promotion model was implemented, 100 percent of subjects who sharpened knives by themselves had never put on cloth gloves when sharpening knives. After the health promotion model had been implemented, 26.3 percent put on cloth gloves sometimes, whereas the rest of 73.7 percent still did not put on gloves when sharpening knives. Nevertheless, the Table 4-3 reveals that the score of wearing gloves after the implementation of the model was higher than that before the implementation of the model significantly (p-value=0.025).

Before the health promotion model was implemented, 71.4 percent had eradicated weeds and tree limbs in the rubber plantation regularly. After the model had been implemented, the percentage rose to 87.8 percent. The Table 4-3 discloses that the score of weeding after the model implementation was higher than that before the implementation significantly (p-value=0.005).

For the prevention of injuries when weeding in the rubber plantation, it was shown that before the model was implemented, most of the subjects at 79.6 percent had put on cloth gloves every time, and 49.0 percent wore boots every time, meanwhile, 40.8 percent had never worn boots. After the model had been implemented, the percentages of putting on gloves and boots increased to 95.9 and 73.5 respectively. The Table 4-3 shows that the score of wearing cloth gloves and

boots after the model implementation was higher than that before the implementation significantly (p-value=0.005 and p-value <0.001 respectively).

With regard to the prevention of injuries during tapping, it was unveiled that 100 percent of the subjects put on long sleeved shirts, long trousers and boots both before and after the health promotion model was implemented.

Based on the interview, 100 percent of subjects who rode motorcycles to work and sell the latex by themselves had never worn helmets. After the model had been implemented, such the percentage dropped to 91.7. However, there was no significant difference between the scores of wearing helmet before and after the implementation of the model as shown in Table 4-3.

2. Use of clean cloth to remove rubber barks or latex from eyes

Since the subjects always had accidents of rubber barks or latex spurting to their eyes almost every time they were tapping, they used the unclean finger to remove the barks or latex, probably causing irritation and infection to the eyes. They were advised by the researcher to use the clean cloth to wrap up the finger first before removing the dust. Based on the questionnaires, it was found that before the health promotion model was implemented, 100 percent of the subjects had never used the clean cloth to wrap up their fingers before removing the dust from their eyes. After the implementation of the model, 14.3 percent used the clean cloth sometimes. The Table 4-3 illustrates that the score of the use of clean cloth after the model implementation was higher than that before the model implementation significantly (p-value=0.008)

3. Checkup of motorcycle, flashlight or lamp before use

Rubber tappers need to use flashlights or lamps during work. Consequently, the checkup of the said equipment is essential. It was shown that before the model implementation, 87.8 percent of the subjects had checked flashlights or lamps every time before use. The percentage rose to 91.9 after the model had been implemented. However, there was no significant difference (p-value=0.157) between the scores of the checkup before and after the model implementation as shown in Table 4-3.

Likewise, motorcycles are the only vehicles the tappers use for transportation, and they need to be checked up before use. It was found that before the model was implemented, 91.7 percent of the tappers using motorcycles to work and sell latex by

themselves had checked up their vehicles every time before use. The percentage decreased to 88.9 percent after the model implementation. There was no significant difference (p-value=0.317) between the scores of the motorcycle checkup before and after the model implementation as revealed in Table 4-3.

4. Loading latex containers

In view of the loading of latex containers, it was shown that 100 percent of loading latex containers on motorcycles for selling was never over 100 kilograms both before and after the model was implemented. The weights were loaded at 52.2 and 52.1 kilograms on average before and after the model implementation respectively.

5. Lifting latex containers

It was unveiled that before the health promotion model was implemented, 55.0 percent of the subjects had lifted the containers heavier than limitation. After the model had been implemented, the lifting of the containers heavier than limitation reduced to 38.2 percent. The Table 4-3 illustrates that the score of lifting latex container after the model implementation was higher than that before the model implementation significantly (p-value=0.008).

All of the subjects who lifted the containers higher than limitation were female. They lifted the containers at 31.5 kilograms and 26.6 kilograms on average before and after the model was implemented respectively. Meanwhile, male lifted the containers at 38.5 kilograms and 36.5 kilograms on average before and after the model was implemented respectively

6. Taking supplementary foods and herbs

Considering the healthcare by taking supplementary foods and herbs, it was reported that a majority of the subjects at 91.8 percent did not take any supplementary foods or herbs both before and after the model was implemented.

7. Annual health checkup

Most of the subjects did not pay attention to the annual health checkup. Before the model implementation, only 11.2 percent had the checkup and increased to 36.7 percent after the model implementation However, there was no significant difference between the scores of the annual health checkup before and after the model implementation as revealed in Table 4-3.

8. Exercise

In light of exercise, it was revealed that before the implementation of the model, 36.8 percent of the subjects exercised. The percentage of exercising increased to 97.9 percent after the implementation. Table 4-3 depicts that the score of exercise after the model implementation was higher than that before the implementation significantly (p-value<0.001)

Table 4-2 Number and percentage of healthcare and prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers (n=49)

Healthcare	Before		After	
	n	%	n	%
Use of Personal Protective Equipment				
Sharpening tapping knives				
Not by oneself	28	52.1	30	61.2
By oneself	21	42.9	19	38.8
Wearing cloth gloves when sharpening knives				
Every time	0	0.0	0	0.0
Sometimes	0	0.0	5	26.3
Never	21	100.0	14	73.7
Weeding in the rubber plantation				
Always	35	71.4	43	87.8
Sometimes	14	28.6	6	12.2
Never	0	0.0	0	0.0
Wearing cloth gloves when weeding in the rubber plantation				
Every time	39	79.6	47	95.9
Sometimes	10	20.4	2	4.1
Never	0	0.0	0	0.0
Wearing boots when weeding in the rubber plantation				
Every time	24	49.0	36	73.5
Sometimes	5	10.2	10	20.4
Never	20	40.8	3	6.1
Wearing long-sleeved shirts, long trousers and boots when tapping				
Every time	49	100.0	49	100.0
Sometimes	0	0.0	0	0.0
Never	0	0.0	0	0.0

Table 4-2 Number and percentage of data of healthcare and prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers (n=49) (continued)

Healthcare	Before		After	
	n	%	n	%
Wearing helmet when riding motorcycle				
Every time	0	0.0	1	2.7
Sometimes	0	0.0	2	5.6
Never	36	100.0	33	91.7
Wrapping fingers with clean cloth before removing rubber barks or latex from the eyes				
Every time	0	0.0	0	0.0
Sometimes	0	0.0	7	14.3
Never	49	100.0	42	85.7
Checkup of flashlight or lamp before use				
Every time	43	87.8	45	91.9
Sometimes	1	2.0	1	2.0
Never	5	10.2	3	6.1
Riding motorcycle to work and sell the latex				
By oneself every time	30	61.2	28	57.2
By oneself sometimes	6	12.2	8	16.3
Never by oneself	13	26.6	13	26.5
Checkup of motorcycle before use				
Every time	33	91.7	32	88.9
Sometimes	3	8.3	4	11.1
Never	0	0.0	0	0.0
Loading latex containers on motorcycle				
By oneself	39	79.6	41	83.7
Not by oneself	10	20.4	8	16.3
Weight of loaded latex containers by oneself				
Above 100 kilograms	0	0.0	0	0.0
Not above 100 kilograms	39	100.0	41	100.0
Mean (SD)	52.2(26.7)		52.1(27.2)	
Min – Max	15-100		10-100	
Lifting latex containers				
By oneself	40	81.6	34	69.4
Not by oneself	9	18.4	13	26.5
By oneself with help	0	0.0	2	4.1
Weight of lifted latex containers				
Over the legal limitation	22	55.0	13	38.2
Not over the legal limitation	18	45.0	21	61.8
Weight of lifted latex containers by oneself (kg.)				
Female	30	75.0	24	70.6
Mean (SD)	31.5(7.6)		26.6(9.9)	
Min – Max	10-40		10-40.	

Table 4-2 Number and percentage of healthcare and prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers (n=49) (continued)

Healthcare	Before		After	
	n	%	n	%
Male	10	25.0	10	29.4
Mean (SD)	38.5(3.4)		36.5(4.1)	
Min – Max	30-40		30-40	
Taking supplementary food and herb				
No	42	91.8	42	91.8
Yes	7	8.2	7	8.2
Types of supplementary foods and herbs				
Calcium	2	50.0	2	50.0
Protein	1	25.0	1	25.0
Spirulina algae	1	25.0	1	25.0
Ginseng	2	66.7	2	66.7
Lemon grass juice	1	33.3	1	33.3
Annual health checkup				
Yes	5	11.2	18	36.7
No	44	89.8	31	63.3
Exercise				
Yes	17	36.8	48	97.9
No	32	63.2	1	2.1

Table 4-3 Test on the difference of scores of healthcare and prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers by Wilcoxon signed matched-pairs ranks test

Variable	Z test	p-value
Wearing cloth gloves when sharpening knives	-2,236	0.025*
Weeding in the rubber plantation	-2.828	0.005*
Wearing cloth gloves when weeding in the rubber plantation	-2.828	0.005*
Wearing boots when weeding in the rubber plantation	-3.938	<0.001*
Wrapping fingers with clean cloth before removing rubber barks or latex from the eyes	-2.646	0.008*
Checkup of flashlights or lamps before use	-1.414	0.157
Wearing helmet when riding motorcycle	-1.633	0.102
Checking up motorcycle before use	-1.000	0.317
Weight of lifted latex containers	-2.646	0.008*
Annual health checkup	-1.886	0.059
Exercise	-5.396	<0.001*

* Level of statistical significance at 0.05

To analyze in detail of the exercise, before the model was implemented, the first 3 popular types of the exercise had been walking at 27.8 percent, cycling at 22.2 percent and stretching exercise at 22.2 percent. The frequency of exercise was at most at 7 times a week. The average frequency of exercise was at 1.9 times a week, and the average length of exercise was at 5.7 minutes a time as shown in Table 4-4.

After the model implementation, it was shown that 97.9 percent of the subjects who exercised did the stretching exercise as trained by the physical therapists. The average frequency of exercise was at 3.7 times a week. The average length of exercise was at 11.9 minutes a time as clarified in Table 4-4.

In addition, the proportions of the subjects who did stretching exercise before and after the model implementation were 0.1 and 0.9 respectively, and the test on the difference between the proportions of the subjects who did stretching exercise before and after the model implementation resulted in that the proportion of the subjects who did stretching exercise after the model implementation was higher than that before the implementation significantly (p-value < 0.001).

Table 4-4 Number and percentage of exercising before and after implementation of the health promotion model for rubber tappers (n=49)

Exercise	Before		After	
	n	%	n	%
Exercise				
No	32	63.2	1	2.1
Yes	17	36.8	48	97.9
Types of exercises				
Aerobic	1	5.6	0	0.0
Ratten Ball	2	11.1	0	0.0
Football	1	5.6	1	2.1
Yoga	1	5.6	0	0.0
Cycling	4	22.2	0	0.0
Walking	5	27.8	0	0.0
Stretching exercise	4	22.2	47	97.9
Jogging	1	5.6	0	0.0
Frequency of exercise (Time/week)				
0	32	65.3	1	2.0
1	0	0.0	7	14.3
2	1	2.0	10	20.4
3	2	4.1	12	24.5
4	4	8.2	3	6.1

Table 4-4 Number and percentage of exercising before and after implementation of the health promotion model for rubber tappers (n=49) (continued)

Exercise	Before		After	
	n	%	n	%
5	1	2.0	4	8.2
6	0	0.0	0	0.0
7	9	18.4	12	24.5
Mean(SD)	1.9(2.8)		3.7(2.2)	
Min-Max	0-7		0-7	
Length of exercise (minute/time)				
≤ 10	37	75.6	35	71.5
11-30	8	16.3	13	26.5
31-50	0	0.0	0	0.0
51-70	3	6.1	0	0.0
> 70	1	2.0	1	2.0
Mean (SD)	5.7(10.6)		11.9(7.7)	
Min-Max	0-120		2-90	

Section 3 Data of work-related health problems before and after implementation of the health promotion model for rubber tappers

Further to the work-related health problems found among the subjects, most of them at 93.9 percent had health problems. Of those with the health problems 100 percent had pain on various body parts, and 17.4 percent had peptic ulcer both before and after the implementation of the model. 36.9 percent and 54.3 percent of the subjects felt exhausted and drowsy during daytime before and after the model was implemented respectively. Only 6.1 percent had none of problems throughout the research period. Details are shown in Table 4-5.

Table 4-5 Number and percentage of work-related health problems before and after implementation of the health promotion model for rubber tappers (n=49)

Health Problem	Before		After	
	n	%	n	%
None of health problems	3	6.1	3	6.1
With health problems	46	93.9	46	93.9
Pain on body parts	46	100	46	100
Myitis of back muscle	0	0.0	1	2.2
Peptic ulcer	8	17.4	8	17.4
Exhaustion and drowsiness during the day	17	36.9	25	54.3

Section 4 Data of pain on body parts before and after implementation of health promotion model for rubber tappers and the implementation of stretching exercise

Based on the data regarding the health problems found among the subjects, pain on body parts was most widely found. The data was analyzed and found that before the model implementation, the first 3 painful parts had been waist at 82.6 percent, knee at 78.3 percent and lower back at 73.9 percent.

After the implementation, it was disclosed that the percentage of pain at all parts reduced. The most 3 painful parts was waist at 65.2 percent, lower back at 63.0 percent and calf at 58.7 percent respectively as clarified in Table 4-6.

Table 4-6 Number and percentage of pain on body parts before and after implementation of the health promotion model for rubber tappers (n=46)

Body Parts	Before		After	
	n	%	n	%
Neck	24	52.2	18	39.1
Shoulder	30	65.2	25	54.3
Upper Back	32	69.6	26	56.5
Lower Back	34	73.9	29	63.0
Waist	38	82.6	30	65.2
Upper Arm	25	54.3	19	41.3
Lower Arm	24	52.2	16	34.8
Wrist and Hand	25	54.3	18	39.1
Thigh	26	56.5	18	39.1
Calf	30	65.2	27	58.7
Knee	36	78.3	25	54.3
Foot and Ankle	25	54.3	14	30.4

Considering the mean of pain at various body parts, it was found that before the model implementation, the first 3 body parts with the highest mean of pain had been lower back at 2.98, knee at 2.93 and waist at 2.85 respectively.

After the implementation, the mean of pain of all body parts decreased, of which the first 3 highest mean was found at lower back at 1.48, waist at 1.41, and knee at 1.39 as shown in Table 4-7.

Table 4-7 The average of pain level on body parts before and after implementation of the health promotion model for rubber tappers

Body Part	Before		After	
	Pain Rank	Pain Level on average	Pain Rank	Pain level on average
Neck	12nd	1.15	10th	0.67
Shoulder	6th	2.39	5th	1.04
Upper Back	5th	2.48	5th	1.04
Lower Back	1st	2.98	1st	1.48
Waist	3rd	2.85	2nd	1.41
Upper Arm	10th	1.67	6th	0.89
Lower Arm	11st	1.50	11st	0.54
Wrist and Hand	9th	1.74	7th	0.80
Thigh	8th	1.87	9th	0.72
Calf	4th	2.50	4th	1.37
Knee	2nd	2.93	3rd	1.39
Foot and Ankle	7th	2.24	8th	0.78
Mean (SD)		2.2(0.6)		1.0(0.3)
Min – Max		1.2-2.9		0.5-1.5

The test on the difference between the pain level before and after the model implementation shows that the level of pain on each body part after the implementation was less than that before the implementation significantly (p-value<0.05) as shown in Table 4-8.

