
**UNIVERSITI PUTRA MALAYSIA**

***THE PREVALENCE OF MUSCULOSKELETAL SYMPTOMS AND ASSOCIATED RISK FACTORS AMONG PINEAPPLE PLANTATION WORKERS AT JOHOR***

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# PREVALENCE OF MUSCULOSKELETAL SYMPTOMS AND ASSOCIATED RISK FACTORS AMONG PINEAPPLE PLANTATION WORKERS AT JOHOR

**BY**

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## ABSTRACT

## THE PREVALENCE OF MUSCULOSKELETAL SYMPTOMS (MSS) AND ITS ASSOCIATED RISK FACTORS AMONG PINEAPPLE PLANTATION WORKERS IN JOHOR

### NUR HIDAYAH RANI

**Introduction:** Pineapple plantation workers are exposed to several physical activities and hazards such excessive bending, twisting and carrying loads. **Objective:** The objective of this study was (a) to determine the one year prevalence of Musculoskeletal Symptoms (MSS) among pineapple plantation workers, (b) to determine their respective body postural risk, (c) to determine the association of the risk factors with one-year prevalence MSS, and (d) to predict the association of reporting MSS with risk factors. **Methodology:** A cross-sectional study was done at a pineapple plantation in Johor. A set of questionnaire which include structured questionnaire and modified Nordic Musculoskeletal questionnaire was used. The posture analysis were done by Rapid Entire Body Assessment (REBA) method. The data were analyzed using Statistical Packages of Social Sciences (SPSS) version 22.0. **Results:** A total of 108 workers participated in this study. Prevalence of MSS was 87.0%. MSS at the lower back was the highest (64.8%) while harvesting was the task with the highest postural risk (76.2%). Harvesting and manual weeding were categorized as medium risk task. Lower back pain is contributed by working tenure of 10 to 25 years (Odds Ratio, OR:3.90; 95% Confidence Interval, CI 1.05-14.4) and more than 25 years (OR: 7.45 (95% CI 1.26 to 44.0). Workers who workers less than 6-hour daily (OR: 0.34 (95% CI 0.02-0.55) or not exceeding 7-hour daily (OR: 0.21(95% CI 0.58-0.79) had lower odds of reporting lower back pain. **Conclusion:** The overall prevalence of MSS was relatively high among pineapple plantation workers. Years of working at plantation and working hours at plantation were associated with MSS. Effective preventive strategies are required to address MSD in this population in order to minimize the risk for MSD.



**Keywords:** Musculoskeletal Symptoms (MSS), Rapid Entire Body Assessment (REBA), Musculoskeletal Disorder (MSD), Confidence Interval (CI), Odd Ratio (OR), pineapple plantation workers

## ABSTRAK

## PREVALENS GEJALA MASALAH GANGGUAN OTOT RANGKA DAN PERHUBUNGAN ANTARA FAKTOR RISIKO DI KALANGAN PEKERJA-PEKERJA LADANG NENAS DI JOHOR

### NUR HIDAYAH RANI

**Pengenalan:** Pekerja di ladang nenas terdedah kepada beberapa aktiviti fizikal dan hazad seperti bengkokkan berlebihan, berpusing and mengangkat beban. **Objektif:** Objektif kajian ini adalah (a) untuk mengenalpasti prevalens MSS setahun dalam kalangan pekerja ladang nenas, (b) mengenalpasti postutur risiko badan mereka, (c) untuk mengkaji kaitan di antara faktor risiko MSS dan prevalens masalah MSS dalam setahun, dan (d) untuk meramalkan hubungkait faktor-faktor risiko dan MSS. **Metodologi:** Satu kajian keratan rentas telah dilakukan di satu ladang nenas di Johor. Satu set borang soal selidik telah digunakan mengandungi soalan soal selidik berstruktur dan soal selidik Nordic yang telah di ubahsuai, Analisis postur menggunakan Penilaian Rapid untuk Keseluruhan Badan (REBA) juga telah dijalankan. Data analisis telah dijalankan menggunakan perisian SPSS versi 22.0 **Keputusan:** Prevalens MSS setahun bagi pekerja ladang nenas adalah 87.0%. MSS paling tinggi adalah pada bahagian belakang bawah (64.8%) manakala tugasan kerja menuai telah direkodkan tahap risiko paling tinggi (76.2%). Tugasan menuai dan merumput secara manual telah dikategorikn sebagai sederhana berisiko. Sakit di bahagian belakang bawah telah di sumbang oleh tempoh bekerja 10 hingga 25 tahun (Odds Ratio, OR:3.90; 95% Confidence Interval, CI 1.05-14.4) dan lebih 25 tahun (OR: 7.45 (95% CI 1.26 to 44.0). Pekerja yang bekerja kurang 6 jam sehari (OR: 0.34 (95% CI 0.02-0.55) atau tidak lebih 7 jam sehari (OR: 0.21(95% CI 0.58-0.79) mempunyai kebarangkalian rendah mendapat sakit di belakang bawah. **Kesimpulan:** Prevalens keseluruhan MSS adalah tinggi dalam kalangan pekerja di ladang nenas. Jumlah tahun bekerja dan jam bekerja di ladang mempunyai hubung kait dengan MSS. Strategi prncegahan yang efektif diperlukan untuk mengatasi dan mengurangkan masalah gangguan otot rangka pada populasi ini.



**Kata kunci:** Masalah gangguan otot rangka (MSS), penilaian rapid untuk Keseluruhan Badan (REBA), pekerja ladang nenas

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| BMI | Body Mass Index |
| DOA | Department of Agriculture |
| DOSM | Department of Statistic Malaysia |
| DOSH | Department of Occupational Safety and Health |
| HIRARC | Hazard Identification, Risk Assessment and Risk Control |
| MOA | Ministry of Agriculture |
| MPIB | Malaysian Pineapple Industry Board |
| MSD | Musculoskeletal Disorder |
| MSS | Musculoskeletal symptoms |
| REBA | Rapid Entire Body Assessment |
| SNQ | Standardized Nordic Questionnaire |
| SOCSO | Social Security Organisation |
| WMSD | Work-related Musculoskeletal Disorder |
| WRMP | Work-related Musculoskeletal Problem |

# CHAPTER 1

# INTRODUCTION

## 1.1 Background

Agricultural sector is one of the sector that contribute to the growing of economics in Malaysia. Specifically for agriculture sector, the Department of Statistic Malaysia (DOSM) showed economy rose 6.0 per cent on 2014 as compared to 4.0 percent in 2013. The agriculture sector was physically strenuous and farm workers are particularly at risk for developing symptoms of musculoskeletal disorder (MSD) compared to other sectors.

Musculoskeletal disorder (MSD) are conditions of the musculoskeletal system that are associated with pain and are usually progressive. They can be categorized into diseases of the joints, spinal disorders, physical disability and conditions resulting from trauma. MSD carry a great impact on society, especially condition such as rheumatoid arthritis, osteoarthritis, osteoporosis, lower-back pain and limb trauma (EU-Public Health, 2007). Agricultural work is the one of the dangerous sectors to work with in terms of health as globally, almost 50 percent of the world labor, especially in the third world and developing nations are involved in agriculture (Das et al, 2001).

Pineapple tree is tropical plant that are believed originate from East Area of South America. Introduced in the Malaya in the 16th century by the Portuguese and rubber crop development. In 1921, pineapples began to be planted in Singapore, Johor and Selangor as a cash crop. According to Malaysian Pineapple Industry Board (2015), Malaysia is one of the world major producer other than Thailand, Philippines, Indonesia, Haiwaii, Ivory Coast, Kenya, Brazil, Taiwan, Australia, India and South Africa.

According to Malaysia Pineapple Industry Board (MPIB), canned pineapple had higher market demand in countries like Japan, United States, Europe economics Union Countries, West Asia and Singapore. Specifically in Malaysia, the pineapple was planted on peat soil area in Johor. Malaysia is famous in exporting quality canned pineapples with golden yellow color and have different characteristics from competitor exporters of other countries.

Currently 95% of canned pineapple productions are available for export market and 5% is for domestic market while fresh pineapples contributes 3% to the export market and 70% to the domestic market by Ministry of Agriculture (2015). In terms of production, Malaysia is one of the world major producer other than Thailand, Philippines, Indonesia, Hawaii, Ivory Coast, Kenya, Brazil, Taiwan, Australia, India and South Africa (MPIB, 2015).

Since workers manually perform the work tasks in pineapple plantation, they are exposed to ergonomic risk factors on continuous basis. Several physical hazardous activities such as excessive bending, twisting, and carrying loads are

common in pineapple plantation. Work in pineapple plantations is labor-intensive because pineapple tree is a short-rotation crop which grow low on the ground at the maximum height of 1.5 meter. Therefore, workers are required to bend their body in positions which are defined as awkward posture at many job task such cultivating, weeding, harvesting and land preparation which could lead to muscle pain and the feeling discomfort (Mohd Tamrin & Aumran, 2014).

## 1.2 Problem Statement

MSD is consistently shown as one of the most common health problem of all occupational non-fatal injuries and illnesses for agricultural workers in the world, especially those who are involved in labor-intensive practices (McCurdy et al.,2003; Meyers et al., 1997; Villarejo,1998: Villarejo & Baron,1999). Besides, MSD have been showed to linked with higher production costs due to absence of workers, insurance and medical cost (Kirkhorn, Earle-Richardson, & Banks, 2010). The work related musculoskeletal disorder (WMSD) are disorder and disease of musculoskeletal system with a multi-factorial etiology where work performance and workplace environment are associated with certain risk factor.

In Malaysia, the Social Security Organization (SOCSO, 2014) reported that MSD cases due to occupational causes have continuously increased every year from 10 cases in 2005 to 675 cases in 2014. Even though this information did not specifically described pineapple plantation workers, it does generally gives an overview on current status of MSD among workers in Malaysia. Figure 1.1 showed the statistic MSD increasing by years in Malaysia by SOCSO (2014).

The agricultural sector employs significant number of workers. In an agricultural-intensive country like India, about 70% Indian females are estimated to engage in agricultural work (Hasalkar et *al.*,2004). In Malaysia, the number of labor force in the agricultural industries has increased from 1.2 million to approximately 1.4 million workers (Department of Agriculture, 2008). According to the Departments of Statistics in Malaysia, the gross domestic product (GDP) from agriculture have increased to RM 26,665 million in the third quarter of 2015 from RM 23,017 million.

Malaysia has continued to be one of the main exporter of pineapple products in the world. According to Utusan Online (2013), Malaysia has previously signed an agreement to export large scales of pineapple products to China starting early 2015. The exporting of pineapples started with one container of 20 tonnes weekly and were estimated to increase approximately 100 containers monthly in 2015. The workers expense high energy due to all task were done manually.

Agricultural sector in general and pineapple plantation in particular contributes to the growing economies in Malaysia, there is need to ensure that the sector continues to grow financially at a rate that is not an expense of workers health. The figure 1.2 below are the pineapple plantation work task which involving the awkward posture and repetitive movement of workers.

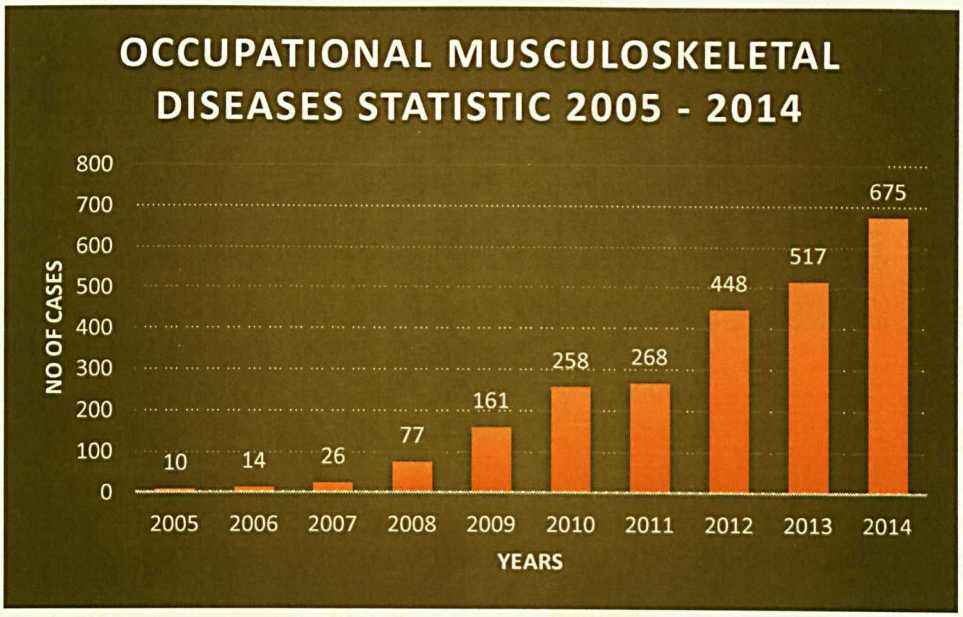


**Figure 1.1 : The Statistics of MSD in Malaysia 2005-2014 (SOCSO, 2014)**

Land preparation

Cultivation of sucker

Manual weeding

Fertilizer (Hand broadcast)

Harvesting

Pesticide spraying

**Figure 1.2: Pineapple Plantations Work tasks**

## 1.3 Research Justification

There has been a lack of study on the distribution of MSD and its associated risks in this specific agricultural sector. The present cross-sectional study was designed to determine the prevalence of the musculoskeletal symptoms (MSS) and its association with risk factors among pineapple plantation workers at a pineapple plantation farm in Johor, Malaysia. MSS differs from MSD due to the fact that MSD is diagnosed by a physician instead, MSS are collective symptoms which can be identified from a self-administered questionnaire. This study also aims to also address the specific occupational risk factor that arise from the specific job tasks associated with pineapple plantation.

The identification of the magnitude of the problem could lead to the accurate estimation of disease burden to the individual, family, organizational or even at the national level. Besides, by identifying the risk factors that may present could benefit to pineapple workers, Department of Occupational Safety and Health, Malaysian Pineapples Industries Board (MPIB) and the Department of Agriculture (DOA) in the ultimate aim to improve the productivity while at the same time managing safety and health of workers.

## 1.4 Research Question

## 1.4 Research Question

i. What is the prevalence of MSS and associated factors among pineapple plantation workers?

ii. What is the body postural risk among pineapple plantation workers associated with work task among pineapple plantation workers?

## 1.5 Research Objectives

### 1.5.1 General Objectives

This study aimed to determine the prevalence of musculoskeletal symptoms (MSS) and its association with risk factors among pineapple plantation workers in Johor.

### 1.5.2 Specific Objective

i. To determine the one year prevalence of MSS among the pineapple plantation workers

ii. To identify the ergonomic risk by Hazard Identification, Risk Assessment and Risk Control (HIRARC) for work task in the pineapple plantation

iii. To evaluate the whole body postural risk based on work task among the pineapple farm plantation workers

iv. To determine the association between non-occupational risk factors with MSS among pineapple plantation workers

v. To determine the association between occupational factor with MSS among pineapple plantation workers

vi. To predict the association of reporting MSS with risk factors.

## 1.6 Research hypothesis

i. There is a significant association between non-occupational risk factors with MSS among pineapple plantation workers.

ii. There is significant association between occupational factors with MSS among pineapple plantation workers.

## 1.7 Conceptual Framework

The pineapple plantation work task that was studied comprise of six major task that involving manual handling by workers. The work task is land preparation, cultivation, weeding control, fertilizing, harvesting and pesticide spraying. The interest of this study was focused to determine ergonomic risk which may cause MSS on the body posture while working. MSS in workers can occur if the risk factors are present and are not controlled. These factors can be divided into occupational risk factors such as previous injury, body postural risk while working, working tenure and duration of work. The non-occupational risk factor such as age, marital status, and educational level, BMI was included in the conceptual framework of this study. There also cofounder which is the lifestyle factor and smoking that may contribute to MSS.

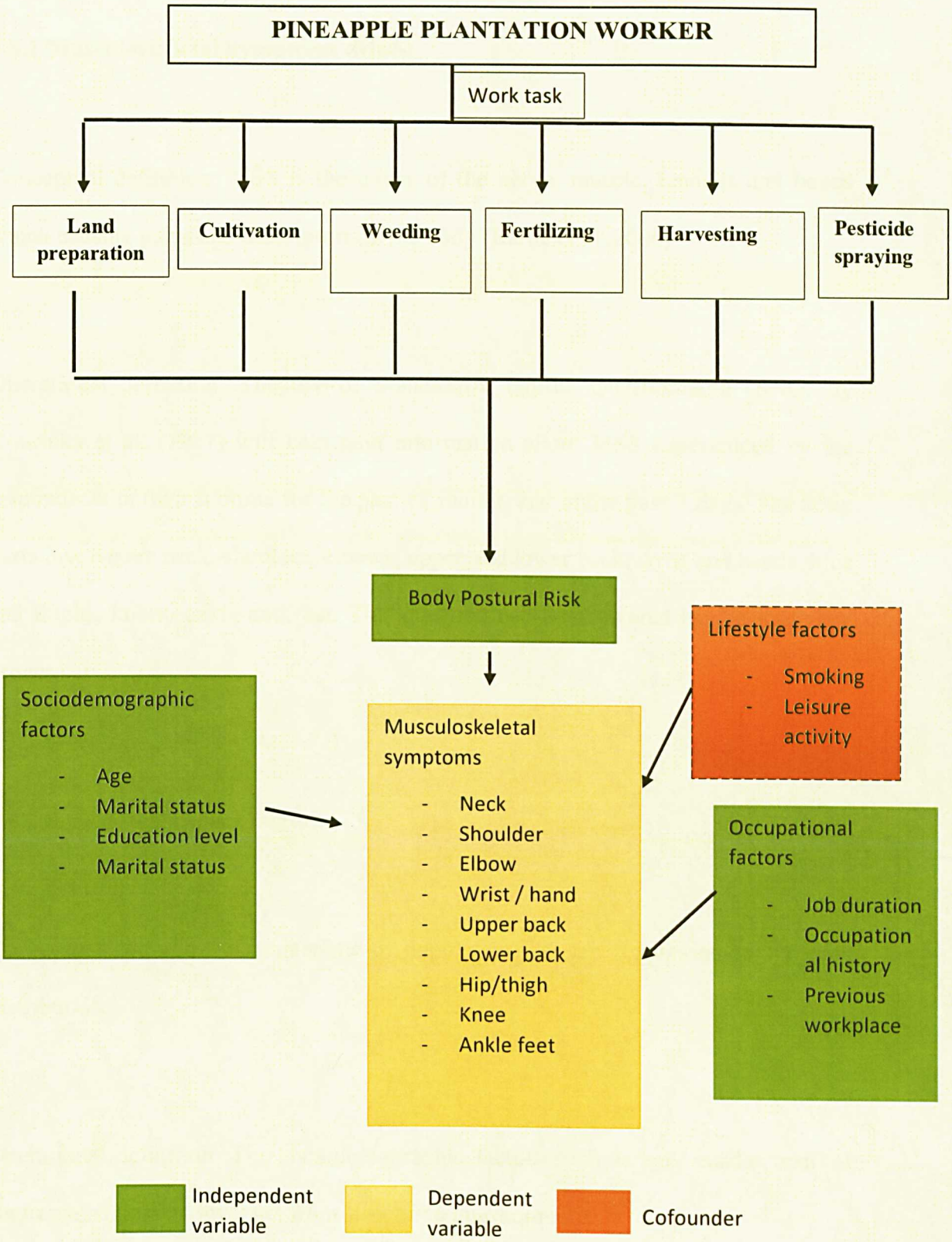


**Figure 1.3 The Conceptual Framework of Study**

## 1.8 Definition of Term

### 1.8.1 Musculoskeletal Symptoms (MSS)

Conceptual definition: MSS is the injury of the nerve, muscle, tendons and bones which causing pains and discomfort on the body (Barbe et al.,2006)

Operational definition: The use of Standardize Nordic Questionnaire (SNQ) by Kourinka et al. (1987) will help gain information about MSS experienced by the respondents in their lifetime for the past 12 month, and in the past 7 days. The body parts involve are neck, shoulder, elbows, upper and lower back, wrist and hands, hips and thighs, knees, ankle and feet. This question can be answered by the interview process.

### 1.8.3 Sociodemographic factors

Conceptual definition: characteristic of population that are expressed as statistics distribution.

Operational definition: The sociodemographic factors such as age, gender, marital status and education level get from structured questionnaire

### 1.8.4 Postural MSD risk

Conceptual definition : Postural MSD risk refers to any possibility of getting any MSD and it is due to characteristics or the way where someone hold their body while standing, sitting, or while performing task or works (Oxford Dictionaries, 2014).

Operational definition: This study uses Rapid Entire Body Assessment (REBA) to assess the awkward posture (Highnett and McAtamney, 2000). REBA are systematic assessment which can evaluate the whole body postural MSD and risk associated with the work task performed. The video recording will be used as a reference tool in the analysis of postural MSD risk together with the REBA checklist.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 The Musculoskeletal Systems

Musculoskeletal system was the system structure of body that provide energy for the movement of all body parts in the human body (Shahmi, 2014). The musculoskeletal system functions to protect the internal structure of organ, to enable movement, shaping the body, produce blood cells and produce heat. There were 206 bones in an adult human body. Each bone contains two form tissues which is compact bone on the external side and spongy bone for the internal part (Claveland Clinic, 2013).

There are three types of muscle in the human body, namely cardiac muscle (muscle locate at heart), smooth muscle (muscle of the gut and blood vessels) and skeletal muscle (striated muscle). When MSD is referred to, it generally means the musculoskeletal system. Muscles worked in pairs, known as antagonistic movement. When one muscle become shortens, the other muscle will lengthens (Department of Education and Training, 2008) and this will cause movement..

## 2.2 Prevalence rate on MSS

The study on MSD among pineapple plantation workers are limited. Statistic from SOCSO have shown the increasing number of reported cases by years from

2005 – 2014 from 10 cases to 674 cases Malaysia. Ng et al (2013) reported the 12 month prevalence rate of pain reported among palm oil plantation harvester in total for any body parts was 88%. The prevalence of the body parts complaint in descending order was at the lower back (61%), followed by knee (44%), shoulder (33%), neck (30%), upper back (20%), ankle/feet (16%), hip/thigh (21%) and elbow (14%) respectively. The study continued to report that the distribution of 7-day prevalence of MSS were almost similar to the 12 months prevalence, but is generally lower (MSS for any body parts was 52%, lower back 32% knee 18%, shoulder 17%, neck 15%, thigh 8%, arm, elbow and upper back was 6% respectively and feet 4%). Besides, the 7-day prevalence of MSS among most farmers in Khon Kaen, Thailand showed similar variations with the lower back pain reported as the highest MSS (56.91%), followed by MSS at the knee (28.62%), hip pain (25.40%), and shoulder pain (25.04%) (Metakul et al., 2011).

**2.3 MSD among agriculture workers**

Agriculture workers are involved in labor-intensive practices exposed to a multitude of MSD risk factors (Fathallah, 2010). Study done by Fathallah et al. (2006) shown that MSD was associated with harvesting and the region most affected was the whole body, shoulder, hand/wrist, and lower back pain. MSD was frequently linked with farm work such as bending wrist forward or tilted back, squatting while doing work for lengthy period of time, working with heavy equipment, work with hand and wrist repeatedly, or work with tilted or bended neck (Luangwilai, Norkaew, & Siriwong, 2014). A previous study in Sakon Nakhon in Thailand found that

99.73% paddy farmers reported MSS which were thought to be due to their occupation (Pengseesang, 2012).

In Malaysia, work-related musculoskeletal problems (WRMP) among agriculture workers has been significantly ranked compared to other groups of occupation (Sukadarin *et* al., 2014). Mechanized system is hard to be introduced in agricultural sector due to the land surface condition, environmental factors, and opposition by farmers to accept new technology (Abdullah & Samah, 2013).

## 2.4 MSD risk factors

### 2.4.1 Occupational risk factors

The presence of injuries that occur in the agriculture sector is due to the exposure of the plantation workers to hazards that comes from their work activities which commonly occur on the field (Mohd Tamrin & Aumran, 2014). As such, plantation workers are at risk for developing MSS such back pain, joint pain, and repetitive stress injuries (Essen & Curdy, 1998).

The injuries that are caused by occupational risks factors are repetitive movement, high force, awkward joint posture, direct pressure, vibration, cold environment, and prolonged constrained posture (Koytcheva et al., 2008). According to Kirkhon *et al.* (2010), primary ergonomic risk factors involve excess force,

repetition, awkward posture and vibration and cold ambient temperatures and pressure points are secondary ergonomics risk factors.

The parts of the body that are most commonly affected are the neck and back, shoulders, wrists, hips, and knees. Work involving stoop posture is considered to be the most contributing factor to low back disorders and a major ergonomic hazard throughout agriculture, particularly fruit, vegetable and horticulture commodities (Fathallah, 2010).

Working tenure of 1 to 9 years were associated with MSS among palm oil mills worker (Shahmi, 2014). Another study done by (Inbaraj *et* al., 2013) among brick kiln workers reported that working tenure of more than 10 years work are significantly associated with acute knee pain and lower back pain. Similar results were found with other studies. Roy et al. (2008) showed that working tenure were significantly linked with musculoskeletal problem ($p<0.001$) among workers in papad-making industry, India. Almost 90.0% of musculoskeletal problem complaint was from workers that worked for more than 5 years.