Table 4-8 Test on the difference between the pain level before and after the implementation of the health promotion model for rubber tappers by Wilcoxon signed matched-pairs ranks test

Variable	Z test	p-value
Neck	-2.360	0.018*
Shoulder	-4.258	<0.001*
Upper Back	-4.002	<0.001*
Lower Back	-4.253	<0.001*
Waist	-3.982	<0.001*
Upper Arm	-2.104	0.035*
Lower Arm	-3.242	0.001*
Wrist and Hand	-2.788	0.005*
Thigh	-3.512	<0.001*
Calf	-3.488	<0.001*
Knee	-4.084	<0.001*
Foot and Ankle	-3.691	< 0.001*

* Level of statistical significance at 0.05

As for the implementation of stretching exercise, it was shown that 91.5 percent of the subjects practiced Wrist Rotation, Thumb Stretching, Hand Waving and Neck Rotating. Second in number, 87.2 percent exercised Knee Stretching, while 85.1 percent did Back Stretching as illustrated further in Table 4-9

Table 4-9 Number and percentage of stretching exercise practiced (n-47)

Stretching Exercise Practice	n	%
Position 1 Wrist Rotation	43	91.5
Position 2 Thumb Stretching	43	91.5
Position 3 Hand Waving	43	91.5
Position 4 Neck Rotation	43	91.5
Position 5 Shoulder Rotating	28	59.6
Position 6 Shoulder Stretching	38	80.9
Position 7 Chest and Arm Stretching	38	80.9
Position 8 Back Stretching	40	85.1
Position 9 Ankle Stretching	19	40.4
Position 10 Knee Stretching	41	87.2
Position 11 Calf Stretching	38	80.9
Position 12 Thigh Stretching	21	44.7

Section 5 Data of work-related accidents and injuries before and after the implementation of health promotion model for rubber tappers

It was found that before the model implementation, 49.0 percent of the subjects had no work-related accidents and injuries. After the model had been implemented, the percentage rose to 81.6. The accident most often found before the model implementation had been a knife-cut when tapping at 48.0 percent of the total number of subjects who used to have accidents and injuries. In addition, the said accident reduced to 33.3 percent after the model had been implemented as shown in Table 4-10.

The proportions of the subjects who had work-related accidents and injuries before and after the model implementation were 0.5 and 0.2 respectively, and the test on the difference between the proportions of the subjects who had work-related accidents and injuries before and after the model implementation resulted in that the proportion of the subjects who had work-related accidents and injuries after the model implementation was less than that before the implementation significantly (p-value < 0.001).

Table 4-10 Number and percentage of work-related accidents and injuries before and after the implementation of the health promotion model for rubber tappers (n=49)

Accident/Injury	Before			After		
	Number of injured subjects	%	Number of injuries	Number of injured subjects	%	Number of injuries
None of accidents and injuries	24	49.0	0	40	81.6	0
With accidents and injuries	25	51.0	27	9	18.4	10
Knife-cut when tapping	12	48.0	14	3	33.3	4
Knife-cut when sharpening	3	12.0	3	3	33.3	3
Knife-cut when weeding	1	4.0	1	0	0.0	0
Cut of broken mower blade	0	0.0	0	1	11.1	1
Motorcycle accident	3	12.0	3	1	22.2	1
Stumble	3	12.0	3	0	0.0	0
Clip of latex track	1	4.0	1	0	0.0	0
Eye irritation and infection due to removal of rubber barks and latex from the eyes	2	8.0	2	1	22.2	1

Section 6 Data of the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses

Table 4-11 reveals data of the cost spent for healthcare and prevention of work-related accident, injuries and illnesses which can be elaborated as follows;

1. Training

The subjects had the training cost on average at Baht 33.3 and Baht 323.6, and the standard deviations were at 103.4 and 152.0 before and after the implementation respectively. Most of the cost was less or equal to Baht 100, tantamount to 71.5 percent and was between Baht 201-300, equivalent to 71.4 percent before and after model implementation respectively.

The standard deviation was high because income loss of the subjects was included. The standard deviation of the income was relatively high, and a number of training courses the subjects attended were not the same. For example, a certain number of subjects at 28.6 percent used to take the training course of Safety Officer for Supervisor for 12 hours, resulting in loss of income during the training and making the training cost have a wide range..

2. Personal Protective Equipment

The cost of Personal Protective Equipment had means at Baht 20.9 and Baht 21.6 before and after the model implementation respectively. A majority of the subjects had the PPE cost at Baht 11-20 at 49.0 percent and 46.9 percent before and after the model implementation respectively.

3. Exercise

The subjects had the cost of exercise on the average at Baht 2.7 and Baht 107.7 and the standard deviations at 15.5 and 56.2 before and after the model implementation respectively. The cost of exercise was mostly equal or less than Baht 100, equivalent to 67.4 percent and was at Baht 101-200, equivalent to 38.8 percent before and after the model implementation respectively.

4. Supplementary foods and herbs

Means of the cost for supplementary foods and herbs were at Baht 22.1 and the standard deviation was equal to 144.9 before and after the model implementation.

5. Annual health checkup

Means of the annual health checkup cost were at Baht 1.1 and Baht 52.2 before and after the model implementation respectively. The cost of annual health checkup was mostly equal or less than Baht 100, equivalent to 91.9 percent and 73.5 percent before and after the model implementation respectively.

Table 4-11 The cost spent for healthcare and prevention of work-related accidents, injuries and illnesses before and after implementation of the health promotion model for rubber tappers divided by the frequency (n=49)

Cost of Healthcare	Before		After	
	n	%	n	%
Training (Baht)				
≤100	35	71.5	0	0.0
101-200	1	2.0	2	4.1
201-300	1	2.0	35	71.4
301-400	2	4.1	2	4.1
401-500	0	0.0	0	0.0
>500	10	20.4	10	20.4
Mean (SD)	33.3(103.4)		323.6(152.0)	
Min – Max	0-2600		174-884	
PPE(Baht)				
≤10	4	8.2	3	6.1
11-20	24	49.0	23	46.9
21-30	11	22.4	14	28.7
31-40	5	10.2	5	10.2
41-50	1	2.0	1	2.0
>50	4	8.2	3	6.1
Mean (SD)	20.9(8.2)		21.6(7.9)	
Min – Max	9-90		10-90	
Exercise(Baht)				
≤100	33	67.4	15	30.6
101-200	3	6.1	19	38.8
201-300	3	6.1	2	4.1
301-400	3	6.1	5	10.2
401-500	0	0.0	3	6.1
>500	7	14.3	5	10.2
Mean (SD)	2.7(15.5)		107.7(56.2)	
Min – Max	89-1867		14-2100	
Supplementary foods and herbs (Baht)				
≤1000	43	87.8	43	87.8
1001- 3000	0	0.0	0	0.0
3001-5000	3	6.1	3	6.1
>5000	3	6.1	3	6.1
Mean (SD)	22.1(144.9)		22.1(144.9)	
Min – Max	0-6300		0-6300	
Annual medical checkup (Baht)				
≤100	45	91.9	36	73.5
101-300	3	6.1	10	20.4
>300	1	2.0	3	6.1
Mean (SD)	1.1(7.4)		52.2(102.7)	
Min – Max	0-400		0-500	

Table 4-12 presents the total cost spent during January- April 2007 which was the period before the implementation of the health promotion model and the total cost incurred during June- September 2007 which was the period after the model implementation. The total expenditure accounted for Baht 58,674 and Baht 64,736 before and after the model implementation respectively at which the total expenditure after the model implementation slightly increased at 10.3% from that before the model implementation. Most of the costs at 53.8 percent and 48.3 percent were spent for supplementary foods and herbs before and after the model implementation respectively.

Table 4-12 The cost spent for healthcare and prevention of work-related accidents, injuries and illnesses before and after the implementation of the health promotion model for rubber tappers sorted by type of expenditure

Cost of Healthcare	Before		After	
	Amount (Baht)	%	Amount (Baht)	%
Total cost	58,674		64,736	
Training	14,700	25.1	15,856	24.5
PPE	1,274	2.2	1,263	1.9
Exercise	10,000	17.0	12,646	19.5
Supplementary food and herb	31,550	53,8	31,270	48.4
Annual health checkup	1,150	1.9	3,700	5.7

Section 7 Data of the cost spent for the treatment of work-related accidents, injuries and illnesses

Table 4-13 describes the data of the cost spent for the treatment of work-related accidents, injuries and illnesses before and after the implementation of the health promotion model. It was shown that the total cost of treatment after the model implementation was less than that before the implementation.

Before the implementation, most of the cost was spent for treatment of work-related accidents and injuries at 68.6 percent; meanwhile, 18.0 percent and 13.4 percent were spent for the pain on body parts and peptic ulcer respectively. Besides, in case of accidents and injuries, most of the treatment cost was incurred by motorcycle accidents at 83.3 percent.

Regarding the treatment cost after the implementation of the health promotion model, it was shown that the highest cost of treatment was spent for the pain on body parts at 45.0 percent of the total treatment cost. 44.5 percent was spent for peptic ulcer. Lastly, 8.4 percent was spent for accidents and injuries, most of which at 71.1 percent came from motorcycle accidents.

Table 4-13 The cost spent for the treatment of work-related accidents, injuries and illnesses

Cost of Treatment	Before		After	
	Amount (Baht)	%	Amount (Baht)	%
Total cost	66,690		16,059	
Accidents and injuries	45,780	68.6	1,349	8.4
Knife-cut when tapping and from sharpening the knife	1,130	2.5	210	15.6
Loss of income	600		0	
Self-care	530		210	
Motorcycle accidents	38,130	83.3	959	71.1
Loss of income	37,800		0	
Doctor and medical service	300		959	
Self-care	30		0	
Stumbles	3,090	6.7	None	
Loss of income	3,000			
Self-care	90			
Eye irritation and infection due to removal of rubber barks or latex from the eyes	430	0.9	150	11.1
Doctor and medical service	430		150	
Cuts on hands from weeding	3,000	6.6	None	
Loss of income	2,000			
Doctor and medical service	1,000			
Cuts on feet by broken mower blades	None		30	2.2
Doctor and medical service			30	
Peptic Ulcer	8,920	13.4	7,140	44.5
Doctor and medical service	8,220		1,440	
Antacid	700		0	
Curcuma mixed with honey	0		5,700	

Table 4-13 The cost spent for the treatment of work-related accidents, injuries and illnesses (continued)

Cost of Treatment	Before		After	
	Amount (Baht)	%	Amount (Baht)	%
Pain on body parts	11,990	18.0	7,220	45.0
Doctor and medical service	5,960		2,910	
Traditional medication	3,070		3,070	
Paracetamol	700		230	
Traditional Thai Massage	800		200	
Pain relief and massage	1,460		810	
Myitis of back muscle	None		350	2.1

The test on the relationship between the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses and the cost spent for treatment when having work-related accidents, injuries and illnesses shows that the cost spent for the healthcare had no relationship with the cost spent for treatment. The mentioned costs mean the costs incurred before and after the implementation of the model as further clarified in Table 4-14.

Table 4-14 Test on the relationship between the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses and the cost spent for treatment when having work-related accidents, injuries and illnesses by Spearman Correlation test

Independent Variable	Dependent Variable	r_s	p-value
The cost spent for healthcare before the implementation of the health promotion model for rubber tappers	The cost spent for treatment before the implementation of the health promotion model for rubber tappers	-0.074	0.307
The cost spent for healthcare after the implementation of the health promotion model for rubber tappers	The cost spent for treatment after the implementation of the health promotion model for rubber tappers	-0.175	0.114

Note: r_s means Spearman Correlation

The test on the difference between the treatment costs when having work-related accidents, injuries and illnesses before and after the model implementation shows that the treatment cost incurred after the implementation was less than that

incurred before the implementation significantly(p-value<0.05). The said cost includes the treatment cost for work-related accidents and injuries, as well as, the treatment cost for illnesses as shown in Table 4-15.

Table 4-15 The test on the difference between the treatment costs when having work-related accidents, injuries and illnesses before and after the implementation of the health promotion model for rubber tappers by Wilcoxon signed matched-pairs ranks test

Variable	Z test	p value
The treatment cost for work-related accidents and injuries	-2.625	0.009*
The treatment cost for illnesses	-3.062	0.002*

* Level of statistical significance at 0.05

Section 8 Outcomes of the implementation of the health promotion model for rubber tappers by means of group work

To implement the model by means of group work, 49 subjects were divided into 8 small groups each of which contained roughly 4-10 subjects. Thereafter, the group leaders were selected. The group leaders were assigned to hold a meeting at least once a month. Therefore, during 4 months when the model was being practiced, group members should have been called for the meeting for at least 4 meetings. As Table 4-16, out of 8 small groups, 4 groups or 50 percent had a meeting according to the frequency set by the researcher one of which, Group 6, could host up to 9 meetings. On the other hand, Group 4 could not have any meetings.

After every meeting, the leaders were requested to record details of meeting in the form provided by the researcher. It was shown that 4 out of 7 groups or 57.1 percent recorded the meeting in the form every time.

With regard to the completeness in proceeding all meeting agendas specified by the researcher, 2 out of 7 groups or 28.6 percent could carry out the proceedings completely.

For the number of meeting participants, only 1 out of 7 groups had a full attendance or 100 percent, and 3 out of 7 groups or 42.9 percent had above 80 percent of attendance.

Further to the record of work-related accidents and injuries, out of 8 groups, 2 groups or 25.0 percent used the accident and injury record form given by the researcher; meanwhile, another 5 groups or 62.5 percent used the meeting minute record form instead, and the rest of one group or 12.5 percent did not make any record.

Finally, about the record of work-related illnesses, 7 out of 8 groups or 87.5 percent used the meeting minute record form instead of the illness record form provided by the researcher. The rest of one group or 12.5 percent did not have any record.