### 2.4.2 Non occupational risk factors

Age is the most related risk factors with MSDs since it involves changes in the musculoskeletal system due to reduction in joint mobility, decrease in muscular strength and the decrease reaction and movement times (HSE, 2010). Increasing age was associated with reduced physical functioning independence of present of medical conditions or MSS (Wench et al., 2008). Physical abilities changes are related with ageing, however are also influenced by genetics of individual and lifestyle as well as the environment in which person work and live (Bunchman et al., 2007; Kenny et al., 2008). Generally, older age both for men and women have reported of high prevalence of MSS (Sukadarin et al., 2014).

BMI are an example of health determinants related with work-related musculoskeletal problem (Cote *et* al., 2009). BMI exceeding 25 $kg/m^2$ are considered as overweight and have been linked with the increase of the risk for MSS (Capodaglio *et* al., 2010; Ghaffari, 2007; Schulte *et* al., 2007). The risk of neck or shoulder disorder have also been associated with BMI (OR=2.5, 95% CI=0.8-7.7) after confounders are adjusted (Kao *et* al, 2009).

The number of hospitalizations due to injury linked with MSDs were significant among patients with low educational status (Layne & Pollack, 2008). Education plays a crucial role in managing workplace hazards. The educational level are significant risk factors of MSS in agricultural sectors (Meksawi *et* al., 2012; Park *et* al., 2010). Study by Gou *et* al., (2004) found that high education level was

associated with declined risk of MSD ($p<0.001$). It may be likely that those with lack of educational level were unaware the safe working practice (Gou *et* al., 2004).

Nag (2010) reported that married person was 5.5 times at increased risk for the occurrence of MSS than non-married persons among weaving industry workers in India. Besides, marital status has been shown as a significant risk factor for work-related musculoskeletal problem among widowed female based on higher intensity scores (Sukadarin *et* al., 2014).

## 2.5 Lifestyle factors

### 2.5.1 Smoking

People who smoke are prone to get MSS especially back pain due to the pharmacological effect of tobacco smoke by reducing the circulation of blood and flow nutrient to the tissue (Eeden et al., 2010). The association between smoker and low back pain were recognized early 1980s (Kauppila, 2009). There were various studies among agricultural workers where it was established that tobacco use will increase risk of MSD (Hartman *et* al., 2005; Holmberg, 2004; Shipp *et* al., 2007).

## 2.6 The instruments for Assessment of MSD

### 2.6.1 Standardized Nordic Questionnaire (SNQ)

The Standardized Nordic Questionnaire or SNQ is one method that has been developed under a project funded by the Nordic Ministers, with the purpose for screening of MSD in an ergonomics context and occupational healthcare services (Kourinka et al.,1987). The questionnaire consist of questions that asks about MSD experience of the respondents in their lifetime, the past 12 months, and the past 7 days. The body parts involved are neck, shoulder, upper and lower back, elbows, hand/wrists, waist/thighs, knees, and ankle/legs. In the original paper by Kourinka et al. (1987), the reliability of this questionnaire has been found to be acceptable to be used.

### 2.6.2 Hazard Identification, Risk Assessment, and Risk Control (HIRARC)

HIRARC is defined as Hazard Identification, Risk Assessment, and Risk Control which is universal method that used by Occupational Safety and Health practitioner in various industries. The aim of HIRARC is identify the hazard, in which all factors which may cause harm to employees and others at workplace. The risk was calculated depends to each hazard that has been identified; therefore it can ease the employer to plan, introduce, and monitor preventive measure to ensure that risk can be controlled at any time (DOSH, 2008).

### 2.6.3 Rapid Entire Body Assessment (REBA)

REBA was developed by Highnett and McAtamney (2000) as a one the way to assess risk and produce the overall risk score which counted all body parts (trunk, legs, neck, shoulders, arms and wrists). This assessment will produce the postural MSD risk level (Negligible, low, medium, high, and very high risk). The posture will be choosen based on: 1) the hardest postures and job tasks based on interview and observation. 2) The chosen posture are sustained for the longest period of time, or 3) the posture where the greatest energy loads occur (Middlesworth, 2013). Figure 2.1 shows the REBA worksheet for assessment.

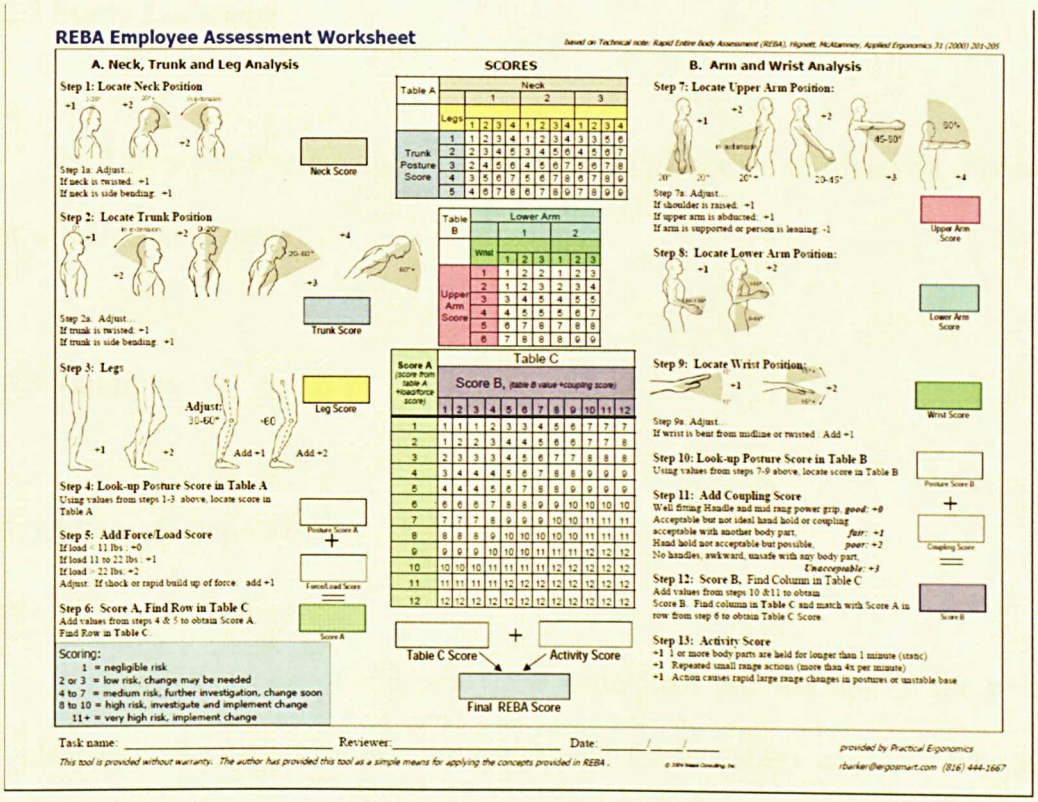


FIGURE 2.1: The REBA assessment worksheet (Highnett and McAtamney,2000)

# CHAPTER 3

# METHODOLOGY

## 3.1 Study Design

This study was classified as cross sectional study in which the disease and exposure will be assessed simultaneously in a point of time. This study was conducted from January to June 2016. The results of this study will give prevalence of MSS among pineapple plantation workers.

## 3.2 Study Location

This study was conducted at a pineapple plantation in Malaysia. Specifically it was located in Johor.

## 3.3 Sampling

### 3.3.1 Sample Population

The population of this study are males that are working in the pineapple plantation area. Workers that are considered for this study are those who worked full-time at the plantation. The workers are involved in a number of tasks related to

pineapple farming such as land preparation, cultivating, weeding, fertilizing, harvesting and pesticide spraying.

### 3.3.2 Sample Frame

The sampling frame of the workers were the workers; name lists obtained from the management of the pineapple plantation. The list consisted all the names of workers working at respective plantation area. The total of pineapple plantation workers had been selected to participate depends on the permission by the respective plantation management.

### 3.3.3 Sampling Unit

The pineapple plantation workers was selected as the sampling unit. Below are the selection criteria.

Inclusion criteria:

1. Malaysian
2. Male
3. Age 18- 60 years
4. Full time worker

Exclusion criteria:

1. Diagnosed worker that has chronic disease such as rheumatism

### 3.4 Sampling method

The sampling method for the respondent selection was via random sampling method where the respondent has been chosen based simple random sampling and fulfilling inclusive criteria.

### 3.5 Sample Size

The sample size was determined by using following formula (Lemeshow and Lwanga ,1999).

$$n = \frac{\left\{ z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)} \right\}^2}{(P_1-P_2)^2}$$

Where:

n = sample size

Z = Z statistic for a level confidence = 1.96

According to the previous study of MSS among oil palm plantation workers, the proportion of MSS is 0.93 (Ng *et*.al., 2014) and the proportion of MSS among automobile assembly line workers (0.78) (Amin *et*.al., 2008).

$P = (P_1 + P_2)/2$

$P_1$ : estimated proportion (larger) = 0.93

$P_2$ : estimated proportion (smaller) = 0.78

P = (0.93 + 0.78) / 2

= 0.857

therefore the sample size is

$$n = \frac{\left((1.96)\sqrt{(2)(0.857)(1-0.857)}+0.842\sqrt{(0.93)(1-0.93)+(0.78)(1-0.78)}\right)^2}{(0.93-0.78)^2}$$

**n = 84**

**Effect size,**

$ESp = \Phi_{1,} - \Phi_{2,}$

ESp = effect size proportion $\Phi_1, \Phi_2$ = arcsine transformation for proportion

ESp = 0.441

Referring to table value of ESp and power of study (80%) the sample size is 90 respondents.

**n = 90 respondents.**

An additional 20% of study population will include to overcome the problem of low response rate.

n = 90 + [ (20/100)* (90)]

**n = 108 workers**

### 3.6 Study Instruments

#### 3.6.1 Instruments

The instrumentation that will use in this study:

1. Study Questionnaire
2. HIRARC form
3. Rapid Entire Body Assessment Checklist (REBA)
4. SECA body meter and TANITA weighing scale

#### 3.6.1.1 Study Questionnaire

This questionnaire in this study consisted of a structured questionnaire of modified Nordic Musculoskeletal Symptoms questionnaire by (Kourinka *et* al., 1987). The structure questionnaire was given in the Malay language and consisted of six parts.

Part A asked briefly on sociodemographic distribution and individual factors such as general personal information on demographic background, age, education level, leisure activity, height, and weight (BMI).

Part B ask about the smoking information such years of smoking and how many cigarette per day.

Part C was asking about health information such health status, the current treatment and intake of any medication.

Part D asked briefly about the occupational information of workers such previous workplace and injury information including type of injury also body part affected in any previous accident of the worker. It also asked about the current workplace, job tenure and duration of working at current workplace.

In part E, the modified of Standardized Nordic Questionnaire (SNQ) by Kuorinka *et* al. (1987) was used to determine the prevalence of MSS. Additionally, the questionnaire also ask about obstruction in performing daily tasks and MSS experienced due to job tasks.

### 3.6.1.2 Hazard Identification, Risk assessment and Risk Control (HIRARC)

Hazard Identification, Risk Assessment and Risk Control (HIRARC) method (Dosh, 2008) was used to identify and assess ergonomic risks in job tasks performed by pineapple plantation workers. The job tasks which assessed were land preparation, cultivation, weeding, harvesting, fertilizing, and pesticide sprayer. The 108 respondents were involved in the HIRARC part of this study. The outcome of the HIRARC method in this study was the identification of high and medium risks for the tasks performed by the pineapple plantation workers.

### 3.6.1.3 Rapid Entire Body Assessment (REBA)

Rapid Entire Body Assessment or REBA is one of the ergonomic assessment methods adapted from Highnett and Mc Atamnet (2000) to evaluate the whole body posture risks associated with job tasks. The evaluation of risk were done based on video or picture recorded while workers were performing their work tasks. The risk level were determine based on REBA scores after data were analyzed using excel spreadsheet software developed by Cornell University Ergonomics Web (CUErgo) (2001).

### 3.6.1.4 Seca Body Meter and Tanita Weighing Scale

The Seca Body Meter was used to measure the height of the respondents. Tanita Weighing Scale was used to measure weight. The both measurement had been used to calculate the body mass index (BMI).

## 3.7 Data Collection Technique

The data collection for questionnaire had been done by face-to-face interview and were conducted in Malay language. Then, the HIRARC was performed to identify the risk levels according their work task. The evaluation of body postural risk were done among respondents using REBA.

### 3.8 Procedure of Data collection

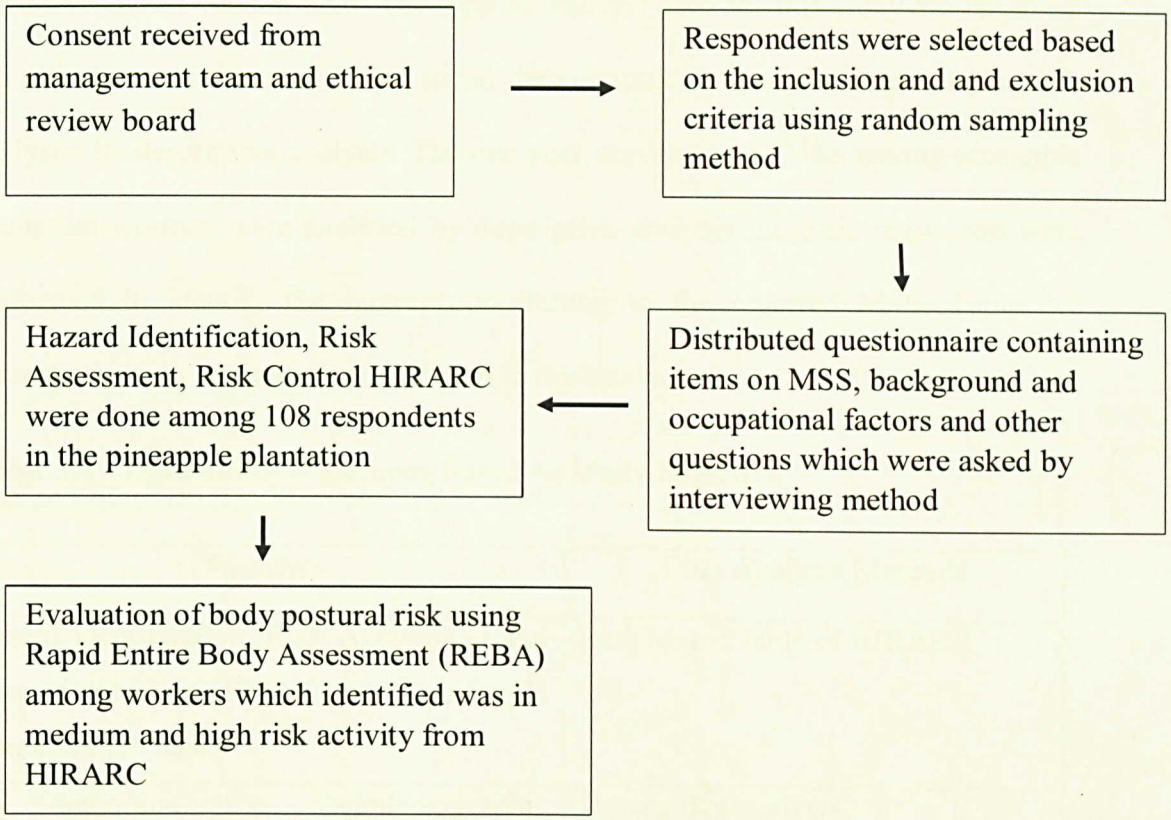


**Figure 3.1 Flowchart of data collection**

### 3.9 Statistical Analysis

The data obtained was analyzed by using IBM SPSS (Statistical Package for the Social Sciences) version 22.0. The type of analysis used for this study are based on the objectives of this study. The social demographic data of the respondents were analysed by descriptive analysis. The one year prevalence of MSS among pineapple plantation workers were analyzed by descriptive analysis. Logistic regression were performed to identify the factors contributing to the reported MSS. Table 3.1 presents the data analysis summary used in this study.

**Table 3.1 : Data analysis methods based on study objective**

| Objectives | Data Analysis Methods |
|---|---|
| Hazard identification, Risk Assessment and Risk Control (HIRARC) of pineapple plantation job task. | Risk Matrix table of HIRARC |
| To determine the sociodemographic distribution of the pineapple plantation workers | Descriptive analysis |
| To determine the prevalence of musculoskeletal symptoms (MSS) among pineapple plantation workers. | Descriptive analysis |
| To evaluate the whole body postural risk based on work task among the pineapple plantation workers | Descriptive analysis |
| To determine the relationship between non occupational factors factors with MSS among pineapple plantation workers | Chi – square test |

| | |
|---|---|
| The determine the relationship between occupational factors with MSS among pineapple plantation workers | Chi – square test |
| To determine the predictor of association of MSS with risk factors | Binary logistic regression |

### 3.10 Validity of Questionnaire

Validity contents of the questionnaire were done in the pre-testing of the questionnaire on 10% of the intended total number of sample size among workers that were working in the agriculture sector. The questionnaire was distributed to workers who were similar in characteristics with the intended respondents of this study. The pre-test were conducted among agricultural workers at Taman Pertanian Universiti, UPM. Any ambiguous terms found from the pre-test were identified and amended in order to help the respondents understand the questionnaire better

### 3.11 Reliability

The reliability of the questionnaire study was tested by using Cronbach's Alpha. It measured the internal consistency in a statistic and It is suitable for measure the internal consistency in scales where items have more than two response options (Adamson & Prion, 2013). The Cronbach's alpha can range from 0.0 to 1.0 which is quantifies the degree correlation with one another (Kausto et al., 2011). Theoritically the value of $\alpha$ is 0 means there is no correlation, when the value of $\alpha$ is 1 means the

perfect correlation. The average correlation is between 0.3 to 0.8 (Kottner & Streiner, 2010). The reliability of questionnaire used in this study was 0.85.

### 3.12 Quality Control

The quality control used in this study was back-to-back translation from English version to Malay version without changing the actual meaning of the questions. The respondents were interviewed by the researcher to avoid any misperception towards question in the questionnaire.

# CHAPTER 4

# RESULTS

## 4.1 Sociodemographic and occupational information

The response rate of this study was 100%. All 108 respondents in this study was Malaysian male with an average (mean±standard deviation) age of 43.0±7.4 years old. The workers had average BMI of 23.8±3.4. Almost all of the respondents (94.4%) were married and more than half of the respondents received educations up to secondary level (58.3%). Less than half of the respondents reported a history of current smoking (41.7%). Besides, about 56.6% the respondents were physically active during the times outside work.

The respondents in the pineapple plantation worked in several section which includes sections such as land preparation (12%), cultivation (25%), weeding (15.7%), fertilizer (11.1%), harvesting (19.1%) and pesticide spraying (16.7%). Overall the respondents had worked in the pineapple plantation for and average of 17.2±9.2 years. Majority of them worked for six to seven hours per day (71.3%) and quarter of them worked for more than 7 hours per day.

About 43.5% of the respondents had previous employment in various sectors before working in the pineapple plantation and one-fifth of them had worked at agricultural sector previously. None of the respondents reported any history of work

accident history at previous workplace. The information on sociodemographic background and occupational history of the pineapple plantation workers are presented in Table 4.1.

**Table 4.1 Frequency distribution of sociodemographic characteristics and occupational information of respondents**

| Variables | | N=108 | | Mean(± SD) |
|---|---|---|---|---|
| | | Frequency | Percent (%) | |
| Age (Years) | < 37 | 24 | 22.2 | 43.0±7.4 |
| | 37-44 | 32 | 29.6 | |
| | > 44 | 52 | 48.1 | |
| Ethnicity | Malay | 106 | 98.1 | |
| | Chinese | 2 | 1.9 | |
| | Indian | 0 | 0 | |
| | Others | 0 | 0 | |
| BMI | Underweight | 3 | 2.8 | 23.8±3.4 |
| | Normal | 69 | 63.9 | |
| | Overweight | 31 | 28.7 | |
| | Obese | 5 | 4.6 | |
| Marital Status | Single | 6 | 5.6 | |
| | Married | 102 | 94.4 | |
| | Divorce | 0 | 0 | |
| Education Level | Primary | 43 | 39.8 | |
| | Secondary | 63 | 58.3 | |
| | College/university | 2 | 1.9 | |
| Smoking | Yes | 45 | 41.7 | |
| | No | 63 | 58.3 | |
| Hobby | Active | 61 | 56.5 | |
| | Non active | 47 | 43.5 | |
| Type of activity | Sports | 30 | 27.8 | |

| Variables | | N=108 Frequency | Percent (%) | Mean(± SD) |
|---|---|---|---|---|
| | (Football, cycling, badminton etc) | | | |
| | Farming | 30 | 27.8 | |
| | Fishing | 34 | 31.5 | |
| | Reading | 14 | 13.0 | |
| Work task in pineapple plantation | Cultivate | 27 | 25.0 | |
| | Weeding | 17 | 15.7 | |
| | Fertilizer | 12 | 11.1 | |
| | Harvesting | 21 | 19.4 | |
| | Pesticide spraying | 18 | 16.7 | |
| Years of working (year) | <10 | 25 | 23.1 | |
| | 10-25 | 52.8 | 52.8 | |
| | >25 | 26 | 24.1 | |
| Working hour at plantation (per day) | <6 | 5 | 4.6 | |
| | 6-7 | 77 | 71.3 | |
| | >7 | 26 | 24.1 | |
| Previous employment | Yes | 47 | 43.5 | |
| | No | 61 | 56.5 | |
| Years of working at previous workplace (Year) | <3 | 12 | 11.1 | |
| | 3-8 | 35 | 32.4 | |
| Types of work at previous workplace | Agriculture | 19 | 17.6 | |
| | Restaurant and catering | 3 | 2.8 | |
| | Factory | 10 | 9.3 | |
| | Storekeeper | 4 | 3.7 | |
| | Mechanic | 5 | 4.6 | |
| | Construction | 6 | 5.6 | |

| Variables | | N=108 | | Mean(± SD) |
|---|---|---|---|---|
| | | Frequency | Percent (%) | |
| Accident at previous workplace | Yes | 0 | 0 | |
| | No | 108 | 100 | |

N = frequency

SD = standard deviation

### 4.2 Prevalence of Musculoskeletal symptoms (MSS)

#### 4.2.1 Prevalence MSS among pineapple plantation workers

Based on Nordic questionnaire results, overall prevalence of MSS among respondents who reported discomfort or pain at any body part was 87.0 %. There was 80.6% of them who complained of MSS in 2 to 5 part of the body. Moreover, the most affected region of body part by MSS were lower back (64.8%), feet and ankle (53.7%), and knee (52.8%).MSS were also reported for shoulder (38.0%), wrist (20.4%), neck (13.0%), hips and thigh (11.1%), and upper back (9.3%). The percentage of workers who complaint MSS on two to five body parts as high as 80.6%. This indicated that the MSS were common among pineapple plantation workers. The result percentage MSS among respondents are tabulated in the Table 4.2

**Table 4.2 Percentage MSS among respondents**

| Variables | | N=108 | |
|---|---|---|---|
| | | Frequency | Percent (%) |
| MSS overall | Yes | 94 | 87.0 |
| | No | 14 | 13.0 |
| Symptoms at body part | No body part | 13 | 12.0 |
| | Only one body part | 8 | 7.4 |
| | 2-5 body parts | 87 | 80.6 |
| | >5 body parts | 0 | 0 |
| Lower back | Yes | 70 | 64.8 |
| | No | 38 | 35.2 |
| Feet/ankle | Yes | 58 | 53.7 |
| | No | 50 | 46.3 |
| Knee | Yes | 57 | 52.8 |
| | No | 51 | 47.2 |
| Shoulder | Yes | 41 | 38.0 |
| | No | 67 | 62.0 |
| Wrist | Yes | 22 | 20.4 |
| | No | 86 | 79.6 |
| Neck | Yes | 14 | 13.0 |
| | No | 94 | 87.0 |
| Hips/thigh | Yes | 12 | 11.1 |
| | No | 96 | 88.9 |
| Upper back | Yes | 10 | 9.3 |
| | No | 98 | 90.7 |

**4.3 Hazard Identification, Risk assessment and Risk Control (HIRARC) on ergonomic risk in pineapple plantation work task.**

Based on the HIRARC outcome, tasks involving land preparation work indicated the risk rating of 6, which is categorized as medium risk in HIRARC guidelines provided by DOSH (2008). This work task requires the worker to make small holes within the depth of 10 – 15 cm into the ground using a dibble. This work task involved postures that need worker to bend their trunk forward in repetitive motion in order to make a hole on the ground with fast movements using the dibble.

On the other hand, cultivation work requires workers to bend while standing in order to plant young pineapple trees called sucker into a hole on the ground. This work task involves awkward posture and constant bending of trunk more than 60 degrees and twisting of the risk and deviation from neutral position. The risk level of cultivation was categorized as medium with a risk rating level of 8. Manual weeding work task obtained a higher risk rating of 10 and was categorized as medium risk. This work task involve constant bending of body trunk more than 60 degrees while removing weed manually by hand. There is also twisting at certain body part such neck, hand and wrist.