Table 4-16 Number and percentage of the outcomes of the implementation of health promotion model for rubber tappers by group work

Implementation of Group Work	n	%
Number of group members (n=49)		
Group 1	5	10.2
Group 2	6	12.2
Group 3	10	20.5
Group 4	4	8.2
Group 5	6	12.2
Group 6	8	16.3
Group 7	4	8.2
Group 8	6	12.2
Frequency of group meeting (n=4)		
Group 1	2	50.0
Group 2	3	75.0
Group 3	5	100
Group 4	0	0.0
Group 5	4	100
Group 6	9	100
Group 7	2	50.0
Group 8	5	100
Record in the meeting form given		
Group 1 (n=2)		
Recorded	1	50.0
Unrecorded	1	50.0
Group 2 (n=3)		
Recorded	3	100
Unrecorded	0	0.0

Table 4-16 Number and percentage of the outcomes of the implementation of health promotion model for rubber tappers by group work (continued)

Implementation of Group Work	n	%
Group 3 (n=5)		
Recorded	5	100
Unrecorded	0	0.0
Group 5 (n=4)		
Recorded	3	75.0
Unrecorded	1	25.0
Group 6 (n=9)		
Recorded	9	100
Unrecorded	0	0.0
Group 7 (n=2)		
Recorded	1	50.0
Unrecorded	1	50.0
Group 8 (n=5)		
Recorded	5	100
Unrecorded	0	0.0
Completeness in proceeding the meeting agendas given		
Group 1 (n=2)		
Complete	1	50.0
Not complete	1	50.0
Group 2 (n=3)		
Complete	3	100
Not complete	0	0.0
Group 3 (n=5)		
Complete	5	100
Not complete	0	0.0
Group 5 (n=4)		
Complete	3	75.0
Not complete	1	25.0
Group 6 (n=9)		
Complete	6	66.7
Not complete	3	33.3
Group 7 (n=2)		
Complete	1	50.0
Not complete	1	50.0
Group 8 (n=5)		
Complete	4	80.0
Not complete	1	20.0
Number of meeting participants		
n= number of group members multiply by frequency of the meeting hosted		
Group 1 (n=10)		
Present	10	100
Absent	0	0.0

Table 4-16 Number and percentage of the outcomes of the implementation of health promotion model for rubber tappers by group work (continued)

Implementation of Group Work	n	%
Group 2 (n=18)		
Present	15	83.3
Absent	3	16.7
Group 3 (n=50)		
Present	42	84.0
Absent	8	16.0
Group 5 (n=24)		
Present	20	83.3
Absent	4	16.7
Group 6 (n=72)		
Present	43	59.7
Absent	29	40.3
Group 7 (n=8)		
Present	5	62.5
Absent	3	37.5
Group 8 (n=30)		
Present	22	73.3
Absent	8	26.7
Record of work-related accidents and injuries (n=8)		
In the accident and injury form given	2	25.0
In the meeting minute form	5	62.5
No record	1	12.5
Record of work-related diseases and illness (n=8)		
In the disease and illness form given	0	0.0
In the meeting minute form	7	87.5
No record	1	12.5

CHAPTER V
DISCUSSION

This research is the study of the cost of the healthcare and the prevention of work-related accidents, injuries and illnesses, as well as, the work-related health problems, accidents, injuries and illnesses in the group of 49 rubber tappers at Klong Piya Sub-District, Jana District, Songkla Province. The research findings can be discussed as in following topics;

1. General data of the study samples

The study samples were composed of 49 rubber tappers, most of which at 81.6 percent were female, and only 18.4 percent were male. They were 50.2 years old on average of which 47.0 percent were more than 50 years of age and categorized as aging people. Their average length of work experience was at 28.1 years, making them high experienced tappers.

Daily working hours of the subjects were at 6.7 hours on average; meanwhile, average working days a week were at 5.3 days. Both were considered normal for people at productive age. Nevertheless, the tappers need to work during the night approximately from 01:00-10: 00 hrs when the tree is still in the dark and gives a lot of latex as aforementioned in the Item: Rubber Tapping in Chapter 2. In addition, the tappers had average sleeping hours at only 5.9 hours. The mentioned reasons led to health problems of the tappers as identified in the health promotion work plan for workforce from the informal sector for 2004-2006 of the Thai Health Promotion Foundation in Chapter II.

As for daily income, the standard deviation of the income was rather high because each of rubber farmers had different size of the plantation ranging from 0.4 acres or equivalent to 75 rubber trees up to 12 acres or more than 2,000 trees. Table 4-1 presents that the average daily income of the subjects during January – April was less than that during June – September since at the end of February till throughout

March, the trees shed their leaves and sprout their young leaves. During this period, most tappers stop tapping because the trees will give only small amount of latex or none. It is not worth tapping and loosing the tree barks as earlier explained in the Tapping Calendar in Chapter II.

2. Data of healthcare and prevention of work-related accidents and injuries before and after implementation of the health promotion model for rubber tappers

2.1 Perception and knowledge on healthcare and prevention of work-related accidents and injuries

From Section 2 in Chapter IV, it shows that 100 percent of the study samples were educated on the right work posture of lifting and tapping by watching the CD made by The Thai Health Promotion Foundation. The CD about 10 minutes long explains the right work posture for lifting and reiterates that female should not lift more than 25 kilograms. To lift the latex container, if it is heavier than 50 kilograms, it should be lifted by 2 people since lifting too heavy objects can cause the intervertebral disc herniation.

Regarding the right work posture for tapping, the CD mentions that the tapping that forces arms to be over the head can cause pain at the shoulders. The tapping below waist can cause pain at lower back, and wrist should not be twisted while tapping. The tapper keeps himself 30 centimeters far from the tree. To soothe the pain derived from tapping, the tapper should do the stretching exercise regularly and work in the right work posture.

28.6 percent of the subjects used to attend the training course, ‘Safety Officer for Supervisor’, and most of them could not remember the content of the course. Some did not understand the training content, whereas some said the knowledge gained from the training could not be efficiently applied to their work.

2.2 Use of Personal Protective Equipment (PPE)

Based on data in Table 4-10, it was revealed that before the model implementation, 51.0 percent of the subjects had work-related accidents and injuries, some of which could have been protected or lessened by wearing PPE. For example, the subjects were suggested to put on cloth gloves to reduce the severity of the cut

when sharpening a knife in case that the accident might take place. However, only 26.3 percent wore gloves sometimes. The rest of 73.7 percent never put them on. The reasons why most subjects did not put on gloves include that they felt clumsy and inept to work with gloves, slowing down the sharpening. Another example is the fall of motorcycle when riding in the plantation. The subjects were recommended to wear helmets to protect the impact on their heads in case of the accident. Most subjects at 91.7 percent had never worn helmets before due to the work constraints. They needed to leave home for the plantation during the night. They wore flashlights or lamps on their heads to provide additional light to the front light of the motorcycles. As a result, they could not wear the helmets. Moreover, the distance from home to the plantation was not far, approximately not more than 2 kilometers on average. As for taking the helmets with them for the use after tapping or when riding on the highway to sell the latex, it was also impossible because the tappers had to load the latex containers, tapping knives, collecting cans and a kit bag containing provisions, including foods, house keys, wallets, etc. Therefore, to bring the helmets along with them is just to make them feel even more bulky.

With regard to PPE, a majority of the subjects at 95.9 percent were accustomed using the PPE, for example, putting on cloth gloves every time when weeding in the rubber farms to protect their hands from injury, stab and from getting callous when holding hands of knives or mowers. 73.5 percent of the subjects wore boots when weeding in the rubber farms, increasing from 49.0 percent after the health promotion model had been implemented. In addition, 100 percent of the subjects put on long sleeved shirts, long trousers and boots when tapping to protect themselves from sting of poisonous insects and bites of venomous snakes.

2.3 Use of clean cloth to remove rubber barks or latex from the eyes

Since the subjects had the barks or latex skipped to their eyes almost every time when tapping, and they used unclean fingers to remove the barks or latex, this made their eyes get irritated and infection. They were advised to use clean cloth to wrap their fingers before removing the barks. Table 4-2 shows that only 14.3 percent of the subjects used the cloth to wrap their fingers because in doing so, most subjects thought it wasted their time.

2.4 Checkup of flashlights, lamps and motorcycles before use

Most subjects checked up the flashlights or lamps before use at 87.8 percent and 91.9 percent before and after the model implementation respectively. The flashlights and the lamps are necessary tools to give adequate light during the night as well as to protect eyes from problems probably derived from focusing eyes on tapping. As quoted in the health promotion work plan for the workforce from the informal sector in agricultural sector, 2004-2006 of the Thai Health Promotion Foundation, the rubber tappers may have eye problems because of focusing their eyes on the tapping in the dim light environment. Besides, flashlights or lamps can also give light while walking in the plantation and help protect tappers from stumbles and see poisonous animals.

The checkup of motorcycles before use was rated important by the subjects at 91.7 percent and 88.9 percent before and after the model implementation respectively because the motorcycles were the only vehicles the subjects rode to work and load the latex to sell. Nonetheless, table 4-10 discloses that there were accidents of motorcycle falls at 12.0 percent and 22.2 percent from total number of injured subjects before and after the model implementation respectively due to the rugged and slippery condition of the road and dim light on the road making riders unable to have clear vision.

2.5 Loading the latex containers on motorcycles

Table 4-2 presents that a majority of the subjects at 79.6 percent and 83.7 percent before and after model implementation loaded latex containers by themselves, of which 100 percent loaded not exceeding 100 kilograms. The safety threshold of 100 kilograms is recommended by Honda Motor Company. Referred to the interview, the subjects reported that loading of latex on motorcycle could be only 2 containers at maximum, and the maximum capacity of each container was 40 liters, equivalent to 40 kilograms.

2.6 Lifting latex containers

Table 4-2 also describes that before the model implementation, 55.0 percent of subjects who lifted the containers by themselves had lifted the container heavier than limitation guided by The Ministerial Regulation on the Weight Scale B.E. 2547, and all of them were female. After the model had been implemented, the said percentage dropped to 38.2, of which 23.1 percent said they did not know about the

limitation, and the other 76.9 percent could not find others to help and wanted to lift alone because they could finish the work more quickly and were used to lifting it.

2.7 Taking supplementary foods and herbs

Table 4-2 reveals that a majority of subjects approximately 91.8% did not take any supplementary foods and herbs because they had low income. They preferred having complete 5 food groups.

2.8 Annual health checkup

As in Table 4-2, most subjects never had annual health checkup because they did not recognize its importance and had no time. The female subjects were promoted to have a medical check on a breast cancer and a cervical cancer at the hospital by the community health volunteer. The subjects would be aware of their health problems only when there were symptoms shown and they went to see a doctor. For instance, the subjects who had peptic ulcer would see the doctor only when they had a bellyache, or after they took the drug by themselves for a while and did not feel better. The subjects especially the elderly were explained the importance of the annual health checkup.

2.9 Exercise

Table 4-2 shows that only 36.8 percent of the subjects did exercise before the model implementation. There were many types of exercises such as walking, cycling and stretching as demonstrated in Table 4-4. The stretching exercise was diversified based on the subjects' creativity or copied from the TV program. Frequency of doing the exercise was at 1.9 times a week, and the length of exercise was at 5.7 minutes per time on average.

After the model implementation, frequency of doing the exercise increased to 3.7 times a week, and the length of exercise also increased to 11.9 minutes per time on average. Moreover, the subjects were requested to stop exercising as mentioned above and start the stretching exercise according to the training provided and the posters distributed. This was aimed at controlling other patterns of exercise, not to have any interference in the test of pain on body parts.

Table 4-4 shows that 1 out of 49 subjects, female and 68 years old with 40 years of tapping experience, did not exercise at all both before and after the model implementation. She had no pain on her body and no any health problems throughout

the research period. Moreover, from 48 subjects who did exercise, another subject, male and 30 years old, exercised by means of playing football and ratten ball instead of doing the stretching exercise. He had a slight body pain at level 8 and had no other health problems throughout the research period. He said playing football and ratten ball was not only the exercise but also a great fun.

3. Data of work-related health problems before and after the implementation of the health promotion model for rubber tappers

Table 4-5 discloses that 93.9 percent of the subjects had health problems both before and after the model implementation. Those with health problems had the body pain at 100 percent, exhaustion and drowsiness during daytime at 36.9 percent before the model implementation and 54.3 percent after the implementation, and peptic ulcer at 17.4 percent.

3.1 Pain on body parts

Table 4-6 presents that the subjects had pain at all body parts before the model implementation. The 3 most painful parts were waist at 82.6 percent, knee at 78.3 percent and lastly lower back at 73.9 percent.

After the model implementation, it was found that percentage of the pain at all parts reduced. The 3 most painful parts were waist at 65.2 percent, lower back at 63.0 percent and calf at 58.7 percent.

The average pain level on each body part after model implementation was also less than that before the implementation as shown in Table 4-7.

Apart from that, the test on the difference between average pain level shown in Table 4-8 reveals that the pain level of each body part after the implementation was less than that before the implementation significantly.

This finding is in the same tune with the information in CD made by the Thai Health Promotion Foundation on the right work posture of rubber tapping, saying that tapping over head level can make pain at shoulders, and tapping lower than waist can cause pain at the lower back. In addition, the health promotion work plan for workforce from the informal sector in agricultural sector, 2004-2006 also says that the body pain especially at the lower back stems from the tapping posture that forces

the tappers to lift and bend very often, as well as, from collecting the latex in which tappers need to carry very heavy latex cans.

For the shoulder pain, Table 4-6 shows that the subjects at 65.2 percent and 54.3 percent had the shoulder pain before and after the model implementation respectively. The CD made by the Thai Health Promotion Foundation on right posture of rubber tapping describes that for tapping over head level, the tapper should use a stool. However, it was found that for tapping over head level, the tapper would tie a stick with a tapping knife handle in order to reduce the muscle strain around the upper arms and shoulders because it was not convenient to carry the stool along.

With reference to the study on the working condition and the prevalence rate of musculoskeletal pain in a group of rubber tappers at Na-Kreu Sub-District, Kantang District, Trang Province, it was found that the highest prevalence rate of the pain in the period of one month was found at the lower back mostly and hand, wrist, and leg respectively. The Carpal Tunnel Syndrome had the highest prevalence rate among work-related diseases, and its prevalence rate increased significantly during hard work (Narong, 2003). Although, the researcher could not diagnose the symptom pathology, Table 4-6 shows that the percentage of pain at wrist and hand reduced from 54.3 percent to 39.1 percent after the model had been implemented. In addition, Table 4-7 also reveals that the average pain level of all body parts including hand and wrist decreased from 1.74 to 0.80 after the model had been implemented even though the data was collected during the hard work season from June-September. This was because most of the subjects at 91.5 percent did the stretching exercise No.1: Wrist Rotation, No.2: Thumb Stretching and No.3: Hand Waving as shown in Table 4-9. The exercise is designed for the patients of Carpal Tunnel Syndrome as illustrated under Item: Carpal Tunnel Syndrome Exercise in Chapter II.

3.2 Exhaustion and drowsiness during daytime

Data in Table 4-5 explains that the subjects were exhausted and sleepy during the day at 36.9 percent which then increased to 54.3 percent after the model implementation in the harvesting season.

From Table 4-1, a number of sleeping hours on average of the subjects were at 5.9 hours. The number was considered insufficient for laborers like farmers. Based on the interview of 32 subjects during the follow-up of the model implementation, it was

found that 6 subjects were drowsy. Four of them had to take a nap for 30 minutes to one hour during the day. Two of them had no time to do so because of other routine works, such as, parenting or baby-sitting, housework, gardening, and weeding in the plantation. One subject could not sleep at night and had taken a sleeping pill from time to time, resulting in drowsiness during daytime. Similar to the finding, the health promotion work plan for workforce from the informal sector in agricultural sector, 2004-2006 devised by the Thai Health Promotion Foundation explains that one problem of the rubber tappers is exhaustion derived from inadequate rest, especially, the abnormal sleep pattern and sleep during daytime in which the tappers are not familiar with. Besides, during the day, the tappers also have other business to deal with all day long.

3.3 Peptic Ulcer

Table 4-5 shows that 17.4 percent of the subjects had peptic ulcer both before and after the model implementation. Referring to the interview of 32 subjects during the follow-up of the model implementation, it was evident that the main cause of peptic ulcer came from abnormal eating pattern. The tappers woke up to work during the night until the morning when the latex was sold around 10 hrs. Most of tappers could have breakfast and lunch in one time. In addition, some tappers having peptic ulcer liked having spicy food, and one subject having peptic ulcer drank fizzy drinks in substitution of water and had insufficient sleep.

4. Data of work-related accidents and injuries before and after the implementation of the health promotion model for rubber tappers

Table 4-10 shows that before the model implementation, the percentage of subjects who had work-related accidents and injuries stayed at 51.0, and it reduced to 18.4 after the implementation.

The type of injuries mostly found both before and after the implementation was a knife-cut when tapping. The percentage of the said injury reduced from 48.0 percent to 33.3 after the implementation. The subjects had the said injury because when the tapper used his/her adroit hand to tap the bark off, at the same time, his/her another hand was picking out the dried latex stuck on the tree surface in order to facilitate the flow of the latex through the new incision. In doing so, it is possible that

the tapping knife in the adroit hand could accidentally cut the cleaning hand. The tapper did so because they wanted to finish work rapidly. Actually, the right work posture of tapping is that the tapper uses both hands to hold a knife-hand as explained in the right rubber tapping posture CD made by the Thai Health Promotion Foundation.

Second to the knife-cut from tapping were a knife-cut from sharpening the knife, a motorcycle accident, and a stumble in the rubber plantation.

In case of the knife-cut during sharpening the knife, the injury was mostly found with subjects who were temporarily hired to sharpen tapping knives for extra income. Nevertheless, all subjects were recommended by the researcher to put on cloth gloves when sharpening knives in order to protect themselves and reduce the severity of the injury. As shown in Table 4-2, most of the subjects at 73.7 percent did not wear gloves because the gloves made them feel maladroit and inconvenient.

As for the motorcycle accident, mostly the accident took place when tappers traveled from home to the rubber plantation because of the road condition which was dark and rugged. The tappers were advised by the researcher to wear helmets to protect their head from knocking against the road. With regard to the research findings shown in Table 4-2, a majority of the subjects at 91.7 percent did not put on helmets because of the working restraints as explained in Item 2.2: Use of PPE.

Another type of accidents mentioned in Table 4-10 is a stumble in the plantation. The stumble was caused by haste of the tappers and rugged condition of the land. Essentially, in the monsoon season, when there was a sign of raining, the tappers had to tap and collect the latex as most quickly as possible. Moreover, for the tappers who had too many trees, after tapping, they needed to collect the latex rapidly; otherwise, the latex would clot. However, the stumble in the plantation caused only minor harms, such as, laceration so that the tappers could look after themselves.

The last injury raised here is eye infection. The infection was caused by the skip of rubber barks or latex into the eyes. When there was the skip, the tappers would use their unclean finger to remove the barks. This type of accident took place almost every tapping and so many times that the tappers themselves could not count during the research was being conducted. They were suggested to wrap clean cloth on

their finger before removing the barks or latex. Table 4-2 presents that most subjects at 85.7 percent did not wrap their finger with clean cloth, because it wasted their time, and the chance that the eyes would get infectious from the skip was minimal. If the infection took place, it would be quite serious, and the tapper needed to see a doctor.

Additionally, the test on the difference of the proportion of the subjects having work-related accidents and injuries before and after the model implementation shows that the proportion before the model implementation was less than that after the model implementation significantly.

5. The cost spent for healthcare and prevention of work-related accidents, injuries and illnesses

Table 4-12 reveals that the total cost spent for healthcare and prevention of work-related accidents, injuries and illnesses of the study samples increased a little at 10 percent after the model implementation. The cost spent for the annual health checkup after the model implementation rose twice as much as that before the model implementation. Accordingly, this finding presents that the subjects became more aware of the annual health checkup.

The highest cost the subjects spent for healthcare and prevention of work-related accidents, injuries and illnesses was from supplementary foods and herbs. Examples of supplementary foods the subjects took included spirulina algae, ginseng, calcium, and protein. Upon the interview with the subject having the algae, she said she ate it to protect herself from cancer. For ginseng eaters, they said they had the herb for anti-aging purpose. As the price of these supplementary foods was comparatively expensive, and they were taken regularly, the cost in this part became the highest.

The cost spent for training came in the second place. Before the model implementation, 28.6 percent of the subjects had a training on ‘Safety Officer for Supervisor’. However, based on the review of this training content, it was found that the training was mainly referred to the Training Manual of Safety Officer for Supervisor, 1997 published by the Department of Labor Protection and Welfare and involved only with the industrial sector, not suitable for the training of workforce from agricultural sector. For instance, under the topic of loss from accidents, the

content covered only the loss of the factory. The examples of unsafe acts and unsafe conditions were also related to the activities occurred in the factory only. Besides, under the topic of safety laws and safety promotion activities, the trainees were informed only the laws concerning the factory, such as, the ministerial notification on safety of machinery work by the Ministry of Interior, dated 23rd July 1976, the ministerial notification on electricity safety by the Ministry of Interior, dated 8th March 1979, and the ministerial notification on the occupational health and working environment committee by the Ministry of Labor and Social Protection, dated 27th June 1995 and the like. In addition, the interview on the subjects attending this training course disclosed that most of them could not remember the substance of the training.

Less was the cost spent for exercising. It was found that the cost rose only 26 percent. When considering Table 4-2, it was apparent that a number of subjects doing the exercise heightened 3 times after the model implementation. Since doing the stretching exercise had no cost of exercise apparatus and the exercise could be done during leisure time, such as, watching TV, the exercise did not make loss of income.

6. The cost spent for the treatment of work-related accidents, injuries and illnesses

From Table 4-13, it was apparent that the treatment cost for work-related accidents, injuries and illnesses after the model implementation reduced from the treatment cost incurred before the implementation at 76 percent. Furthermore, the test on the research assumption proves that the treatment cost incurred after the implementation was less than the cost incurred before the implementation significantly as shown in Table 4-15, in which the treatment cost for accidents and injuries decreased mostly at 97 percent; meanwhile, the cost for body pain and peptic ulcer reduced at 39 percent and 20 percent respectively.

The study on the treatment cost spent for accidents and injuries in Table 4-13 found that the highest cost of treatment came from the fall of motorcycle. The accident occurred twice before the implementation and once after the implementation. Even though the accident frequency was very low, the severity of the accident was rather high. When it took place, mostly the victim needed to see a doctor and took a

sick leave. One victim commented that the motorcycle collapsed because the road from home to the plantation was bumpy. She could not see the road well and unknowingly rode her motorcycle into the hole on the road and fell down. Her ankle bumped against the ground and needed to see a doctor for a stitch though motorcycle speed was only at 30 kilometers/hour. Another case was similar but more severe. The victim had a fall of motorcycle due to a hole on the road on the way back home after selling the latex. The accident made the ribs dislocated, and she needed to take leave for 45 days. She lost a lot of income because her average daily income was high. Nevertheless, after the model implementation, the treatment cost for the motorcycle accident reduced at 97 percent because the fall took place only once and not so seriously that the victim did not take the sick leave and lose income.

Secondly, a stumble in the rubber plantation made the injured tapper have to take a sick leave for 15 days and lose the income.

Thirdly, a cut of a weeding-knife happened only once before the model implementation. The injured tapper said that he did not put on gloves while weeding. Moreover, the weeding knife was very sharp, causing a deep cut. He had to take a sick leave for 10 days unable to generate any income. After the said accident, this tapper wears gloves when weeding always.

Lastly, a cut when tapping and sharpening a knife generated the least cost of treatment. With reference to an interview, a majority of the subjects viewed the cut when tapping and sharpening a knife as a normal trivia. They were reminded by the researcher that only a small cut could become a serious problem if the knife was dirty and contained tetanus toxin. One subject shared a story of a tapper of another rubber tapper group that the referred tapper had the tetanus from the cut of the tapping knife and almost lost his hand because of the disease. Therefore, the study samples became more aware of the severity of the cut of the tapping knife, reducing the number of the cuts as well as the treatment cost of the cuts at 81 percent.

As for the treatment cost for body pain, before the model implementation, most of the subjects used to see a doctor at a private clinic because they were fed up with red-tape and bureaucracy in using a 30-Baht card at the governmental hospital. Hence, their treatment cost for the pain was high. Based on the observation and the interview of the subjects, it was found that most subjects were not recognized of the

prevention or the reduction of the pain at the root cause of the problem. For instance, Table 4-2 shows that 69.4 percent of the subjects who lifted latex containers by themselves still lifted the containers heavier than the limitation, even though some of them were fully aware of the said limitation and possible threats of doing so. As explained in the CD on right posture of rubber tapping made by the Thai Health Promotion Foundation, lifting too heavy objects can cause intervertebral disc herniation. Nonetheless, after the health promotion model had been implemented, almost 100 percent of the subjects did the stretching exercise regularly for 4 months as shown in Table 4-4 They said the exercise helped reduced body pain as shown in Table 4-8. In addition, a number of subjects who used to see the doctor reduced from 9 to 5. Out of 5, 2 of them changed from seeing the doctor at the clinic to using the 30-Bhat card at the hospitals instead. Consequently, the treatment cost was reduced for 39 percent.

The final cost discussed here is the cost the subjects spent for the treatment of peptic ulcer. It was disclosed that before the model implementation, most of the peptic ulcer patients had the treatment with the doctor at the clinic which charged them higher than the use of 30-Baht card at the hospital because of the same reasons mentioned above. The doctor prescribed medicine and made an appointment for the follow-up periodically. The patients themselves did not pay attention to personal healthcare as it should have been. For example, they continued their abnormal eating pattern due to the working condition and restraints, eating spicy food, drinking fizzy drinks and coffee bringing about the chronic peptic ulcer. Some subjects had a carton of milk to fill up their stomach during work. They were advised by the researcher to drink soybean milk instead, stop eating spicy food and drinking carbonate drinks and coffee less. In addition, a group leader who was a member of the elderly club suggested the peptic ulcer patients eat Curcuma longa L. by chewing the Curcuma longa L. finely first and having 1 table spoon of honey right after. This local wisdom came from the information exchange at the club. After all the patients looked after themselves according to the recommendation of the researcher and the group leader, they agreed that the stomach from peptic ulcer was soothed. After the model had been implemented, 4 out of 8 patients did not need the doctor anymore. 3 out of 4 who still

needed the doctor changed from going to the private clinic to using the 30-Baht card at the governmental hospitals, lessening the treatment cost for 20 percent.

7. Cost study of occupational health and safety

The test on the relationship between the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses and the treatment cost when having work-related accidents, injuries and illnesses shows that the cost spent for healthcare had no relationship with the treatment cost before and after the model implementation as illustrated in Table 4-14.

Considering data in Table 4-12, it was found that the highest cost of healthcare and prevention of work-related accidents, injuries and illnesses came from supplementary foods and herbs. Even though the data in Table 4-2 shows that a minority of the subjects took the supplementary foods and the herbs, the minority had the expensive ones, for example, calcium, Spirulina algae, protein and ginseng. Besides, the minority group of the subjects also took them continuously and regularly. Hence, the cost on this part was enormous and higher than other costs. Similar to the cost of the supplementary foods and herbs, the cost of training was second in number. It was reported that most of the training cost was incurred by conducting the course, called ‘Safety Officer for Supervisor’. Though there were only 28.6 percent of the subjects attending the course, the course took time around 12 hours, and the participating subjects had average daily income at medium-high level. As a result, the cost of training became high, while the implementation of this course was scant because most participants could not remember the training contents, did not understand its main idea, and could not fully apply the knowledge gained to their work.

At the same time, when viewing the data of the treatment cost in Table 4-13, it was apparent that most of the treatment cost at 57 percent was spent for accidents and injuries; whereas, 23 percent was spent for body pain, and 19 percent was paid for peptic ulcer. This data reiterates that taking the supplementary food and herb could not help prevent or reduce the seriousness of accidents and injuries and could not alleviate the stomachache from peptic ulcer nor body pain. Likewise, the subjects attending the said training course could not fully apply the knowledge gained to the healthcare and the prevention of work-related accidents and injuries in the reality.

Only the cost spent for the stretching exercise was effective since the exercise could help ease pain on body parts as described in Table 4-8. However, the cost spent for the exercise had a comparatively small share when compared with the cost of supplementary foods and herbs and the training cost.

The aforementioned discussion can be concluded that the cost spent for the healthcare and the prevention of work-related accidents, injuries and illnesses by the subjects could not help reduce their treatment cost when they had the work-related accidents, injuries and illnesses.

8. Implementation of the health promotion model for rubber tappers

The results of implementation of the health promotion model can be described by;

8.1 Cooperation of the study samples in conducting group work

Table 4-16 shows that the subjects provided the cooperation in having group activities moderately as following;

8.1.1 Meeting frequency: the frequency required was at least once a month in which only 50 percent of the small working groups could reach the target set by the researcher. For some reasons, Group 4 had none of the meetings since the selected group leader was young at 30 years old, short of accountability and responsibility in accomplishing his assignment.

8.1.2 A number of meeting participants: the targeted attendance of each meeting was at least 80 percent of the total number of group members. 50 percent of the working groups could attain the target. It was observed that Group 6 called for a meeting most at 9 times, but only 50 percent of the group members attended because 3 male members were absent to host a local shadow play as a side-line job.

8.1.3 A record of work-related accidents and injuries and a record of work-related illnesses: 60 percent and 80 percent of all working groups could meet the specified target respectively. Though most group leaders did not record the data in the forms given, the data given was comprehensive and adequate as needed.

8.1.4 Meeting agenda: the meeting agenda could be followed completely only 28 percent. Most groups did not have the agenda on the exchange of

new idea on healthcare probably because the subjects were farmers and low educated. Therefore, they were not interested in receiving information regarding healthcare from mass media, such as, newspaper, magazine, or TV program as much as it should have been.

8.2 Cooperation of the study samples in the implementation of the health promotion model for rubber tappers

The health promotion model for rubber tappers received very warm welcome from the study samples. From Table 4-3, the test on the difference between the scores of healthcare and prevention of work-related accidents and injuries before and after the model implementation presents that after the model implementation, the scores of the activities listed below were higher than those before the implementation significantly.

- Wearing cloth gloves when sharpening a knife
- Weeding in the rubber plantation
- Wearing cloth gloves when weeding in the rubber plantation
- Wearing boots when weeding in the rubber plantation
- Wrapping the finger with clean cloth before removing rubber barks or latex from the eye
- Weight of lifted latex containers and
- Doing exercise

With regard to the checkup of flashlights or lamps and motorcycles before use, the test on the difference of the scores between before and after the model implementation shows no significant difference because the study samples had paid the attention on the checkup already before the model implementation at 87.8 percent and at 91.7 percent respectively.

For wearing helmets when riding motorcycles, the test on the difference between the scores before and after the model implementation found no significant difference due to working conditions and restraints as earlier mentioned in Item 2.2: Use of PPE.

Lastly, for the annual health checkup, although the test on the difference between the scores before and after the model implementation found no significant difference, the cost of annual health checkup after model implementation shows

much higher than that before model implementation demonstrating the improvement of annual health checkup awareness in the study samples.

8.3 The result of the test on the difference of the cost spent for the treatment when having work-related accidents, injuries and illnesses before and after the implementation of the health promotion model for rubber tappers

From Table 4-15, the test on the difference of the treatment cost when having work-related accidents, injuries and illnesses shows that the treatment cost incurred after the implementation of the health promotion model was less than that before the implementation significantly. The said cost includes the treatment cost for work-related accidents and injuries as well as the treatment cost for work-related illnesses.