Similarly, harvesting work task was also categorized as medium risk. The pineapple harvester needs to carry the knapsack basket at their back while collecting pineapple fruits. The full loads they were carried was 50 to 70 kg for each session of pineapple fruits collecting and this will go on for more than 4 hours of their day. It

involves awkward posture of the trunk and area forceful exertion while performing task using shoulder, arm, wrist and hand.

Other tasks such as manual fertilizing and pesticide spraying were indicated as low risk. The manual fertilizing involved repetitive movement of shoulder throughout their working hours. The postural risk of body part was at the wrist area as it was twisted while the task was being performed. Pesticide spraying was performed using knapsack sprayer that weight 20 kg in order to prevent crops from being infected with diseases. The details of HIRARC was shown in Table 4.3

*Table 4.3 HIRARC in pineapple plantation*

| 1. HAZARD IDENTIFICATION | | | | 2. RISK ANALYSIS | | | | 3.RISK CONTROL |
|---|---|---|---|---|---|---|---|---|
| NO | ACTIVITY | HAZARD | EFFECT | EXISTING RISK CONTROL | LIKELIHOOD | SEVERITY | RISK | RECOMMENDED CONTROL MEASURE |
| 1 | **Land preparation** | **Make small holes in depths of 10 – 15 cm using a dibble.**<br><br>Forward bending of trunk 10° – 20°<br><br>Repetitively hand motion in making hole more 20 times per minute<br><br>Working on soft ground (peat soil) | Excess fatigue<br><br>Lower back pain<br><br>Repetitive strain injuries<br><br>Knee and feet pain | | 3 | 2 | 6 (medium) | Providing additional resting break |
| 2 | **Cultivation** | **Planting young sucker of pineapple into holes on the ground**<br><br>Constant bending of trunk more than 60° along working hours (more than 4 hour per day) | Low back pain<br><br>Fatigue | | 4 | 2 | 8 (medium) | Provide additional resting break<br><br>Do the stretching exercise |

| 1. HAZARD IDENTIFICATION | | | | 2. RISK ANALYSIS | | | | 3.RISK CONTROL |
|---|---|---|---|---|---|---|---|---|
| NO | ACTIVITY | HAZARD | EFFECT | EXISTING RISK CONTROL | LIKELIHOOD | SEVERITY | RISK | RECOMMENDED CONTROL MEASURE |
| | | Deviation and twisting of wrist from neutral position repetitively (more than 20 times per minute)<br><br>Working on soft ground (peat soil) | Repetitive strain injuries<br><br>Knee and feet pain | | | | | |
| 3 | **Fertilizer (hand broadcast)** | **Sprinkle fertilizer manually with hand**<br><br>Repetitive motion of hand (more than 20 times per minutes)<br><br>Working on soft ground (peat soil) | Low back pain<br><br>fatigue<br><br>Shoulder pain<br><br>Knee and feet pain | | 2 | 2 | 4 (Low) | Providing additional resting break<br><br>Doing the stretching exercise |
| 4 | **Weed control** | **Manually remove weed with hands**<br><br>Prolong standing and bending alternately of | Low back pain<br><br>fatigue | | 5 | 2 | 10 (medium) | Increase the number of employees assigned to work task |

| 1. HAZARD IDENTIFICATION | | | | 2. RISK ANALYSIS | | | | 3.RISK CONTROL |
|---|---|---|---|---|---|---|---|---|
| NO | ACTIVITY | HAZARD | EFFECT | EXISTING RISK CONTROL | LIKELIHOOD | SEVERITY | RISK | RECOMMENDED CONTROL MEASURE |
| | | trunk more than 60° along working hours (more than 4 hour per day)<br><br>Deviation and twisting of wrist from neutral position repetitively (more than 20 times per minute)<br><br>Working on the soft ground (peat soil) | Knee and tight pain | | | | | |
| 5 | **Harvesting** | **Collecting pineapple using knapsack basket at the back**<br><br>Carry heavy load along working hours (50 to 70 kilogram per session)<br><br>Forceful exertions of shoulder, arm, wrist, and trunk. | Low back pain and knee pain<br><br>excess fatigue<br><br>shoulder pain and lower back pain | | 5 | 2 | 10 (medium) | Providing additional resting break<br><br>Periodically rotating workers to less stressful jobs |

| 1. HAZARD IDENTIFICATION | | | | 2. RISK ANALYSIS | | | | 3.RISK CONTROL |
|---|---|---|---|---|---|---|---|---|
| **NO** | **ACTIVITY** | **HAZARD** | **EFFECT** | **EXISTING RISK CONTROL** | **LIKELIHOOD** | **SEVERITY** | **RISK** | **RECOMMENDED CONTROL MEASURE** |
| | | Moderately flexion of trunk according to load (20°-60°)<br><br>Excessive bending during unloading the pineapple to the ground (more than 60°)<br><br>Deviation and twisting of wrist from neutral position repetitively (more than 20 times per minute)<br><br>Working on soft ground (peat soil) | Repetitive strain injuries<br><br>Knee and feet pain | | | | | Reduce the load at the back by reducing the total of pineapple |
| **6** | **Pesticide spraying** | **Manually spraying of pesticide using knapsack sprayer**<br><br>Carrying load at the back along working hours | Shoulder pain<br><br>Lower back pain<br><br>Repetitive | | 2 | 2 | 4 (Low) | Providing additional resting break |

| 1. HAZARD IDENTIFICATION | | | | 2. RISK ANALYSIS | | | | 3.RISK CONTROL |
|---|---|---|---|---|---|---|---|---|
| **NO** | **ACTIVITY** | **HAZARD** | **EFFECT** | **EXISTING RISK CONTROL** | **LIKELIHOOD** | **SEVERITY** | **RISK** | **RECOMMENDED CONTROL MEASURE** |
| | | (20 kilogram)<br><br>Repetitive hand flexion (more than 20 times per minutes)<br><br>Working on soft ground (peat soil) | strain injury | | | | | |

### 4.4 Evaluation body postural risk based on work task in pineapple plantation

Rapid Entire Body assessment (REBA) was done among 78 workers in the pineapple plantation farm to determine their postural risk level associated with work tasks. The result shows the workers fall into medium, high and very high risk with correspondence to REBA scores range 4 to 7, 8 to 10 and more than 10 respectively. The result distribution of postural body risks among pineapple plantation workers shown in the Table 4.4.

**Table 4.4 the distribution of postural body risks among pineapple plantation work**

| Work task | Frequency (n) | Postural body risk (REBA Scores) | | | | |
|---|---|---|---|---|---|---|
| | | Negligible risk (1) (%) | Low risk (2-3) (%) | Medium risk (4-7) (%) | High risk (8-10) (%) | Very high risk (>10) (%) |
| **Land preparation** | 13 | 0 | 0 | 0 | 38.5 | 61.5 |
| **Cultivation** | 27 | 0 | 0 | 11.1 | 85.2 | 3.7 |
| **Weeding** | 17 | 0 | 0 | 17.6 | 58.8 | 23.5 |
| **Harvesting** | 21 | 0 | 0 | 0 | 23.8 | 76.2 |

N = 78

### 4.5 Association between MSS with occupational and non-occupational risk factors

Chi-square test were done to determine whether the risk for occupational and non-occupational factors were significantly associated with one year prevalence of MSS as reported by the pineapple plantation workers. The occupational risk factors tested includes history of working at previous workplace before entering pineapple plantation, years of working at pineapple plantation, and working hours at plantation. The risk factor from non-occupational were tested including age, BMI, marital status, educational level, hobby and smoking. The result of association between MSS with occupational and non-occupational risk factors were shown in Table 3.5 and Table 3.6.

***Table 4.5 Association between MSS with occupational risk factors among respondents***

| Occupational factors | | Lower back N (%) | | | | | | Feet/ankle N (%) | | | | | | Knee N (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | | Yes | | $\chi^2$ | P value* | No | | Yes | | $\chi^2$ | P value* | No | | Yes | | $\chi^2$ | P value* |
| | | N | % | N | % | | | N | % | N | % | | | N | % | N | % | | |
| Work task in pineapple plantation | Land preparation | 2 | 5.3 | 11 | 15.7 | 10.77 | 0.056 | 6 | 12.0 | 7 | 12.1 | 7.11 | 0.213 | 4 | 7.8 | 9 | 15.8 | 9.99 | 0.076 |
| | Cultivate | 11 | 28.9 | 16 | 22.9 | | | 13 | 26.0 | 14 | 24.1 | | | 17 | 33.3 | 10 | 17.5 | | |
| | Weeding | 5 | 13.2 | 12 | 17.1 | | | 6 | 12.0 | 11 | 19.0 | | | 6 | 11.8 | 11 | 19.3 | | |
| | Fertilizer | 5 | 13.2 | 7 | 10 | | | 8 | 16.0 | 4 | 6.9 | | | 7 | 13.7 | 5 | 8.8 | | |
| | Harvesting | 4 | 10.5 | 17 | 24.3 | | | 6 | 12.0 | 15 | 25.9 | | | 6 | 11.8 | 15 | 26.3 | | |
| | Pesticide spraying | 11 | 28.9 | 7 | 10 | | | 11 | 22.0 | 7 | 12.1 | | | 11 | 21.6 | 7 | 12.3 | | |
| Years of working at plantation (Year) | <10 | 16 | 42.1 | 9 | 12.9 | 12.04 | 0.002* | 17 | 34.0 | 8 | 13.8 | 15.21 | 0.001* | 17 | 33.3 | 8 | 14.0 | 5.73 | 0.057 |
| | 10 – 25 | 16 | 42.1 | 41 | 58.6 | | | 29 | 58.0 | 28 | 48.3 | | | 24 | 47.1 | 33 | 57.9 | | |
| | >25 | 6 | 15.8 | 20 | 28.6 | | | 4 | 8.0 | 22 | 37.9 | | | 10 | 19.6 | 16 | 28.1 | | |

N = frequency
*Statistically significant when $p<0.05$
*Statistically significant when $p<0.001$
[1]Statistical test-Fisher exact Test

| Occupational factors | | Lower back N (%) | | | | | | Feet/ankle N (%) | | | | | | Knee N (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* |
| | | N | % | N | % | | | N | % | N | % | | | N | % | N | % | | |
| Working hours at plantation (Hour) | <6 | 4 | 10.5 | 1 | 1.4 | 9.36[I] | 0.009* | 2 | 4.0 | 3 | 5.2 | 1.01[I] | 0.603 | 4 | 7.8 | 1 | 1.8 | 3.95[I] | 0.139 |
| | 6-7 | 30 | 78.9 | 47 | 57.1 | | | 38 | 76.0 | 39 | 67.2 | | | 38 | 74.5 | 39 | 68.4 | | |
| | >7 | 4 | 10.5 | 22 | 31.4 | | | 10 | 20.0 | 16 | 27.6 | | | 9 | 17.6 | 17 | 27.8 | | |
| History working at Previous workplace | No | 22 | 57.9 | 31 | 44.3 | 0.05 | 0.827 | 30 | 60.0 | 31 | 53.4 | 0.47 | 0.493 | 31 | 60.8 | 20 | 39.2 | 0.73 | 0.394 |
| | Yes | 16 | 42.1 | 39 | 55.7 | | | 20 | 40.0 | 27 | 46.6 | | | 30 | 52.6 | 27 | 47.4 | | |

N = frequency
*Statistically significant when p<0.05
*Statistically significant when p<0.001
[I]Statistical test-Fisher exact Test

**Table 4.6 Association between MSS and non-occupational risk factors among respondents**

| Non-occupational factors | | Lower back N (%) | | | | | | Feet/ankle N (%) | | | | | | Knee N (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* |
| | | N | % | N | % | | | N | % | N | % | | | N | % | N | % | | |
| Age (year) | <37 | 14 | 36.8 | 10 | 14.3 | 7.26 | 0.027* | 18 | 36.0 | 6 | 10.3 | 13.17 | 0.001* | 18 | 35.3 | 6 | 10.5 | 10.89 | 0.04* |
| | 37 - 44 | 9 | 23.7 | 23 | 32.9 | | | 16 | 32.0 | 16 | 27.6 | | | 10 | 19.6 | 22 | 38.6 | | |
| | >44 | 15 | 39.5 | 37 | 52.9 | | | 16 | 32.0 | 36 | 62.1 | | | 23 | 45.1 | 29 | 50.9 | | |
| BMI | Underweight | 3 | 7.9 | 0 | 0 | 7.50[1] | 0.058 | 2 | 4.0 | 1 | 1.7 | 5.55 | 0.135 | 3 | 5.9 | 0 | 0 | 5.949 | 0.114 |
| | Normal | 23 | 60.5 | 46 | 65.7 | | | 36 | 72.0 | 33 | 56.9 | | | 30 | 58.8 | 39 | 68.4 | | |
| | Overweight | 9 | 23.7 | 22 | 31.4 | | | 9 | 18.0 | 22 | 37.9 | | | 14 | 27.5 | 17 | 29.8 | | |
| | Obese | 3 | 7.9 | 2 | 2.9 | | | 3 | 6.0 | 2 | 3.4 | | | 4 | 7.8 | 1 | 1.8 | | |
| Marital status | Single | 3 | 4.3 | 3 | 7.9 | 0.61[1] | 0.434 | 2 | 4.0 | 4 | 6.9 | 0.43[1] | 0.512 | 3 | 5.9 | 3 | 5.3 | 0.02[1] | 0.888 |
| | Married | 35 | 92.1 | 67 | 95.7 | | | 48 | 96.0 | 54 | 93.1 | | | 48 | 94.1 | 54 | 94.7 | | |