8.4 The result of the test on the difference of the proportion of the subjects having work-related accidents and injuries before and after the implementation of the health promotion model for rubber tappers

The test on the difference of the proportion of the injured subjects reveals that the proportion after the implementation of the health promotion model was less than that before the implementation significantly.

8.5 The result of the test on the difference of work-related body pain level before and after the implementation of the health promotion model for rubber tappers

From Table 4-8, the test on the difference of the pain level after the implementation of the health promotion model was less than that before the implementation significantly.

8.6 Satisfaction of the study samples

Based on the interview of 32 subjects during the follow-up of the implementation, it was found that all of them were satisfied with the result of stretching exercise. They agreed that to do the exercise regularly made them feel the pain on their body was alleviated; their mind became agile; and their bodies were more active. One subject told that her menstrual pain was less because of the exercise. In a view of the extension of the knowledge gained from doing the stretching exercise, many subjects informed their family members regarding the advantage of the exercise. One group leader who was a member of the elderly club also disseminated the knowledge to the elderly club of Jana Hospital and Faculty of

Nursing, Prince of Songkla University, members of which accounted for 130. The exercise was demonstrated following to the pictures on the posters supported by the researcher . Furthermore, a head of the study samples also brought this exercise to the meeting on healthcare of local people, hosted by the Rattapoom District Administration Office, Songkla Province. The meeting was attended by 50 heads of vocational groups, for example, rubber tapping, weaving, bakery, embroidery of Muslim head scarf. They were demonstrated the exercise according to the posters by the group leader who was member of the elderly club.

In addition, most subjects appreciated the benefit of talking, exchange of idea, experience, and information regarding healthcare, reduction and prevention of work-related accidents, injuries and illnesses. In the case of peptic ulcer treatment for example, the mixture of Curcuma longa L. and honey introduced by the group head who was a member of the elderly club was used by the peptic ulcer patients. The patients experienced a satisfied result after use.

9. Strength of this study

9.1 This research is aimed at analyzing the cost of occupational health and safety and reducing work-related health problems, accidents, injuries and illnesses found in a group of rubber tappers. In reviewing relevant literature, the researcher is ascertained that this research topic has never been studied before both in Thailand and other countries.

9.2 This research made the subjects recognized that to do the stretching exercise regularly could alleviate the pain of their body parts, and this satisfied them so greatly that some subjects introduced the exercise program to other rubber groups, several professional groups, as well as, the elderly club

10. Limitation of this study

The technique of Sample Random Sampling could not be used in this study as the rubber tappers at Klong Piya Sub-District, Jana District, Songkla Province did not work independently but under a group system. The tappers united and formed up around 10 rubber groups, each of which had about 60-70 members. Any request made to the group members to do any activity had to be agreed by the group leaders first.

Any communication needed to be approved also. Therefore, to reduce the said problems and facilitate the study process in order to finish this thesis in a limited time, the researcher selected one rubber group out of 10 randomly and used all members of the chosen group as the sample population. Because the researcher did not test on the sample population whether and how they had personal characteristics similar to or different from other non-selected groups, the researcher cannot ensure that the finding of this research could be generalized and applied to other rubber tapper groups as effectively as the study samples

11. Bias of this study

11.1 Because the historical data was used in this research for the period of 4 months, and most of the subjects were relatively aging persons, 50.2 years old on average, the discrepancies of statistical data and numbers, such as, the cost of healthcare and treatment, the frequency of exercising (time/week), and length of exercising (minute/time) can be expected. The researcher reduced the said discrepancies by asking the subjects to record the data soon after the model was implemented.

11.2 Communication problems were hardly avoidable since a majority of the subjects had poor education and were quite old. Some subjects spoke only the dialect, while some were deft, stemming inevitable miscommunication. The researcher lessened the problems by communicating with the mentioned subjects via a translator as much as possible.

11.3 During Job Safety Analysis, some workplace hazards may be overlooked because only 3-4 subjects were observed. More information regarding the working hazards was collected from the interview of the subjects. To reduce the said problem, the researcher tried to talk to the subjects in order to collect more information as much as possible during 3 rounds of the follow-up of the model implementation.

11.4 Bias of the pain level measurement from using Visual Analog Scale: to minimize the bias, the researcher interviewed the subjects by herself in no haste in order to give luxurious time for the subjects to think and consider before identifying the pain level.

11.5 Prejudice stemmed from inability of the subjects to tell the difference between pain and fatigue: to avoid this prejudice, the researcher explained the difference thoroughly and also gave them easy examples before interviewing the pain level.

12. Instrument error

The research instrument was consisted of;

12.1 The cost spent for healthcare and prevention of work-related accidents, injuries and illnesses is the preventive cost. Besides, there is no common definition of 'cost of occupational health and safety'. Therefore, the questionnaires were developed from the review of literature, journals and all relevant documents, and it is possible that this study may not cover all possible costs.

12.2 The treatment cost when having work-related accidents, injuries and illnesses was calculated from doctor and nursing fee, medical service and medical equipment or the direct cost, together with the indirect cost, such as, the transportation to hospital and income loss. In the reality, there are other costs, for example, deprivation of quality of life, pain and anguish of the patients or injured tappers and their families that cannot be priced.

CHAPTER VI
CONCLUSION

6.1 Conclusion of this study

The core objective of this study is to study the cost of the healthcare and the prevention of work-related accidents, injuries and illnesses as well as to reduce and prevent work-related health problems, accidents, injuries and illnesses by implementing the health promotion model in a group of 49 rubber tappers at Klong Piya, Jana District, Songkla Province. The findings of this research comprise the following;

6.1.1 Regarding the study on personal factors, for example, sex, age, length of work, average daily working hours and sleeping hours contributing to health problems, accidents, injuries and illnesses in the group of rubber tappers, it was shown that most subjects were female. Although a number of daily working hours on average of the subjects were equal to that of normal people at productive age, most of the subjects were aging, had long experience of tapping, and had a relatively small number of sleeping hours. The mentioned reasons led to health problems of the tappers.

6.1.2 The study on the relationship between the cost spent for healthcare and prevention of work-related accidents, injuries and illnesses and the treatment cost when having work-related accidents, injuries and illnesses in the group of rubber tappers found that the cost spent for the healthcare and the prevention of the study samples could not reduce the treatment cost incurred when having work-related accidents, injuries and illnesses.

6.1.3 Considering the study on the difference of the treatment cost work-related accidents, injuries and illnesses before and after the implementation of the health promotion model, the assumption test proved that the treatment cost incurred after the model implementation was less than that before the implementation significantly.

6.1.4 In light of the study on the difference of the proportions of the subjects having work-related accidents and injuries before and after the implementation of the health promotion model, the assumption test confirmed that the proportion of injured subjects after the model implementation was less than that before the implementation significantly

6.1.5 Regarding the study on the difference of body pain levels before and after the implementation of the health promotion model, the test of the assumption revealed that the pain level of each body part after the model implementation was less than that before the implementation significantly.

6.2 Recommendation from this study

6.2.1 The Ministerial Regulation on Labor Protection for Agricultural Sector B.E. 2547 mentions only the practice of an employer to an employee. The regulation does not cover farmers who are self-employed and have no employee. For instance, a rubber farm owner taps the rubber trees by himself. Accordingly, the government sector should create other work plans to support these farmers in order to reduce their work-related health problems, accidents, injuries and illnesses.

6.2.2 Referring to the data on the treatment cost when having the work-related, the motorcycle accident cost highest when compared with other expenditures. Though a number of motorcycle accidents were low, when the accident took place, it was serious. The injured persons had to see a doctor, take sick leave and lose a lot of income. Besides, the rubber tappers were very vulnerable to having the accident because they had to work in the dark. The road from home to the plantation had no light and was bumpy. The tappers had to load the latex containers on the motorcycle on the way back as well. Therefore, the government should have a plan to promote or develop a training course, particularly for the rubber tappers, which contains the topics about the maintenance of the motorcycles, safe-riding behavior, as well as, increases the awareness of dangers and loss when having the accidents.

6.3 Recommendation for further study

6.3.1 This research found that the motorcycle accident caused the major injury. Even though cases of disability or death were not found, the subjects lost their income because the accident victim had to stop working. Since the rubber tappers felt uncomfortable to put on helmets as described in Item 2.2 : Use of Personal Protective Equipment (PPE) in Chapter V, it is advisable that there be a further study on the improvement of the tapping equipment design, especially, head flashlights and lamps which obstructed the tappers from wearing helmets to be more suitable.

6.3.2 The rubber tappers were not only vulnerable to work-related health problems, accidents, injuries and illnesses but also often exposed to 2 dangerous chemicals, namely, Ammonia and Paraquat. Sometimes, the tappers had to pour down Ammonia in the container first before filling the latex in order to stop the latex from clotting. Ammonia is irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. Exposure to the liquid or rapidly expanding gases may cause severe chemical burns and frostbite to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure.(32) The other chemical was Paraquat which the tappers used to kill weeds. Paraquat is very toxic and destructive of mucous membrane by inhalation, ingestion and if absorbed through skin. It is a possible mutagen and a possible carcinogen.(33) Since these 2 chemical are hazardous substances, it is suggested that there be a further research on the impact of the chemicals on the health of users.

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APPENDIX A

Job Safety Analysis

ชื่อกิจกรรม: การลับมีด

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
 	1. เตรียมน้ำ 1 ขัน มีดที่จะลับและหินลับมีดวางไว้บนโต๊ะ 2. จับด้ามมีดให้มั่นด้วยมือซ้าย แล้วจับหินลับมีดด้วยมือขวา ค่อยๆถูหินลับมีดตรงบริเวณคมมีด ทั้งด้านหน้า และด้านหลัง 3. จุ่มมีดลงในขันน้ำเป็นระยะเพื่อล้างคราบสกปรกออก เมื่อได้มีดที่คมและสะอาดตามความต้องการแล้ว เช็ดมีดให้แห้งแล้วใช้เศษผ้าพันเก็บไว้	1. มีดบาดมือ 2. มีดบาดมือ 3. มีดบาดมือ	1.ไม่มี 2.ไม่มี 3.ไม่มี	1.สวมถุงมือผ้า 2. สวมถุงมือผ้า 3. สวมถุงมือผ้า

ชื่อกิจกรรม: **การเตรียมอุปกรณ์และเดินทางไปที่สวนยาง**

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
 	1. ตรวจสอบความเรียบร้อยของไฟฉายหรือ ตะเกียงว่ายังคงใช้งานได้ดี และตรวจสภาพรถมอเตอร์ไซค์ เช่น ระบบไฟ ยาง และระดับน้ำมัน 2. นำแกลลอนน้ำยางซึ่งมีหลายขนาด เช่น 25 ลิตร 30 ลิตร 35 ลิตร และ 40 ลิตร มีด กระป๋องเก็บน้ำยาง ไม้ปาดน้ำยาง ที่มีลักษณะคล้ายพายมีด้ามเป็นไม้และลำตัวเป็นยาง และไฟฉายหรือตะเกียง ไปผูกติดกับรถ 3. สตาร์ทรถแล้วออกตัวเพื่อเดินทางจากบ้านไปสวนยาง ผู้กรีดยางจะเริ่มออกจากบ้านเพื่อไปกรีดยางประมาณ 5 ทุ่มถึงตี 3 4. จอดรถที่สวนยาง	1.ไม่มี 2.ไม่มี 3. รถมอเตอร์ไซค์ล้ม 4.1 รถล้มเนื่องจากพื้นที่ขรุขระ 4.2 งูกัด	3.ไม่มี 4.1 จอดรถในบริเวณที่ผิวดินเรียบ 4.2 จอดรถในบริเวณที่โล่งเตียนและสวมรองเท้าบูท	3. สวมใส่หมวกนิรภัย 4.1ไม่มี 4.2ไม่มี

ชื่อกิจกรรม: **การกรีดยาง**

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
  	1.เดินจากรถไปยังต้นยางที่ต้องการจะกรีด พร้อมด้วยมีด 2. ลอกเศษยางที่แห้งติดอยู่กับถ้วยรองน้ำยางออกก่อน แล้วจึงใช้มือทั้งสองข้างจับที่ด้ามมีด ค่อยๆ ลากมีดลงมาตามร่องเป็นแนวเฉียงจากบนลงมาล่าง น้ำยางจะค่อยๆไหล มาตามร่องแล้วหยดลงสู่ถ้วยรองน้ำยาง	1. สะดุดกิ่งไม้หกล้ม 2.1 มีดบาดมือขณะกรีดยาง 2.2 น้ำยางและเปลือกยางกระเด็นเข้าตา แล้วผู้กรีดยางใช้นิ้วมือเขี่ยออกทำให้ตาระคายเคืองหรืออักเสบ 2.3 แมลง ยุงกัดต่อย 2.4 อากาศเย็นทำให้เป็นหวัด	1. ทำบริเวณให้โล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้ 2.1ไม่มี 2.2ไม่มี 2.3 สวมเสื้อแขนยาวและกางเกงขายาว 2.4 สวมหมวก	1.ไม่มี 2.1 ไม่ใช้มือข้างใดข้างหนึ่งดึงเศษยางในขณะที่มืออีกข้างหนึ่งกำลังกรีดยางอยู่ 2.2 ก่อนที่จะใช้นิ้วเขี่ยน้ำยางหรือเปลือกยางให้ใช้ผ้าสะอาดพันรอบนิ้วก่อน 2.3ไม่มี 2.4 ไม่มี

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
	3. เดินไปกรีดยางให้ครบทุกต้น ถ้าต้นยางทุกต้นถูกเริ่มกรีดพร้อมกัน แนวการกรีดยางจะอยู่ในระดับเดียวกันการกรีดยางผู้กรีดจะเริ่มกรีดจากส่วนบนของลำต้นไล่ลงมาเรื่อยๆ จนถึงโคนต้น	3.1 สะดุดกิ่งไม้หกล้ม 3.2 ปวดเมื่อยส่วนต่างๆ ของร่างกายจากการกรีดยางจำนวนมากและในระดับต่างๆกัน	3.1 ทำให้บริเวณโล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้ 3.2 ไม่มี	3.1 ไม่มี 3.2 ทำท่าบริหารยืดกล้ามเนื้อ
	4. เดินกลับไปที่รถเพื่อนำกระป๋องและไม้ปาดยางกลับมาที่ต้นยางหลังจากที่น้ำยางหยุดไหล	4.1 สะดุดกิ่งไม้หกล้ม	4.1 ทำให้บริเวณโล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้	4.1 ไม่มี
	5. นำถ้วยน้ำยางออกมาจากขดลวดแล้วใช้ไม้ปาดน้ำยาง ปาดน้ำยางจากถ้วยลงในกระป๋อง แล้วจึงวางถ้วยกลับไว้ตามเดิมในลักษณะตะแคงเพื่อป้องกันไม่ให้ถ้วยเปียกน้ำค้าง หรือน้ำฝน เดินเก็บน้ำยางไปทีละต้นจนได้น้ำยางเกือบเต็มกระป๋อง	5.1สะดุดกิ่งไม้หกล้ม 5.2 ปวดเมื่อยเนื่องจากการเดินและหิ้วกระป๋องใส่น้ำยาง	5.1 ทำให้บริเวณโล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้ 5.2 ไม่มี	5.1 ไม่มี 5.2 ทำท่าบริหารยืดกล้ามเนื้อ