N = frequency
*Statistically significant when p<0.05
*Statistically significant when p<0.001
[1]Statistical test-Fisher exact Test

| Non-occupational factors | | Lower back N (%) | | | | | | Feet/ankle N (%) | | | | | | Knee N (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* | No | | Yes | | □² | P value* |
| | | N | % | N | % | | | N | % | N | % | | | N | % | N | % | | |
| Educational level | Primary | 14 | 36.8 | 29 | 41.4 | 0.37 | 0.831 | 29 | 58.0 | 32 | 55.2 | 4.26[1] | 0.119 | 21 | 42.1 | 22 | 38.6 | 1.84[1] | 0.399 |
| | Secondary | 23 | 60.5 | 40 | 57.1 | | | 32 | 64.0 | 31 | 53.4 | | | 30 | 58.8 | 33 | 57.9 | | |
| | College | 1 | 1.4 | 1 | 2.6 | | | 2 | 4.0 | 0 | 0 | | | 0 | 0 | 2 | 3.5 | | |
| Hobby | Active | 21 | 55.3 | 40 | 57.1 | 0.04 | 0.851 | 29 | 58.0 | 32 | 55.2 | 0.09 | 0.768 | 25 | 49.0 | 36 | 63.2 | 2.189 | 0.139 |
| | Non-active | 17 | 44.7 | 30 | 42.9 | | | 21 | 24.0 | 26 | 44.8 | | | 26 | 51.0 | 21 | 36.8 | | |
| Smoking | Yes | 44 | 62.9 | 26 | 37.1 | 1.68 | 0.196 | 21 | 42.0 | 24 | 41.4 | 0.00 | 0.948 | 23 | 45.1 | 22 | 38.6 | 0.47 | 0.494 |
| | No | 19 | 50.0 | 19 | 50.0 | | | 29 | 58.0 | 34 | 58.6 | | | 28 | 54.9 | 35 | 61.4 | | |

N = frequency
*Statistically significant when p<0.05
*Statistically significant when p<0.001
[1]Statistical test-Fisher exact Test

## 4.6 Logistic Regression Analysis

The risk factors for MSS which were found statistically associated with MSS includes age, years of working at plantation and working hours at plantation were further analyzed using logistic regression analysis to identify its link with reported MSS. The results shown that pineapple plantation workers who reported working tenure of 10 to 25 years were experienced of MSS at lower back area (Odd ratio, OR: 3.90(95% Confidence Interval, CI 1.05 to 14.4) more compared to workers that working less than 10 years. Besides, for workers that working more than 25 years more likely to experience MSS at the lower back area (OR: 7.45(95% CI 1.26 to 44.0) times compared to workers who had less working tenure than that respectively. Workers who had working hours less than 6 hour has (OR: 0.34(95% CI 0.02 to 0.55) likely to experienced lower back MSS. Moreover, workers that working between 6 to 7 hour per day more likely to experience MSS at the lower back (OR: 0.21 (95% CI 0.58 to 0.79) compared to workers that worked more hour than that. Table 4.8 showed logistic regression analysis for predictor of association between MSS and risk factors.

*Table 4.7 Logistic regression Analysis for predictor of association between MSS and risk factors*

| Variables | | Lower back | | | | Feet/ankle | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Odd Ratio (OR) | 95% of Confidence Interval | | p-value* | Odd Ratio (OR) | 95% of Confidence Interval | | p-value* |
| | | | Lower | Upper | | | Lower | Upper | |
| Age (Years) | <37 | 1.00 | - | | - | 1.00 | | - | - |
| | 37 - 44 | 2.12 | 0.55 | 8.10 | 0.27 | 2.77 | 0.80 | 9.64 | 0.11 |
| | >44 | 1.49 | 0.35 | 6.29 | 0.59 | 3.10 | 0.77 | 12.6 | 0.11 |
| Years of working at plantation (Year) | <10 | 1.00 | | | | 1.00 | | | |
| | 10 – 25 | 3.90 | 1.05 | 14.4 | 0.04* | 1.22 | 0.37 | 3.95 | 0.75 |
| | >25 | 7.45 | 1.26 | 44.0 | 0.03* | 5.69 | 1.00 | 32.3 | 0.05 |
| Working hours at plantation (Hour) | <6 | 0.34 | 0.02 | 0.55 | 0.02* | - | | - | - |
| | 6-7 | 0.21 | 0.58 | 0.79 | 0.02* | - | | - | - |
| | >7 | 1.00 | | | | - | - | | - |

*Statistically significant when P<0.05 level
1.00 as reference indicator

# CHAPTER 5

# DISCUSSIONS

## 5.1 Distribution of MSS among pineapple plantation workers

The finding of MSS in this study was high and comparable with other studies. Vasanth *et al.* (2015) recorded the prevalence of MSS among workers at tea plantation in India to be 83.6%. Other studies with different working population also indicated high prevalence of MSS, Rampal et al. (2004) showed the prevalence MSS is 80.0% among semiconductor workers in peninsular Malaysia.

These studies indicates the MSS as one of the major occupational health problem in various occupational settings. The higher prevalence of MSS reflects high burden of the disease in the agriculture sector which may impose a significant direct or indirect impacts on costs also affect the quality of work (Piedrahita, 2006). A study by Gupta (2013), found that farmers was exposed to various dangerous situations like excessive bending, twisting, kneeling carrying load, squatting, static and awkward stoop postures, repetitive and monotonous work. These was the risk factors which contributes to the various MSDs.

MSS at the lower back (64.8%) was most prevalent among workers. This is in line with the other study conducted among oil palm harvester reported of (61%) experienced lower back MSS (Ng and Shamsul, 2014). In addition, the prevalence of MSS at the lower back among farmers of Kanpur, a district of rural India was 60% (Gupta, 2013). Workers in the present study are exposed to heavy lifting of basket fashioned into a knapsack on their back during the collecting of pineapple fruits during harvesting process. Besides, the workers had to perform excessive bending during cultivation of shoot and manual weeding process.

Reported MSS at the feet and ankle part of the body was the second highest prevalence of symptoms (53.7%). The prevalence is higher compared to the study by Ng and Shamsul (2014) which reported MSS at the similar part of body (21%) among oil palm plantation harvester. In present study, pineapple trees were planted on peat soil that causes the workers to work on unstable base of land.

The workers also had verbally reported that unstable base of land causes them to easily fall and get injuries. The risk of slipping, tripping and falling of famers working on uneven field have been reported to contribute to MSS (Gupta, 2013). The work task like harvesting of pineapples demand high physical exertion, as it requires workers to walk and collect pineapples and placing the fruits into the basket knapsack on their back until the basket full to the brim. Harvesting process also exerts higher forces on the feet and ankle area due to walking with heavy load on soft ground.

MSS at the knee region had the third highest prevalence of the overall body parts (52.8%). This prevalence was higher compared to the study from different agriculture sectors such among oil palm harvester that recorded the prevalence at knee the region to be (44%) (Ng and Shamsul, 2014). Moreover, the study by Gupta (2013) showed prevalence of knee MSS was (39%) among farmers in Kanpur, India. In the pineapple plantation, the workers were exposed to work tasks that involves forward bending, heavy lifting and carrying. In addition, they were working on peat soil. The workers complained of pain at the knee region when doing job tasks such as harvesting, weeding and cultivation.

## 5.2 Evaluation of body postural risk in pineapple plantation

Awkward posture were found in almost all the working process performed by workers in the pineapple plantation. Working in extreme and awkward posture causes workers to have more exertion that which ultimately leads to overusing and tiredness of muscle (Shahmi, 2014).

In the outcome of the REBA exercise, the scores indicate the actions to be taken for improvement. According to Hignett and Atamney (2000), for work activities fall into medium postural risks, further investigation is needed, and change must be implemented soon. The activities with high postural risk, immediate investigation and implementation of changes is needed, while for work activities categorized to very high postural risk, change must be implemented immediately without any investigation. The present study were indicated that harvesting and land

preparation work task was needed change to be immediately implementation. It can be explained by the nature of their job task that required workers to work in awkward posture most of the time. Besides, these two work task also need workers to deal with manual handling tool which repetitively used of same muscle groups and joints along their working hour. A study by Ghasemkhani et al., (2006) explained the repetitive movements with awkward postures cause physical injury involving same joints and muscle groups moving in the same motion very often and quickly for long duration of time.

## 5.3 Association between MSS with occupational and non-occupational risk factors

Based on the logistic regression analysis, the result showed there was significant association between lower back MSS with workers that working 10 to 25 years and working more than 25 years at $p<0.05$. The majority of the workers in the pineapple plantation studied had working tenure more than 10 years and up to 35 years. Most of the respondents verbally reported that they were working in the pineapple plantation at an early age.

Furthermore, the workers in the pineapple plantation have low turnover as the workers have been working for many years. Due to manual handling task, they exposed to various physical activity that give exertion to their muscle and skeletal system during conducting of work. The same fibres of a muscle in a body part will activated if the workers often do repeating job task which caused internal tolerance of tissues exceeded and accumulate resulted from exposure to long duration of

exertion (Radwin *et* al., 2001). This finding was supported by the other study by Park *et* al., (2010) found that higher working tenure were influencing on the occurrence of the musculoskeletal disease among shipyard workers.

Besides, job duration of workers that work less than six hours per day and between six to seven hours per day were significantly associated with lower back MSS with $p<0.05$. This condition may due to the nature job task in the pineapple plantation that still uses of traditional tools and most of the work demands high energy usage. It might be that pineapple plantation workers experienced lower back MSS due to the physical demand in conducting work task even though the job task were done during work which is less than 6 hours.

However, in the pineapple plantation studied, the working hours of pineapple plantation workers were given consideration by their management because the workers were exposed to harsh environment conditions such as direct sunlight. They started working early in the morning at 7 am and can have a rest at 11 am. Then, they will continue to work from 2 pm to 4.30 pm. In addition, the workers can take a short break around 10 to 20 minutes and then continue their works thereafters.

Other occupational risk factors in the pineapple plantation, which are specific work tasks, did not show any significant association with MSS. This can be explained by the fact that nearly all work tasks studied in the pineapple plantation were classified medium risk according to the HIRARC performed and requires a suitable approach to control the risk to the workers in pineapple plantation. The

workers in pineapple plantation have verbally reported to have general task training and are experienced in their job task but did not received any specific training in safe manual handling or correct body postures according to their work task.

Generally, there is no standard knapsack basket for pineapple plantation workers used during harvesting process. Different workers have different of knapsack basket pattern and some of the workers modified the basket to increase the loads depending on their body ability to carry loads during the collection of fruits. The minimum weight full knapsack basket with fruits was 50 kilograms and if modified the basket can carry up to 70 kilogram. Based on the NIOSH Lifting Equations (2016) recommended weight limit for manually lifting work task was 23kg. The condition of MSS could be worsen during the process of unloading the pineapple to the ground and workers need to bend their body excessively.

Moreover, the logistic regression analysis showed that non-occupational risk factor did not show any significant association of age with MSS. One of the possible reason because, in the pineapple plantation studied there flexible of resting breaks for workers. The management did not put any specific schedule for workers to follow and they can take a rest when they are tired and can continue their work later. By doing this, age has become a non-predictor of MSS in the studied population. However, other study indicated that increasing age was associated with MSS. A study by Enghlom *et al.* (2005) the reported that prevalence of MSS was increased strongly by age. The study by (Weigel *et al.*, 2014) showed capacity of

musculoskeletal farmworkers declined as much as 25% between the age of 30 to 65 years with the most rapid period of reduction starting at the age of 45 years old.

This study has some limitation, the finding was limited to workers of one pineapple plantation studied only. The result cannot be generalized to other pineapple plantation in Malaysia. In addition, this was a cross-sectional study in design where the association between risk factors and MSS at a particular point in time could be determined. However, a cause and effect relationship of MSS could not be recognized. No causality can be demonstrated since both the dependent and independent variables are being measured at the same time.