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
  	6. นำกระป๋องน้ำยางไปเทใส่แกลลอนที่ผูกติดไว้กับรถมอเตอร์ไซค์ ในกรณีที่มี 2 แกลลอนผูกติดไว้ 2 ด้านของรถผู้กรีดยางต้องเทน้ำยางใส่ทั้ง 2 แกลลอนเท่าๆกันเพื่อให้เกิดความสมดุลป้องกันรถล้ม 7. เดินกลับมาที่ต้นยางเพื่อเก็บน้ำยางต่อไปจนครบทุกต้น	6.1 ปวดเมื่อยจากการยกกระป๋องน้ำยางเทลงในแกลลอน 6.2 สะดุดกิ่งไม้หกล้ม 7.1 สะดุดกิ่งไม้หกล้ม 7.2 ปวดเมื่อยเนื่องจากการเดินและหิ้วกระป๋องใส่น้ำยาง	6.1 ไม่มี 6.2 ทำให้บริเวณโล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้ 7.1 ทำให้บริเวณโล่งเตียนด้วยการกำจัดหญ้าและไม้กิ่ง 7.2 ไม่มี	6.1 ทำท่าบริหารคลายกล้ามเนื้อ 6.2 ไม่มี 7.1 ไม่มี 7.2 ทำท่าบริหารยืดกล้ามเนื้อ

ชื่อกิจกรรม: **การนำน้ำยางไปขาย**

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
 	1. สตาร์ทรถแล้วออกตัว ขับรถมอเตอร์ไซค์ไปตามเส้นทางในสวนยาง แล้วขับออกสู่ถนนหลวง 2. เมื่อถึงกลุ่มรับซื้อน้ำยาง ยกแกลลอนลงจากรถมอเตอร์ไซค์ไปวางไว้บนเครื่องชั่งแล้วยกออกจากเครื่องชั่งไปเทลงในถังรับน้ำยาง	1.1 รถมอเตอร์ไซค์ล้มเนื่องจากถนนขรุขระ ถนนลื่น หรือ ถนนมืด 1.2 อุบัติเหตุทางรถยนต์ขณะขับออกสู่ถนนหลวง 2.1 ปวดเมื่อยเนื่องจากยกแกลลอนน้ำยาง	1.1 บรรทุกแกลลอนบรรจุน้ำยางไม่เกิน100 ลิตร 1.2 ตรวจสภาพรถก่อนการใช้งาน 2.1 จัดสถานที่ทำงานโดยให้ผู้กรีดยางสามารถนำรถมาจอดใกล้เครื่องชั่งให้มากที่สุดและจัดระยะทางจากเครื่องชั่งให้อยู่ใกล้ถังรับน้ำยาง	1.1 สวมหมวกนิรภัย 1.2 สวมหมวกนิรภัย 2.1.1 ท่าทางบริหารยืดกล้ามเนื้อ 2.1.2 ผู้หญิงยกแกลลอนน้ำยางไม่เกินขนาด 25 ลิตร และผู้ชายยกแกลลอนน้ำยางไม่เกินขนาด 55 ลิตร 2.1.3 ท่าทางการยกของที่ถูกต้อง

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
  	3. นำแกลลอนเปล่ามาชั่ง แล้วนำแกลลอนไปผูกติดกับรถมอเตอร์ไซค์	2.2 แกลลอนน้ำยางหล่นทับเท้า 3ไม่มี	2.2 จัดสถานที่ทำงานโดยให้ผู้กรีดยางสามารถนำรถมาจอดใกล้เครื่องชั่งให้มากที่สุดและจัดระยะทางจากเครื่องชั่งให้อยู่ใกล้ถังรับน้ำยาง	2.2.1ผู้หญิงยกแกลลอนน้ำยางไม่เกินขนาด 25 ลิตร และผู้ชายยกแกลลอนน้ำยางไม่เกินขนาด 55 ลิตร 2.2.2 ท่าทางการยกของที่ถูกต้อง

ชื่อกิจกรรม: **การเดินทางกลับบ้าน**

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
ไม่มี	1. สตาร์ทรถมอเตอร์ไซค์แล้วออกตัว	1. ไม่มี		
	2. ขับรถมอเตอร์ไซค์ไปตามถนนหลวงไปตามเส้นทางกลับบ้าน	2 1อุบัติเหตุทางรถยนต์ขณะขับออกสู่ถนนหลวง	2.1 ตรวจสภาพรถก่อนการใช้งาน	2. 1สวมหมวกนิรภัย
		2.2รถล้มขณะขับรถกลับบ้านเนื่องจากถนนขรุขระหรือลื่น	2.2 ตรวจสภาพรถก่อนการใช้งาน	2.21สวมหมวกนิรภัย
	3. นำอุปกรณ์ต่างๆเช่น แกลลอน มีด ไฟฉายหรือตะเกียง และกระป๋องไปเก็บ	3. ไม่มี		

ชื่อกิจกรรม: **การกำจัดหญ้าและกิ่งไม้บริเวณสวนยาง**

ภาพประกอบ	ขั้นตอนการทำงาน	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การควบคุมที่เสนอแนะ
ไม่มี	1. เตรียมอุปกรณ์การตัดหญ้า เช่นมีดดายหญ้าหรือเครื่องตัดหญ้า	1.ไม่มี		
	2. เก็บกิ่งไม้และเศษไม้ออก	2. เศษไม้ทิ่มแทงมือ	2. สวมถุงมือผ้า	2. ไม่มี
	3.กำจัดหญ้าด้วยมีดดายหญ้าหรือเครื่องตัดหญ้า	3.1มีดดายหญ้าบาดมือ 3.2ใบมีดเครื่องตัดหญ้าแตกกระเด็นบาดเท้า	3.1. สวมถุงมือผ้า 3.2. ไม่มี	3.1 ไม่มี 3.2.1ตรวจสอบสภาพและเปลี่ยนใบมีด 3.2.2สวมรองเท้าบูท

APPENDIX B

Risk Assessment

Risk Assessment คือ การชี้บ่งอันตรายในแต่ละขั้นตอนการทำงาน เพื่อตัดสินใจว่าแผนงาน หรือการควบคุมที่มีอยู่เพียงพอหรือไม่ โดยประกอบด้วย 3 ขั้นตอนพื้นฐานคือ

- ชี้บ่งอันตรายต่างๆ
- ประมาณความเสี่ยงของแต่ละอันตราย
- ตัดสินว่าความเสี่ยงนั้นยอมรับได้หรือไม่

เกณฑ์การประเมินความเสี่ยง

ขนาดของการบาดเจ็บ / ทรัพย์สินเสียหาย	**ความถี่ของการเกิดอันตราย** / **โอกาสของการเกิดการบาดเจ็บ**	**ทุกวัน (a)**	**เดือนละหลายครั้ง (b)**	**ปีละหลายครั้ง (c)**	**ไม่มีโอกาส (d)**
พิการ หรือตาย / > 10,000 บาท	(a) สูง	16	14	11	8
หยุดงาน / 5,001 - 10,000 บาท	(b) มีบ้าง	15	13	10	6
พบแพทย์ แต่ไม่หยุดงาน / 1,000 - 5,000 บาท	(c) ต่ำ	12	9	5	3
ปฐมพยาบาล / < 1,000 บาท	(d) ไม่มี	7	4	2	1

Rank A : 14 - 16 ระดับความเสี่ยงยอมรับไม่ได้

ไม่อนุญาติให้ทำงานต่อให้หยุดทันที และเปลี่ยนวิธีการทำงาน

Rank B : 11 – 13 ระดับความเสี่ยงสูง

มีปัญหารุนแรง ให้ปรับปรุงวิธีการทำงานเพื่อลด และป้องกันปัญหา และต้องมีมาตรการควบคุม

Rank C : 8 – 10 ระดับความเสี่ยงปานกลาง

มีปัญหาบ้าง ถ้าเป็นไปได้ให้แก้ไขปรับปรุงวิธีการทำงาน ต้องมีมาตรการควบคุมมีข้อความเตือน และจัดการอบรมให้คำแนะนำ

Rank D : 2-5 ระดับความเสี่ยงต่ำ

มีปัญหาเล็กน้อย มีข้อความเตือน และจัดการอบรมให้คำแนะนำ

Rank E : 1 ระดับความเสี่ยงยอมรับได้

ไม่จำเป็นต้องมีการแก้ไขปรับปรุง

Risk Assessment for Rubber Tapping

กิจกรรม	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การประเมินความเสี่ยง			การควบคุมที่เสอนแนะ	การประเมินความเสี่ยง		
			โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง		โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง
การลับมีด	1. มีดบาดมือ	1. ไม่มี	b	9	ปานกลาง	1. สวมถุงมือผ้า	b	4	ต่ำ
การเตรียมอุปกรณ์และเดินทางไปที่สวนยาง	1. รถล้มขณะเดินทางทำให้บาดเจ็บ 2. รถล้มขณะจอดรถในสวนยางทำให้รถเสียหาย 3. งูกัด	1. ตรวจสภาพรถก่อนการใช้งาน 2. จอดรถในบริเวณที่ผิวดินเรียบ 3. จอดรถในบริเวณที่โล่งเตียนและสวมรองเท้าบูท	c c d	10 2 1	ปานกลาง ต่ำ ยอมรับได้	1. สวมหมวกนิรภัย 2. ไม่มี 3. ไม่มี	c	5	ต่ำ
การกรีดยาง	1. สะดุดกิ่งไม้หกล้มทำให้บาดเจ็บ 2. มีดบาดมือขณะ	1. ทำบริเวณให้โล่งเตียนด้วยการกำจัดหญ้าและกิ่งไม้ 2.ไม่มี	c b	2 4	ต่ำ ต่ำ	1. ไม่มี 2. ไม่ใช้มือข้างใดข้างหนึ่ง	d	1	ยอมรับได้

กิจกรรม	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การประเมินความเสี่ยง			การควบคุมที่เสอนแนะ	การประเมินความเสี่ยง		
			โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง		โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง
	กรีดยาง					ดึงเศษยางในขณะที่มืออีกข้างหนึ่งกำลังกรีดยาง			
	3. น้ำยางและเปลือกยางกระเด็นเข้าตาแล้วผู้กรีดยางใช้นิ้วมือเขี่ยออกทำให้ตาระคายเคือง	3. ไม่มี	b	9	ปานกลาง	3. ก่อนใช้นิ้วเขี่ยน้ำยางหรือเปลือกยางให้ใช้ผ้าสะอาดพันรอบนิ้วก่อน	d	1	ยอมรับได้
	4. แมลงยุงกัดต่อย	4. สวมเสื้อแขนยาวและกางเกงขายาว	c	2	ต่ำ	4. ไม่มี			
	5. อากาศเย็นทำให้เป็นหวัด	5. สวมหมวก	c	2	ต่ำ	5. ไม่มี			
	6. ปวดเมื่อยส่วนต่างๆ ของร่างกายจากการกรีดยางจำนวนมากและระดับต่างๆกัน	6. ไม่มี	b	9	ปานกลาง	6. ทำท่าบริหารยืดกล้ามเนื้อ	b	4	ต่ำ
	7. ปวดเมื่อยเนื่องจาก	7. ไม่มี	b	9	ปานกลาง	7. ทำท่าบริหารยืด	b	4	ต่ำ

กิจกรรม	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การประเมินความเสี่ยง			การควบคุมที่เสอนแนะ	การประเมินความเสี่ยง		
			โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง		โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง
	การเดินและหิ้วกระป๋องใส่น้ำยาง					กล้ามเนื้อ			
	8. ปวดเมื่อยเนื่องจากการยกกระป๋องน้ำยางเทลงในแกลลอน	8. ไม่มี	b	9	ปานกลาง	8. ทำท่าบริหารยืดกล้ามเนื้อ	b	4	ต่ำ
การนำน้ำยางไปขาย	1. รถล้มขณะขับในสวนยางทำให้บาดเจ็บ	1. ทำบริเวณให้โล่งเตียนด้วยการกำจัดเศษหญ้าและกิ่งไม้	b	9	ปานกลาง	1. สวมหมวกนิรภัยและไม่บรรทุกแกลลอนน้ำยางเกิน 100 ลิตร	c	5	ต่ำ
	2. อุบัติเหตุทางรถยนต์ขณะขับออกสู่ถนนหลวง	2. ตรวจสภาพรถก่อนการใช้งาน	c	10	ปานกลาง	2. สวมหมวกนิรภัย	c	5	ต่ำ
	3. ปวดเมื่อยเนื่องจากยกแกลลอนน้ำยาง	3. ไม่มี	b	9	ปานกลาง	3.1 ผู้หญิงยกแกลลอนน้ำยางไม่เกินขนาด 25 ลิตร (25 กก) และผู้ชายยกแกลลอนน้ำยางไม่เกินขนาด 55 ลิตร (55 กก)	b	4	ต่ำ

กิจกรรม	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การประเมินความเสี่ยง			การควบคุมที่เสอนแนะ	การประเมินความเสี่ยง		
			โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง		โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง
						3.2 ท่าทางการยกของที่ถูกต้อง 3.3 ทำท่าบริหารกล้ามเนื้อ			
	4. แกลลอนน้ำยางหล่นทับเท้า	4. จัดสถานที่ทำงานโดยให้ผู้กรีดยางสามารถทำรถมาจอดใกล้เครื่องชั่งให้มากที่สุดและจัดระยะทางจากเครื่องชั่งให้อยู่ใกล้ถังรับน้ำยาง	b	9	ปานกลาง	4.1 ผู้หญิงยกแกลลอนน้ำยางไม่เกินขนาด 25 ลิตร (25 กก) และผู้ชายยกแกลลอนน้ำยางไม่เกินขนาด 55 ลิตร (55 กก) 4.2 ท่าทางการยกของที่ถูกต้อง	c	5	ต่ำ
การเดินทางกลับบ้าน	1. อุบัติเหตุทางรถยนต์ขณะขับออกสู่ถนนหลวง	1 ตรวจสภาพรถก่อนการใช้งาน	c	10	ปานกลาง	1. สวมหมวกนิรภัย	c	5	ต่ำ
	2. รถล้มขณะขับรถกลับบ้านเนื่องจากถนนขรุขระหรือลื่น	2. ตรวจสภาพรถก่อนการใช้งาน	c	10	ปานกลาง	2 สวมหมวกนิรภัย	c	5	ต่ำ

กิจกรรม	อันตรายและการบาดเจ็บ	การควบคุมที่มีอยู่	การประเมินความเสี่ยง			การควบคุมที่เสนอแนะ	การประเมินความเสี่ยง		
			โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง		โอกาสในการเกิด	ความรุนแรง	ระดับความเสี่ยง
การกำจัดหญ้าและกิ่งไม้บริเวณสวนยาง	1. เศษไม้ที่มีแทงมือ 2.มีดตายหญ้าบาดมือ 3.ใบมีดเครื่องตัดหญ้าแตกกระเด็นบาดเท้า	1. สวมถุงมือผ้า 2. สวมถุงมือผ้า 3. ไม่มี	d d c	1 1 10	ยอมรับได้ ยอมรับได้ ปานกลาง	1. ไม่มี 2. ไม่มี 3.1 ตรวจสอบสภาพและเปลี่ยนใบมีด 3. 2สวมรองเท้าบูท	d	1	ยอมรับได้

APPENDIX C

แนวทางการปฏิบัติงานอย่างปลอดภัยสำหรับผู้ประกอบอาชีพกรีดยางพารา

1. หมั่นกำจัดหญ้า และเศษไม้ในบริเวณสวนยางให้โล่งเตียนอยู่เสมอเพื่อป้องกันการสะดุดหกล้ม ให้สวมถุงมือผ้าและรองเท้าบูททุกครั้งเพื่อป้องกันอุบัติเหตุเช่น มีดบาดมือขณะดายหญ้าหรือใบมีดเครื่องตัดหญ้าแตกบาดเท้า
2. คอยตรวจสอบและเปลี่ยนใบมีดเครื่องตัดหญ้า
3. การลับมีดกรีดยางให้สวมถุงมือผ้าทุกครั้งเพื่อลดความรุนแรงหากมีดบาดมือ
4. ตรวจสภาพความเรียบร้อยของไฟฉายหรือตะเกียงว่ายังคงใช้งานได้ดีและตรวจสภาพของรถมอเตอร์ไซค์ เช่น ระบบไฟฟ้าส่องสว่าง สภาพยาง และระดับน้ำมันก่อนการใช้งาน
5. สวมหมวกนิรภัยทุกครั้งขณะขับขี่มอเตอร์ไซค์
6. เวลาไปกรีดยางให้สวมเสื้อแขนยาว กางเกงขายาวและรองเท้าบูทเพื่อป้องกันแมลงมีพิษและสัตว์มีพิษเช่นงู และสวมหมวกเพื่อกันน้ำค้าง
7. ขณะกรีดยางอย่าใช้มือข้างใดข้างหนึ่งดึงเศษไม้หรือเศษยางในขณะที่มืออีกข้างหนึ่งกำลังกรีดยางอยู่เพื่อป้องกันมีดบาดมือ
8. ถ้ามีน้ำยางหรือเปลือกยางกระเด็นเข้าตาในขณะกรีดยาง ก่อนใช้นิ้วเขี่ยออกให้ใช้ผ้าสะอาดพันรอบนิ้วก่อนเพื่อป้องกันตาอักเสบหรือระคายเคือง
9. ขณะเดินเก็บน้ำยางอย่ารีบร้อนจนเกินไปเพราะจะทำให้สะดุดหกล้มหรือลื่น
10. การบรรทุกน้ำยางเพื่อนำไปขายไม่ควรบรรทุกเกิน 100 ลิตร เพื่อป้องกันอุบัติเหตุ เช่น ยางแตกหรือ รถล้ม
11. การยกแกลลอนน้ำยางผู้หญิงยกแกลลอนน้ำยางได้ไม่เกิน 25 ลิตร ผู้ชายยกได้ไม่เกิน 55 ลิตร เพราะการยกของที่มีน้ำหนักเกินอาจทำให้หมอนรองกระดูกเคลื่อน
12. การยกแกลลอนน้ำยางให้ยกในท่าที่ถูกต้องเพราะการยกของในท่าที่ไม่ถูกต้องจะทำให้ปวดหลัง
13. ให้ทำท่าบริหารยืดกล้ามเนื้ออย่างสม่ำเสมอจะช่วยให้กล้ามเนื้อแข็งแรงลดอาการปวดเมื่อย

APPENDIX D

<u>แบบสัมภาษณ์ข้อมูลส่วนตัวสำหรับผู้ประกอบอาชีพกรีดยางพารา</u>

ชื่อ _____ นามสกุล_____

1. เพศ

( ) ชาย ( ) หญิง

2. ปัจจุบันอายุ _____ ปี

3. จำนวนชั่วโมงการทำงานเฉลี่ยต่อวัน _____ ชั่วโมง

4. จำนวนวันทำงาน _____ วัน ต่อสัปดาห์

5. รายได้เฉลี่ยต่อวัน_____ บาท

6. ระยะเวลาในการทำงาน _____ ปี

7. จำนวนชั่วโมงการนอนโดยเฉลี่ย_____ชั่วโมง

<u>แบบสัมภาษณ์ข้อมูลและค่าใช้จ่ายในการดูแลสุขภาพ การเจ็บป่วย การป้องกันอุบัติเหตุและ การบาดเจ็บสำหรับผู้ประกอบอาชีพกรีดยางพารา</u>

1. เคยได้รับการแนะนำความรู้เรื่องการดูแลสุขภาพ เพื่อป้องกันโรค การป้องกันอุบัติเหตุและ การบาดเจ็บที่เกิดจากการทำงานหรือไม่

( ) เคย จาก ( ) ไม่เคย

( ) โทรทัศน์ / วิทยุ / หนังสือพิมพ์

( ) หน่วยงานของรัฐ ระบุชื่อหน่วยงาน_____

( ) เพื่อนร่วมงาน

( ) ไปเข้าร่วมอบรมด้วยตนเอง

ระบุชื่อหลักสูตรและระยะเวลาการอบรม

1.

2.

3.

ค่าใช้จ่ายในการอบรม_____ บาท

2. มีการใช้อุปกรณ์ป้องกันอันตรายส่วนบุคคลเพื่อป้องกันโรค ป้องกันอุบัติเหตุและ การบาดเจ็บที่เกิดจากการทำงานหรือไม่

ชื่ออุปกรณ์ที่ใช้	ราคา	จำนวน/เดือน	ความถี่ในการใช้งาน	
			ใช้สม่ำเสมอ	ใช้บ้างไม่ใช้บ้าง
1. สวมถุงมือผ้าขณะลับมีด				
2. สวมถุงมือผ้าขณะดายหญ้า				
3. สวมเสื้อแขนยาว				
4. สวมกางเกงขายาว				
5. สวมรองเท้าบูทขณะกรีดยาง				
6. สวมรองเท้าบูทขณะตัดหญ้า				
7. ไฟฉายหรือตะเกียง				
8. สวมหมวกนิรภัย				

ในกรณีที่ไม่เคยใช้ให้ระบุสาเหตุ_____

3. มีการตรวจสภาพไฟฉาย หรือตะเกียง และสภาพรถมอเตอร์ไซค์ ก่อนการใช้งานหรือไม่

( ) ตรวจทุกครั้ง ( ) ตรวจบ้างไม่ตรวจบ้าง ( ) ไม่เคยตรวจ

4. ยกแกลลอนน้ำยางมีน้ำหนักมากที่สุด_____ ลิตร

หมายเหตุ ขนาดของแกลลอน 15 ลิตร 20 ลิตร 25 ลิตร 30 ลิตร 35 ลิตร และ 40 ลิตร

ในกรณีที่ยกน้ำหนักเกินกฎหมายกำหนดให้ระบุสาเหตุ_____

5. บรรทุกแกลลอนน้ำยางน้ำหนักมากที่สุด_____ลิตร

ในกรณีที่บรรทุกน้ำหนักเกิน 100 ลิตรให้ระบุสาเหตุ_____

6. มีการกำจัดหญ้าและกิ่งไม้บริเวณสวนยางหรือไม่

( )ทำสม่ำเสมอ ( ) ทำบ้างไม่ทำบ้าง ( ) ไม่เคยทำ

หมายเหตุ ทำสม่ำเสมอหมายถึงอย่างน้องปีละ 2 ครั้ง

7. นำเอาท่าทางยืดกล้ามเนื้อไปปฏิบัติหรือไม่

( )ปฏิบัติ ( ) ไม่ปฏิบัติ

ความถี่ของการปฏิบัติ_____ ครั้ง / สัปดาห์

ระยะเวลาในการปฏิบัติ _____ นาที / ครั้ง

ท่านปฏิบัติท่าใดบ้าง _____

8. มีการทำกิจกรรมส่งเสริมสุขภาพหรือไม่

( ) มี ( ) ไม่มี

( ) เต้นแอโรบิค

( ) รำกระบอง

( ) เล่นกีฬา_____

( ) อื่นๆ_____

ระยะเวลาที่ใช้ _____นาที / ครั้ง_____ครั้ง / สัปดาห์

9. มีการรับประทานผลิตภัณฑ์เสริมอาหารหรือไม่

( ) มี ( ) ไม่มี

ถ้ามีระบุชนิด_____ ราคา _____ บาท จำนวน/เดือน_____

10. มีการรับประทานสมุนไพรหรือไม่

( ) มี ( ) ไม่มี

ถ้ามีระบุชนิด_____ ราคา _____ บาท จำนวน/เดือน_____

11. เคยไปตรวจร่างกายกับแพทย์หรือไม่

( ) ไป มีค่าใช้จ่าย _____ บาท ( )ไม่เคยไป

ในกรณีที่ไม่เคยไปให้ระบุสาเหตุ_____

<u>แบบสัมภาษณ์ข้อมูลโรคประจำตัว การเจ็บป่วย อุบัติเหตุ หรือการบาดเจ็บและค่าใช้จ่ายในการรักษา สำหรับผู้ประกอบอาชีพกรีดยางพารา</u>

1. ปัจจุบันมีโรคประจำตัวหรือไม่

( ) มี (ระบุชื่อโรค) _____ ( ) ไม่มี

2. จากข้อ 1 คิดว่าโรคประจำตัวนั้นเป็นโรคที่เกิดจากการทำงานหรือไม่

( ) ใช่ ( ) ไม่ใช่ ( ) ไม่แน่ใจ

3. จากข้อ 1 มีวิธีการรักษาอย่างไร

( ) ซื้อยาทานเอง มีค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลหรือคลินิกมีค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลโครงการ 30 บาท

ค่าใช้อื่นๆ เช่นค่ารถ _____บาท

4. จากข้อ 1 มีการหยุดงานเนื่องจากโรคประจำตัวที่เป็นอยู่หรือไม่

( ) มี จำนวน _____ วัน _____ ชั่วโมง ( ) ไม่มี

5. มีการเจ็บป่วยอื่นๆ หรือไม่

( ) มี ( ) ไม่มี

ระบุอาการเจ็บป่วย และจำนวนครั้ง

1.

2.

3.

ยกตัวอย่างอาการเจ็บป่วย

- อ่อนเพลีย - นอนไม่หลับ
- ปวดศีรษะ - ปวดเมื่อยส่วนต่างๆ

6. จากข้อ 5 คิดว่าเป็นการเจ็บป่วยเนื่องจากการทำงานหรือไม่

( ) ใช่ ( ) ไม่ใช่ ( ) ไม่แน่ใจ

7. จากข้อ 5 มีวิธีการรักษาอย่างไร

( ) ซื้อยามาทานเอง มีค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลหรือคลินิก มีค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลโครงการ 30 บาท

ค่าใช้อื่นๆ เช่นค่ารถ _____ บาท

8. จากข้อ 5 มีการหยุดงานเนื่องจากการเจ็บป่วย หรือไม่

( ) มี จำนวน _____ วัน _____ ชั่วโมง ( ) ไม่มี

9. เคยได้รับอุบัติเหตุ หรือการบาดเจ็บจากการทำงานหรือไม่

( ) เคย ( ) ไม่เคย

ระบุลักษณะของอุบัติเหตุและจำนวนครั้ง

1.

2.

3.

ยกตัวอย่างลักษณะของอุบัติเหตุหรือการบาดเจ็บ

- ตกจากที่สูง
- หกล้ม / ลื่นล้ม
- วัตถุ / สิ่งของ พังทลาย หล่นทับ
- วัตถุ / สิ่งของ กระแทก, ชน
- วัตถุ / สิ่งของ หนีบ ดึง
- วัตถุ / สิ่งของ บาด ทิ่ม แทง
- วัตถุ / สิ่งของ กระเด็นเข้าตา หน้า
- วัตถุ / สิ่งของ ระเบิด
- ยกหรือเคลื่อนย้ายของหนัก
- แพ้จากการสัมผัสสารเคมี หรือสิ่งมีพิษ

10. จากข้อ 9 มีวิธีการรักษาอย่างไร

( ) ซื้อยามาทานเอง มีค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลหรือคลินิกมี ค่าใช้จ่าย _____ บาท

( ) ไปพบแพทย์ที่โรงพยาบาลโครงการ 30 บาท

ค่าใช้อื่นๆ เช่นค่ารถ_____ บาท

11. จากข้อ 9 มีการหยุดงาน หรือไม่

( ) มี จำนวน _____ วัน _____ ชั่วโมง ( ) ไม่มี

12. มีการหยุดงานนอกเหนือจากที่กล่าวมาข้างต้นหรือไม่

( ) มี ( ) ไม่มี ( ) ไม่แน่ใจ

ถ้ามีระบุจำนวนวัน_____สาเหตุ_____

APPENDIX E

แบบสัมภาษณ์เรื่องความรู้สึกปวดส่วนต่างๆของร่างกาย

ชื่อ สกุล

ให้ท่านทำเครื่องหมายกากบาท (X) ลงบนเส้น กาตรงไหนก็ได้ที่ตรงกับความรู้สึกปวดของท่าน ให้ครบทั้ง 12 ข้อ

ดูสีหน้าประกอบการตัดสินใจ

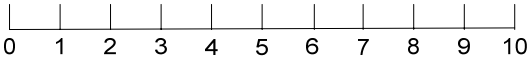
0 = ไม่ปวดเลย

1-3 = ปวดเล็กน้อย

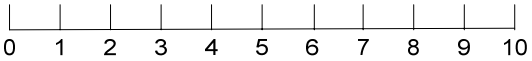

4-6 = ปวดปานกลาง


7-10 = ปวดมาก

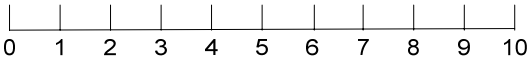
1. คอ



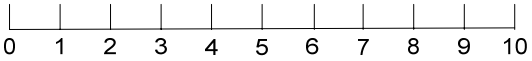
2. ไหล่



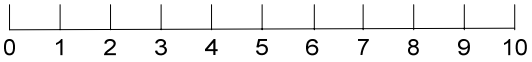
3. หลังส่วนบน (สูงกว่าเอว)



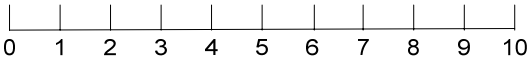
4. หลังส่วนล่าง (จากเอวลงมา)



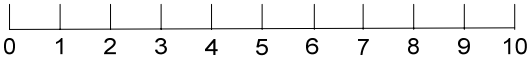
5. เอว



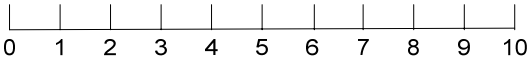
6. แขนส่วนบน



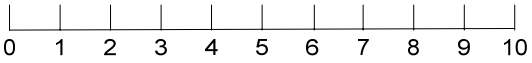
7. แขนส่วนล่าง



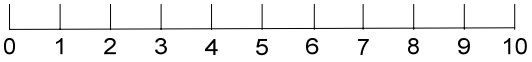
8. ข้อมือหรือมือ



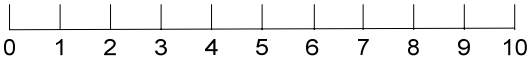
9. ต้นขา



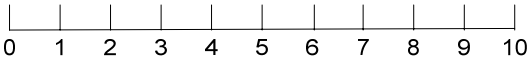
10. น่อง



11. หัวเข่า



12. เท้าหรือข้อเท้า



APPENDIX F

รายงานการไปพบแพทย์ เพื่อรักษาโรคที่เกิดจากการทำงาน

กลุ่มที่ : _____

ชื่อ-นามสกุล	วันที่พบแพทย์	โรคที่เป็น	ลักษณะอาการของโรค	สถานพยาบาล	ค่าใช้จ่าย

APPENDIX G

รายงานสถิติการเกิดอุบัติเหตุ / การบาดเจ็บจากการทำงาน

กลุ่มที่ : _____

ชื่อ-นามสกุล	วันที่ได้รับอุบัติเหตุ	ลักษณะของอุบัติเหตุหรือการบาดเจ็บ	วิธีการรักษา	ค่าใช้จ่ายในการรักษา	สาเหตุของอุบัติเหตุหรือการบาดเจ็บ	แนวทางป้องกัน