# CHAPTER 6

## CONCLUSION AND RECOMMENDATIONS

This study concluded that one year MSS prevalence was 87.0% among pineapple plantation workers with low back, feet/ankle and knee as the most reported body part affected with MSS. Body postural risk found that harvesting work was the highest risk level of work task compared to others. Meanwhile, working tenure of 10 to 25 years and more than 25 years at plantation and working hour at plantation of less than 6 hours per day and 6 to 7 hours per day were found to be significantly associated with the reporting of lower back MSS. The workers claimed that, high MSS experienced on the body region was due to awkward body posture, excessive force used and working on the soft ground.

There are less of machinery tool used in this agricultural sector and the workers manually did most of the works. In addition, there are still less study focusing on the ergonomic risks for pineapple plantation job tasks as compared to other agricultural sector such oil palm plantation. As an example, oil palm plantation research includes the designing of a chisel as a harvesting tool for reducing ergonomic risk among workers (Md Yusoff, Mohd Tamrin, Yee Guan, Mat Said, & Mori, 2014). For recommendation, there is need of automated engineering control method to be in places to reduce ergonomic risks such innovative design of modified knapsack basket among harvester to prevent excessive bending more than 60° during the unloading of pineapple onto the ground. Besides, the administrative control such

training focusing on ergonomic risk are needed. This can be essential to help workers to do their work in proper way. It is also recommended that future research provide medical data (secondary data) on MSD to be included to support the self-reported MSS data.

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## FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

### 1. STUDY TITLE :

**Prevalence of Musculoskeletal Symptoms in Pineapple plantation workers at Pontian,Johor**

### 2. INTRODUCTION:

**Malaysia is one of the country that exporting pineapple in the world. Cultivation of pineapple fruit at a large scale located at south Malaysia in Johor. This study to identify the musculoskeletal symptoms among pineapple plantation workers. The effect of musculoskeletal symptoms which may decrease the workers production and health problem to the worker itself.**

### 3. WHAT WILL YOU HAVE TO DO?

**You need answering questionaire based on interview that will be distribute as to get the information on individual factor, duration of working and awkward posture during working. The video recording will be taking at least 20 minutes during your working process to be used as a material for observation in the analysis process.**

### 4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

**Female pregnant workers and workers that already diagnosed of chronic disease such rheumatism arthritis.**

### 5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

**This study will assess if there have risk on musculoskeletal symptoms while doing work task. It will help to increase of your health status.**

(b) TO THE INVESTIGATOR?

**It will help the investigator to determine the prevalence and risk factor of musculoskeletal symptoms among workers in pineapple plantation workers.**

I ..... Identity Card No. .....
address.....
.....hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

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

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

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

* delete where necessary

Signature .....
(Respondent)

Date :.....

Signature .....
(Witness)

Name :.....

I/C No. :.....

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

Date .....

Signature .....
(Researcher)

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SELANGOR, MALAYSIA

## BORANG B1: PENERANGAN DAN PERSETUJUAN RESPONDEN

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

### 1.TAJUK KAJIAN

**Prevalens Gejala Gangguan Otot Rangka dan Faktor-Faktor Risiko Berkaitan Dalam Kalangan Pekerja Ladang Nenas di Pontian, Johor**

### 2. PENGENALAN

Negara Malaysia merupakan antara salah sebuah negara pengeksport buah nenas di dunia. Penanaman buah nenas yang secara meluasnya di selatan tanah air seperti di Johor. Kajian ini ingin mengenalpasti gangguan otot rangka kepada pekerja di ladang nenas. Kesan daripada gejala otot rangka ini adalah kemerosotan dari segi produktiviti serta masalah kesihatan kepada individu terbabit.

### 3. APAKAH YANG PERLU ANDA LAKUKAN?

Anda perlu menjawab soalan soal selidik secara interview yang akan di edarkan bagi tujuan mendapatkan maklumat terperinci mengenai faktor individu,tempoh masa bekerja dan postur janggal ketika bekerja. Anda akan diukur berat badan dan ketinggian untuk mendapatkan Indeks Jisim Badan (BMI). Rakaman video sekurang-kuarngnya 20 minit sewaktu anda bekerja akan diambil untuk pemerhatian proses analisis.

### 4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Pekerja ladang wanita yang mengandung adalah di kecualikan dan pekerja yang mempunyai penyakit kronik seperti rheumatism arthritis.

### 5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

#### a) KEPADA ANDA SEBAGAI PESERTA?

Kajian ini akan menilai jika terdapat risiko gejala otot apabila anda melakukan kerja di ladang. Hal ini dapat meningkatkan status kesihatan anda.

#### b) KEPADA PENYELIDIK?

Ia akan membantu penyelidik untuk menentukan kajadian gangguan otot kerangka dan faktor risikonya dalam kalangan pekerja di ladang nenas.

**9. PERSETUJUAN**

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

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

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

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

*potong yang tidak berkenaan

Tandatangan .....
(*Responden*)

Tarikh :.....

Tandatangan .....
(*Saksi*)

Nama :.....

No. K/P: .....

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

Tarikh .....

Tandatangan .....
(*Penyelidik*)

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

# SOALAN KAJI SELIDIK

## BORANG SOAL SELIDIK BAGI KAJIAN KELAZIMAN GEJALA GANGGUAN OTOT RANGKA DALAM PEKERJA LADANG NENAS DI PONTIAN JOHOR


**NAMA PENYELIDIK:**

**NUR HIDAYAH BINTI RANI**

**169511**


Adalah dimaklumkan bahawa anda telah dipilih untuk menjadi salah seorang daripada responden dalam kajian ini. Oleh itu, anda diminta untuk menjawab soalan, seperti arahan yang diberikan. Soalan kaji selidik ini akan mengambil masa 15 minit untuk di jawab. Semua maklumat responden adalah sulit dan hanya akan digunakan untuk kajian ini sahaja. Terima kasih atas kerjasama anda

ID Responden ☐☐☐

## BAHAGIAN A : MAKLUMAT PERIBADI

1.1 Tarikh Lahir ☐☐ hari ☐☐ bulan ☐☐ tahun

1.2 Warganegara 1☐ Malaysia 0☐ Bukan Warganegara

1.3 Bangsa 1☐ Melayu 2☐ Cina 3☐ India ☐ Lain-lain:_____

1.5 Status Perkahwinan 1☐ Bujang 2☐ Berkahwin ☐ 3 Bercerai

1.6 Pendidikan 1☐ Rendah 2☐ Menengah 3☐ Kolej 4☐ Universiti

1.7 Berat ☐☐ Kilogram

1. 8 Tinggi ☐☐☐ Sentimeter

1.9 BMI ☐☐☐

1.10 Hobi _____

## BAHAGIAN B : PENGGUNAAN TEMBAKAU

2.1Pernahkah anda merokok?

1☐ Ya 0☐ Tidak

2.2 Jika **YA**, adakah anda masih merokok?

1☐ Ya 0☐ Tidak Jika **TIDAK**, jawab soalan 2.5

2.3 Bila anda mula merokok? ☐☐ Tahun yang lalu

2.4 Berapa batang rokok anda merokok sehari? ☐☐ Batang rokok

2.5 Jika **TIDAK**, sudah berapa tahun anda berhenti merokok? ☐☐ Tahun

## BAHAGIAN C : MAKUMAT PERUBATAN

3.1 Adakah anda mempunyai penyakit berikut?

Penyakit Jantung ☐

Darah Tinggi ☐

Kencing Manis ☐

Asma ☐

Penyakit Sendi ☐

3.2 Sudah berapa tahun anda mempunyai penyakit tersebut? ☐☐ Tahun

3.3 Adakah anda mengambil ubat untuk penyakit tersebut?

1☐ Ya 0☐ Tidak

## BAHAGIAN D : MAKLUMAT PEKERJAAN

### 4.1 Maklumat Sejarah Pekerjaan

4.1.1 Pernahkah anda bekerja di tempat lain sebelum ini?

1☐ Ya 0☐ Tidak Jika **TIDAK**, jawab soalan 4.2

4.1.2 Jika YA, sila nyatakan jenis pekerjaan anda dan tempoh anda bekerja

Jenis Pekerjaan : _____

Jumlah Tahun Bekerja : _____

4.1.3 Pernahkah anda mengalami kemalangan di tempat kerja anda sebelum ini yang memerlukan anda mendapat cuti dari doktor selama 4 hari atau lebih?

1☐ Ya 0☐ Tidak Jika **TIDAK**, jawab soalan 4.2

4.1.4 Jika **YA**, sila nyatakan

Bahagian badan yang tercedera : _____

Berapa hari anda di beri cuti? _____ hari

4.1.5 Adakah anda mendapat rawatan (doktor, fisioterapi atau ahli perubatan yang lain) bagi memulihkan kecederaan tersebut?

1☐ Ya 0☐ Tidak

4.1.6 Berapa orang yang terlibat dalam kemalangan terbabit? ☐☐ Orang

4.1.7 Adakah anda melaporkan kemalangan tersebut kepada Jabatan Keselamatan dan Kesihatan Pekerjaan (JKKP)?

1☐ Ya 0☐ Tidak

4.1.9 Selepas kemalangan tersebut, adakah anda di tugaskan kepada kerja lain disebabkan kecederaan yang di alami?

1☐ Ya 0☐ Tidak

**4.2 Maklumat Pekerjaan Sekarang**

4.2.1 Apakah pekerjaan anda sekarang?

- ☐ Penyediaan tanah
- ☐ Penanam
- ☐ Merumput
- ☐ Peracun
- ☐ Penuai
- ☐ Membaja

4.2.2 Sudah berapa tahun anda bekerja dalam bidang pekerjaan anda sekarang? ☐☐ Tahun

4.2.3 Secara keseluruhan, berapa jam anda bekerja sehari (tidak termasuk kerja lebih masa)?

☐☐ Jam sehari

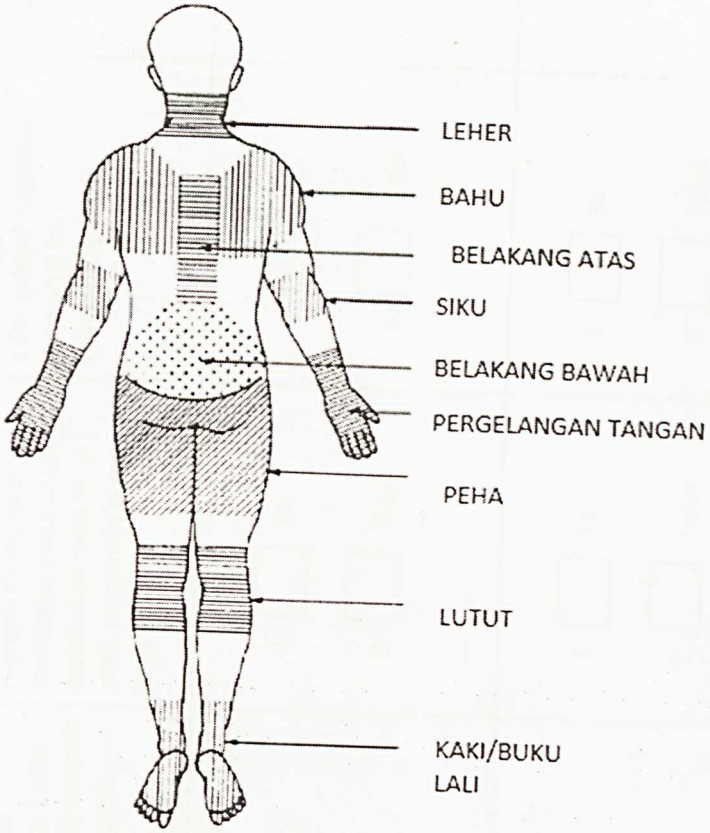
4.2.4 Adakah anda melakukan kerja lebih masa?

1☐ Ya 0☐ Tidak

4.2.5 Berapa jam anda bekerja semasa kerja lebih masa? ☐☐ Jam

4.2.6 Berapa kali seminggu anda bekerja lebih masa? ☐☐ Kali seminggu

## BAHAGIAN E : GEJALA SAKIT OTOT SKELETAL PADA ORGAN LOKOMOTIF




Rajah 1

**Sila rujuk Rajah 1 bagi menjawab soalan di bawah.**

| Bahagian ini hendaklah diisi oleh semua responden | | Bahagian ini hanya perlu diisi oleh mereka yang mempunyai masalah sahaja (bagi mereka yang menjawab **YA** di bahagian sebelah kiri) | | |
|---|---|---|---|---|
| Bahagian anggota badan | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) pada bahagian anggota badan berikut sepanjang tempoh 12 bulan yang lepas? | Adakah dalam tempoh 12 bulan yang lepas, anda mengalami masalah yang mencegah anda untuk melakukan rutin kerja anda (di rumah/di tempat kerja?) | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) sepanjang tempoh 7 hari kebelakangan ini? | Adakah anda merasakan masalah itu disebabkan oleh pekerjaan anda? |
| 1.1.1 Tengkuk / Leher<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |
| 1.1.2 Bahu<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |

| Bahagian ini hendaklah diisi oleh semua responden | | Bahagian ini hanya perlu diisi oleh mereka yang mempunyai masalah sahaja (bagi mereka yang menjawab **YA** di bahagian sebelah kiri) | | |
|---|---|---|---|---|
| Bahagian anggota badan | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) pada bahagian anggota badan berikut sepanjang tempoh 12 bulan yang lepas? | Adakah dalam tempoh 12 bulan yang lepas, anda mengalami masalah yang mencegah anda untuk melakukan rutin kerja anda (di rumah/di tempat kerja?) | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) sepanjang tempoh 7 hari kebelakangan ini? | Adakah anda merasakan masalah itu disebabkan oleh pekerjaan anda? |
| 1.1.3 Siku<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |
| 1.1.4 Punggung atas<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |

| Bahagian ini hendaklah diisi oleh semua responden | | Bahagian ini hanya perlu diisi oleh mereka yang mempunyai masalah sahaja (bagi mereka yang menjawab **YA** di bahagian sebelah kiri) | | |
|---|---|---|---|---|
| Bahagian anggota badan | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) pada bahagian anggota badan berikut sepanjang tempoh 12 bulan yang lepas? | Adakah dalam tempoh 12 bulan yang lepas, anda mengalami masalah yang mencegah anda untuk melakukan rutin kerja anda (di rumah/di tempat kerja?) | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) sepanjang tempoh 7 hari kebelakangan ini? | Adakah anda merasakan masalah itu disebabkan oleh pekerjaan anda? |
| 1.1.5 Punggung Bawah<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |
| 1.1.6 Lengan / Tangan<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |

| Bahagian ini hendaklah diisi oleh semua responden | | Bahagian ini hanya perlu diisi oleh mereka yang mempunyai masalah sahaja (bagi mereka yang menjawab **YA** di bahagian sebelah kiri) | | |
|---|---|---|---|---|
| Bahagian anggota badan | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) pada bahagian anggota badan berikut sepanjang tempoh 12 bulan yang lepas? | Adakah dalam tempoh 12 bulan yang lepas, anda mengalami masalah yang mencegah anda untuk melakukan rutin kerja anda (di rumah/di tempat kerja?) | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) sepanjang tempoh 7 hari kebelakangan ini? | Adakah anda merasakan masalah itu disebabkan oleh pekerjaan anda? |
| 1.1.7 Pinggul / Peha<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |
| 1.1.8 Lutut<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |

| Bahagian ini hendaklah diisi oleh semua responden | | Bahagian ini hanya perlu diisi oleh mereka yang mempunyai masalah sahaja (bagi mereka yang menjawab **YA** di bahagian sebelah kiri) | | |
|---|---|---|---|---|
| Bahagian anggota badan | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) pada bahagian anggota badan berikut sepanjang tempoh 12 bulan yang lepas? | Adakah dalam tempoh 12 bulan yang lepas, anda mengalami masalah yang mencegah anda untuk melakukan rutin kerja anda (di rumah/di tempat kerja?) | Adakah anda menghadapi masalah (pedih, sakit, tidak selesa) sepanjang tempoh 7 hari kebelakangan ini? | Adakah anda merasakan masalah itu disebabkan oleh pekerjaan anda? |
| 1.1.9 Pergelangan Kaki / Kaki<br>☐ Ya ☐ Tidak | | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak | 1 ☐ Ya<br>0 ☐ Tidak |

UNIVERSITI PUTRA MALAYSIA

# RESEARCH QUESTIONNAIRE

## TITLE OF PROPOSAL:

## THE PREVALENCE OF MUSCULOSKELETAL SYMPTOMS AND ASSOCIATED WITH ITS RISK FACTORS AMONG PINEAPPLE PLANTATION WORKERS AT JOHOR


**RESEARCHER'S NAME:**

**NUR HIDAYAH BINTI RANI**

**169511**


Please be informed that you have been selected to be one of the respondents in this study. Therefore, you are asked to answer a number of questions, such as the instructions given. This questionnaire will take 15 minutes to answer. All the information will be kept private and confidential and will only be used for this research only. Thank you for your cooperation.

Respondent's ID ☐☐☐

## PART A : PERSONAL DETAILS

1.1 Date of Birth ☐☐ day ☐☐ month ☐☐ year

1.2 Nationality 1☐ Malaysian 0☐ Non-Malaysian

1.3 Race 1☐ Malay 2☐ Chinese 3☐ Indian 4☐ Others: _____

1.4 Religion 1☐ Islam 2☐ Buddha 3☐ Hindu 4☐ Others: _____

1.5 Marital Status 1☐ Single 2☐ Married 3☐ Divorced

1.6 Education 1☐ Primary 2☐ Secondary 3☐ College 4☐ University

1.7 Weight ☐☐ Kilogram

1. 8 Height ☐☐☐ centimeter

1.9 BMI ☐☐☐

1.10 Hobby _____

## PART B : TOBACOO CONSUMPTION

2.1Have you ever smoked?

1☐ Yes 0☐ No

2.2 If **YES**, are you still smoking?

1☐ Yes 0☐ No If no proceed to Question 2.4

2.3 When do you start smoking? ☐☐ Year ago

2.3 How many cigarettes do you smoke in a day? ☐☐ Cigarettes

2.4 If **NO**, how many years have you stopped smoking? ☐☐ Years

## PART C : MEDICAL INFORMATION

3.1 Do you have the following diseases?

Heart Disease ☐

Hypertension ☐

Diabetes ☐

Asthma ☐

Rheumatoid ☐

3.2 How many years do you have those diseases? ☐☐ Years

3.3 Are you taking medicine for that diseases?

1☐ Yes 0☐ No

## PART D : EMPLOYMENT DATA

**4.1 Data Work History**

4.1.1 Have you ever worked in other places before?

1☐ Yes 0☐ No **If no proceed to Question 4.2**

4.1.2 If **YES,** please state your type of work and its duration

Type of Work : _____

Total years of work: _____

4.1.3 Have you had an accident at your work place before that need you to have medical leave for 4 days and more?

1☐ Yes 0☐ No **If no proceed to Question 4.2**

4.1.4 If **YES,** please state

The part of body which had been injured: _____

How many days of leave have been given? _____ Days

4.1.5 Have you received a treatment for that accident?

1☐ Yes 0☐ No

4.1.6 How many person involved in that accident? ☐☐ Person

4.1.7 Have you reported the accident to Department of Occupational Safety and Health (DOSH)?

1☐ Yes 0☐ No

4.1.9 After the accident, have you been transferred to another work task due to injury?

1☐ Yes 0☐ No

**4.2 Current Work Data**

4.2.1 What is your current job?

- ☐ Land preparation
- ☐ Cultivation
- ☐ Weeding
- ☐ Pesticides sprayer
- ☐ Harvester
- ☐ Fertilizer

4.2.2 How many years have you worked for this current job?

☐☐ Day ☐☐ Month ☐☐☐☐ Years

4.2.3 As a total, how many hour have you worked per day (excluded overtime)?

☐☐ Hour per day

4.2.4 Do you do overtime?

1☐ Yes 0☐ No

4.2.5 How many hours do you work during overtime? ☐☐ Hours

4.2.6 How many times do you do overtime per week? ☐☐ Times per week

## PART E: MUSCULOSKELETAL DISORDERS SYMPTOMS AT LOCOMOTIF ORGAN

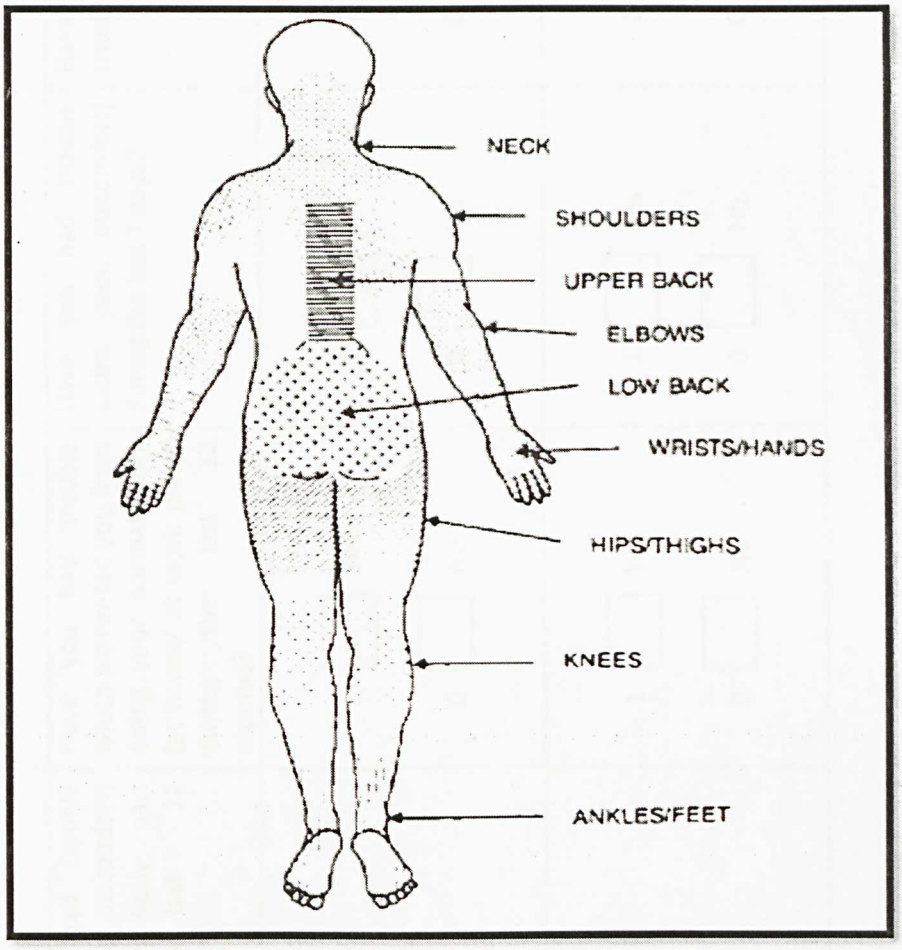



Diagram 1

**Please refer Diagram 1 to answer the Questions below.**

| This part must be filled by respondents | | This part must be filled by those who has trouble only ( those who had answer **YES** in left part) | | |
|---|---|---|---|---|
| Body Part | Have you had trouble (ache, pain, discomfort) with these body part during the last 12 months? | Have you had trouble which prevented you from doing your normal work (at home/ at work place) during the last 12 months? | Have you had trouble (ache, pain, discomfort) during the last 7 days? | Have you think that trouble due to your work? |
| 1.1.1 Neck<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |
| 1.1.2 Shoulders<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |

| This part must be filled by respondents | | This part must be filled by those who has trouble only ( those who had answer **YES** in left part) | | |
|---|---|---|---|---|
| Body Part | Have you had trouble (ache, pain, discomfort) with these body part during the last 12 months? | Have you had trouble which prevented you from doing your normal work (at home/ at work place) during the last 12 months? | Have you had trouble (ache, pain, discomfort) during the last 7 days? | Have you think that trouble due to your work? |
| 1.1.3 Elbow<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |
| 1.1.4 Upper Back<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |

| This part must be filled by respondents | | This part must be filled by those who has trouble only ( those who had answer **YES** in left part) | | |
|---|---|---|---|---|
| Body Part | Have you had trouble (ache, pain, discomfort) with these body part during the last 12 months? | Have you had trouble which prevented you from doing your normal work (at home/ at work place) during the last 12 months? | Have you had trouble (ache, pain, discomfort) during the last 7 days? | Have you think that trouble due to your work? |
| 1.1.5 Lower Back<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |
| 1.1.6 Wrists/Hands<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |

| This part must be filled by respondents | | This part must be filled by those who has trouble only ( those who had answer **YES** in left part) | | |
|---|---|---|---|---|
| Body Part | Have you had trouble (ache, pain, discomfort) with these body part during the last 12 months? | Have you had trouble which prevented you from doing your normal work (at home/ at work place) during the last 12 months? | Have you had trouble (ache, pain, discomfort) during the last 7 days? | Have you think that trouble due to your work? |
| 1.1.7 Hips/ Thighs<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |
| 1.1.8 Knees<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |

| This part must be filled by respondents | | This part must be filled by those who has trouble only ( those who had answer **YES** in left part) | | |
|---|---|---|---|---|
| Body Part | Have you had trouble (ache, pain, discomfort) with these body part during the last 12 months? | Have you had trouble which prevented you from doing your normal work (at home/ at work place) during the last 12 months? | Have you had trouble (ache, pain, discomfort) during the last 7 days? | Have you think that trouble due to your work? |
| 1.1.9 Ankles/Feets<br>☐ Yes ☐ No | | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No | 1 ☐ Yes<br>0 ☐ No |