APPENDIX H

บันทึกการประชุมกลุ่ม

กลุ่มที่ : _____

วันที่ประชุม	จำนวนสมาชิกที่ร่วมประชุม	หัวข้อการประชุม	รายละเอียดของการประชุม

APPENDIX J

ท่าบริหารยืดกล้ามเนื้อ

ท่าที่ 1 หมุนข้อมือ (Wrist Rotating)


- กำมือหมุนข้อมือเป็นวงกลม ข้างละ 10 รอบ
- แบมือหมุนข้อมือเป็นวงกลม ข้างละ 10 รอบ

ท่าที่ 2 ยืดนิ้วหัวแม่มือ (Thumb Stretching)

- ใช้มือขวาดึงนิ้วโป้งมือซ้ายเข้าหาตัว จะรู้สึกตึงบริเวณอุ้งมือและข้อนิ้วโป้ง ค้างไว้ 5 วินาที สลับทำอีกข้าง ทำซ้ำ 3 ครั้ง

ท่าที่ 3 สะบัดมือ (Hand Waving)


- สะบัดมือขึ้นลง ตามแนวนอน ข้างละ 10 ครั้ง

ท่าที่ 4 หมุนคอ (Neck Rotating)

- วางมือบนศีรษะค่อย ๆ ใช้มือดึงศีรษะให้คอเอียงช้า ๆ เมื่อเริ่มรู้สึกตึงที่บ่าด้านตรงข้าม ให้ค้างทิ้งไว้ประมาณ 10 วินาที จะรู้สึกว่ากล้ามเนื้อที่ตึงนั้นคลายตัวลง ค่อย ๆ เอียงคอเพิ่มไปอีกเล็กน้อยจนรู้สึกตึงเท่าครั้งแรก ค้างไว้ 10 วินาที แล้วเอียงคอกลับมาในท่าตรง
- ค่อย ๆ หมุนคอไปด้านใดด้านหนึ่งช้า ๆ เมื่อเริ่มรู้สึกตึงที่บ่าด้านตรงข้าม หรือด้านเดียวกันให้ค้างไว้ 10 วินาที จะรู้สึกว่ากล้ามเนื้อที่ตึงนั้นคลายตัวลง ค่อย ๆ หมุนคอเพิ่มไปอีกเล็กน้อยจนรู้สึกตึงเท่าครั้งแรก ค้างไว้ 10 วินาที แล้วหมุนคอกลับมาในท่าตรง

ท่าที่ 5 หมุนไหล่ (Shoulder Rotating)

- ตั้งศอกขวา แล้วใช้มือซ้าย ค่อย ๆ ดึงข้อศอกขวา จนติดหน้าอก ค้างไว้ 10 วินาที
- สลับทำอีกข้าง

ท่าที่ 6 บริหารไหล่ (Shoulder Stretching)

- ยกมือขึ้นทั้งสองข้างเหนือศีรษะเอามือไขว้กัน ค้างท่านี้ไว้ 10-30 วินาที

ท่าที่ 7 บริหารนื้ออกและกล้ามเนื้อแขน (Chest and Arm Stretching)

- ยื่นมือทั้งสองข้างไปข้างหลัง นิ้วหัวแม่มือชี้ลงพื้น ค่อยๆเอามือเข้าหากันจะกระทั่งเกิดความตึงที่หัวไหล่ค้างไว้ 10-30 วินาทีแล้วจึงกลับท่าเดิม ทำซ้ำสัก 2-3 ครั้ง

ท่าที่ 8 บริหารกล้ามเนื้อหลัง

นั่งบนเสื่อปลายเท้าจรดติดกัน แบะข้อเข่าออก ใช้ข้อศอกดันข้อเข่าแบะออกจนกระทั่งเริ่มเกิดความตึงขึ้นบริเวณกล้ามเนื้อให้คงท่านั้นไว้ 10-30 วินาที

ท่าที่ 9 บริหารข้อเท้า

1. นั่งที่ขอบเก้าอี้ หมอนหนุนหลัง
2. เหยียดเท้าไปข้างหน้า ให้เข่าตึง ส้นเท้าติดพื้น
3. กระดกข้อเท้าเข้าหาตัวเองให้สุดแล้วคงท่าเดิม 10 วินาที
4. เหยียดข้อเท้าให้สุดและคงท่าเดิม 10 วินาที
5. ทำซ้ำ 3-5 ครั้ง

ท่าที่ 10 บริหารกล้ามเนื้อหัวเข่า

1. นั่งบนเก้าอี้ หลังพิงพนัก
2. ถ้าร่างกายแข็งแรงให้ถ่วงน้ำหนักที่ข้อเท้า
3. ยกเท้าขวาขึ้นใช้เวลา 3 วินาที
4. กระดกข้อเท้าจนนิ้วหัวแม่เท้าชี้ที่หน้า คงท่านี้ไว้ 1-2 วินาที
5. ยกเท้าลง ช้าๆใช้เวลา 3 วินาที ให้ทำข้างละ8-15 ครั้ง

ท่าที่ 11 บริหารกล้ามเนื้อน่อง


1. ยืนห่างกำแพง1-2 ฟุต มือยันกำแพง แขนเหยียดตรง
2. ถอยเท้าขวาไปข้างหลัง 2 ฟุตเท้าขวาวางบนพื้นทั้งเท้า เข่าซ้ายงอเล็กน้อยส่วนเข่าขวาตึงจะทำให้รู้สึกตึงบริเวณกล้ามเนื้อน่องถ้าไม่รู้สึกตึงให้ถอยเท้าขวาอีจนรู้สึกตึงคงท่านั้นไว้ 10 วินาที
3. ให้งอเข่าขวาลงเล็กน้อยและคงตำแหน่งนั้นไว้ 10-30 วินาที
4. ให้ทำอีกครั้งโดยสลับเท้า

ท่าที่ 12 บริหารกล้ามเนื้อต้นขา

1. นอนตะแคงขวา ศีรษะหนุนหมอน
2. งอเข่าซ้าย มือซ้ายจับข้อเท้าซ้าย ดึงเข้าหาตัว จนรู้สึกตึงกล้ามเนื้อต้นขา คงท่านั้นไว้ 10-30 วินาที

ทำ 3 ครั้ง แล้วสลับข้าง

APPENDIX K

โรคกระเพาะ

<u>อาการ</u>

- ปวดท้องเป็นๆ หายๆ เรื้อรัง ตรงบริเวณกลางยอดอก หรือใต้ลิ้นปี่
- อาการปวดอาจจะค่อนมาทางซ้าย หรือทางขวาก็ได้
- เวลาที่ปวดมักจะสัมพันธ์กับมื้ออาหาร เช่น ก่อนหรือหลังอาหาร
- ลักษณะการปวด อาจปวดแสบ ปวดตื้อ จุกเสียด
- มีความรู้สึกหิวข้าวก่อนเวลาอาหาร
- มีอาการคลื่นไส้อาเจียน หรือ เรอเปรี้ยว

ในผู้ป่วยที่มีแผลที่ลำไส้เล็กส่วนต้นมักจะมีอาการ ปวดท้อง หลังอาหารประมาณ 1-3 ชั่วโมง หรือขณะท้องว่าง โดยมากจะเริ่มปวดตอนสายๆ หลังกินข้าวแล้วจะปวดมากขึ้น ในช่วงบ่ายๆ เย็นๆ และอาจปวดมากในตอนดึกๆ จนต้องตื่นนอน หรือนอนไม่หลับ อาการปวดมักดีขึ้นทันทีหลังกินอาหาร ดื่มนม กินยาลดกรด หรืออาเจียน

ถ้าแผลลามไปที่ตับอ่อน จะมีอาการปวดหลังร่วมด้วย และไม่หายปวดหลังกินอาหาร

ถ้าเป็นแผลที่กระเพาะอาหาร มักมีอาการปวดท้องหลังอาหาร ประมาณ 1-2 ชั่วโมง

บางคนอาจมีอาการเบื่ออาหาร (ไม่อยากกินอาหาร เพราะกลัวปวดท้อง) และน้ำหนักลด

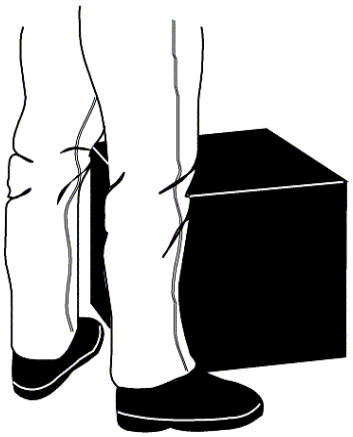
<u>ข้อแนะนำ</u>

1. กินอาหารให้ตรงเวลาทุกมื้อ อย่าปล่อยให้หิว
2. งดบุหรี่ แอลกอฮอล์ ชา กาแฟ หรือเครื่องดื่มมีกาเฟอีน และน้ำอัดลม
3. หลีกเลี่ยงการใช้แอสไพริน
4. หลีกเลี่ยงอาหารรสเผ็ดจัด เปรี้ยวจัด
5. ออกกำลังกายเป็นประจำ หรือหาวิธีคลายเครียด
6. พักผ่อนให้เพียงพอ ไม่นอนดึก
7. ควรกินยาต่อเนื่อง และพบแพทย์ตามนัด

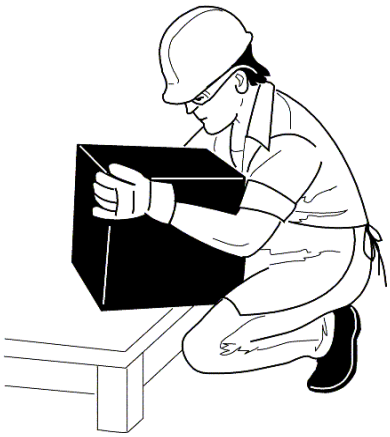
APPENDIX L

<u>การยกของอย่างถูกวิธีและปลอดภัย</u>

ควรหยุดคิดสักนิดก่อนการยกวัสดุสิ่งของ ไม่ว่าจะเป็นมุมที่คมของวัสดุสิ่งของ จุดจับที่ลื่น จับยาก หรืออันตรายแฝงอื่นๆ ควรรู้ขีดจำกัดความสามารถของตัวเอง ไม่ควรพยายามที่จะออกแรงมากจนเกินไป ถ้าสามารถแบ่งน้ำหนักสิ่งของให้เบาได้ก็ควรทำ หากสิ่งของมีน้ำหนักเกิน25กิโลกรัม ผู้หญิงไม่ควรยกด้วยตนเอง การยกสิ่งของขึ้นเพื่อเทของเหลวใส่ภาชนะบรรจุนั้นผู้ยกต้องจับภาชนะให้มั่นและควรยกพร้อมกันสองคนถ้าของเหลวในภาชนะบรรจุมีน้ำหนักเกิน50กิโลกรัมเนื่องจากการยกของที่เกินกำลังอาจทำให้เกิดหมอนรองกระดูกเคลื่อนได้ ที่สำคัญจะต้องรู้จุดและเส้นทางที่จะยกสิ่งของไปวาง โดยเส้นทางต้องไม่มีสิ่งของอื่นกีดขวาง แล้วปฏิบัติตามขั้นตอนการยกของขึ้นโดยมีรายละเอียดดังนี้



1. วางเท้าให้ถูกตำแหน่ง โดยการวางเท้าข้างหนึ่งขนานหรือชิดกับด้านข้างวัสดุที่ยก ส่วนเท้าอีกข้างหนึ่งอยู่ด้านหลัง ระยะห่างของเท้าควรเท่ากับความกว้างของไหล่ การวางเท้าเช่นนี้จะทำให้เมื่อยกของขึ้นแล้ว เกิดความพร้อมที่จะก้าวไปข้างหน้า



2. ตรึงคางและหลังตรง ย่อตัวลงเพื่อคุกเข่า ตรึงคางโดยการยืดศีรษะขึ้น แล้วก้มหน้าลงให้คางแนบชิดลำตัวที่สุดเท่าที่จะทำได้ และขณะที่นั่งลงพยายามให้หลังตรง การกระทำเช่นนี้จะทำให้กระดูกสันหลังช่วงบน เป็นเส้นตรงกับกระดูกสันหลังส่วนล่าง

3. จับวัสดุสิ่งของที่จะยกให้แน่นและถูกต้อง ก่อนการยก ควรจับสิ่งของที่จะยกด้วยฝ่ามือ หรือทุกส่วนของนิ้ว ไม่ควรใช้เฉพาะปลายนิ้วเท่านั้น มือทั้งสองข้างจับสิ่งของบริเวณที่จะทำให้น้ำหนักเกิดความสมดุล

4. ยกขึ้นอย่างช้าๆ โดยใช้แรงส่งจากขา ห้ามบิดลำตัวขณะทำการยกสิ่งของ

5. เมื่อยกสิ่งของขึ้นเรียบร้อยแล้ว ควรให้สิ่งของอยู่แนบลำตัวมากที่สุดเท่าที่จะทำได้ เนื่องจากขณะที่จุดศูนย์ถ่วงของสิ่งของเคลื่อนออกจากลำตัวจะเกิดความเครียดอย่างมากบริเวณส่วนเอว

ถ้าจะต้องเลี้ยวหรือกลับตัวขณะที่ยกสิ่งของ ควรเลี้ยวหรือกลับตัวโดยใช้เท้า ไม่ใช่ลำตัว ในการที่จะวางสิ่งของต่ำกว่าระดับเอว ให้ปฏิบัติตามขั้นตอนข้างต้นตามลำดับย้อนหลัง พึงระลึกเสมอว่า ควรให้หลังตรงที่สุดเท่าที่จะเป็นไปได้และย่อเข่าลง

No. MU 2007-071

Documentary Proof of Ethical Clearance
The Committee on Human Rights Related to
Human Experimentation
Mahidol University, Bangkok

Title of Project: Cost Effectiveness of Occupational Health & Safety and Occupational Hazard in Rubber Tappers
(Thesis for Master Degree)

Principle Investigator: Miss Porntip Chaonasuan

Name of Institution: Faculty of Public Health

Approved by the Committee on Human Rights Related to Human Experimentation

Signature of Chairman: .....
(Professor Dr.Srisin Khusmith)

Signature of Head of the Institute: .....
(Professor Dr.Pornchai Matangkasombut)

Date of Approval: 12 APR 2007

Date of Expiration: 11 APR 2008

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