UNIVERSITI PUTRA MALAYSIA

THE ASSESSMENT OF RESPIRATORY SYMPTOMS AMONG PALM OIL MILL WORKERS USING LUNG FUNCTION TEST

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BY

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Thesis submitted in fulfillment of the requirement for the degree of Bachelor Science (Environmental and Occupational Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

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ABSTRACT

THE ASSESSMENT OF RESPIRATORY SYMPTOMS AMONG PALM OIL MILL WORKERS USING LUNG FUNCTION TEST

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Background: Palm oil mill involves processes such as preparation, oil extraction, purification and kernel extraction which are one of the sources of organic dust in the working environment. However, no study has been conducted to determine the level of dust exposed among the workers. Therefore, the objective of this study is to assess the respiratory symptoms and lung function among the workers of various work station. **Methods:** The workers participated in this study were selected from three palm oil mills. The workers (n=111) were interviewed using self-constructed questionnaire and lung function test by using an electronic spirometer. **Results:** The sterilization have the highest number of workers with restrictive patterns of lung function status (62.5%), whereas workers in press work sections had the least (22.2%). In the work station of loading ramp and sterilization, coughing and shortness of breath is recorded as the highest (50%) respiratory symptoms. Workers with high exposure to dust are majorly at the boiler room (35.7%). The relationship between exposure to dust and ratio Forced Expiratory Volume (FEV1)/Forced Vital Capacity (FVC) variables were found statistically significant (p-value = 0.37). There are significant relationship between exposure to dust and respiratory symptoms (Coughing at night p-value =0.014, Wheezing sometimes during cold; p-value=0.021). Also, there is a statistically difference in the mean of ratio FEV1/FVC between the different work station (F=5.973, p-value = 0.16). The difference between mean of exposure to dust and different groups of work station is statistically significant (F= 4.267, p-value=0.00). **Conclusions:** Majority of workers in sterilization has abnormalities in lung function status. Workers had high respiratory symptoms in sterilization and loading ramp work station. High exposures to dust are detected at boiler room compared to other stations. The exposure to dust is identified as a health hazards among the workers. The outcomes also indicated that there is differences between studied variables and work station; Lung function (boiler room and sterilization work station) and Dust (boiler room and kernel plant).

Keywords: Spirometer, Lung function, Pulmonary function test, Palm oil mill, Respiratory disease

ABSTRAK

PENILAIAN SIMPTOM PERNAFASAN DALAM KALANGAN PEKERJA KILANG MINYAK SAWIT MENGGUNAKAN FUNGSI UJIAN PARU-PARU

PUTRI ANIS SYAHIRA BINTI MOHAMAD JAMIL

Latar belakang: Kilang minyak sawit melibatkan proses seperti penyediaan, perahan minyak, penapisan dan pengeluaran isirong yang merupakan salah satu sumber debu organik dalam persekitaran kerja. Walau bagaimanapun, kajian kurang telah dijalankan untuk menentukan tahap debu terdedah di kalangan pekerja. Oleh itu, objektif kajian ini adalah unutuk menilai symptom pernafasan dan fungsi paru-paru dalam kalangan pekerja di pelbagai stesen kerja. **Kaedah**: Para pekerja mengambil bahagian dalam kajian ini dipilih daripada tiga kilang minyak sawit. Pekerja-pekerja (n = 111) telah ditemuramah menggunakan borang dan ujian fungsi paru-paru yang dibina sendiri dengan menggunakan spirometer elektronik. **Hasil**: Stesen pensterilan mempunyai bilangan tertinggi pekerja dengan corak rigid status fungsi paru-paru (62.5%), manakala pekerja di bahagian kerja akhbar adalah terendah (22.2%). Di stesen kerja muatan jalan dan pensterilan, batuk dan sesak nafas direkodkan sebagai yang paling tinggi (50%) gejala pernafasan. Pekerja dengan pendedahan yang tinggi kepada habuk adalah majorly di bilik dandang (35.7%). Hubungan antara pendedahan kepada habuk dan nisbah paksa *Forced Expiratory Volume*(FEV1)/*Forced Vital Capacity*(FVC) pembolehubah didapati statistik yang signifikan (p-value =0.37). Terdapat hubungan yang signifikan di antara pendedahan kepada habuk dan pernafasan gejala (Batuk pada waktu malam p-value = 0.014 , Berdehit kadang-kadang semasa sejuk; p- value=0.021). Selain itu, terdapat perbezaan statistik dalam min nisbah FEV1/FVC antara stesen berbeza kerja (F=5,973,p-value = 0.16). Perbezaan antara min pendedahan kepada habuk dan berbeza kumpulan stesen kerja adalah statistik yang signifikan (F=4,267,p-value=0.00). **Kesimpulan**: Kebanyakan pekerja dalam pensterilan mempunyai keabnormalan dalam *status* fungsi paru-paru. Pekerja mempunyai gejala pernafasan yang tinggi dalam pensterilan dan stesen kerja muatan jalan. Pendedahan yang tinggi kepada habuk dikesan di bilik dandang berbanding stesen-stesen lain. Pendedahan kepada habuk dikenalpasti sebagai bahaya kesihatan di kalangan pekerja. Pekerja mempunyai hubungan yang signifikan di antara pendedahan kepada habuk dan gejala pernafasan. Hasil juga menunjukkan bahawa terdapat perbezaan di antara pemboleh ubah yang dikaji dan stesen kerja; Fungsi paru-paru (bilik dandang dan stesen kerja pensterilan) dan Debu (bilik dandang dan loji kernel).

Kata kunci: Spirometer, Fungsi paru-paru , Fungsi Pulmonari Ujian, Kilang Minyak Sawit , Penyakit pernafasan

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LIST OF ABBREVIATIONS

%	Percentage
FEV	Forced expiratory Volume
FVC	Forced vital capacity
SPSS	Statistical Package for Social Science
MPOB	Malaysian Palm Oil Board
MPOC	Malaysian Palm Oil Council
COPD	Chronic Pulmonary Disorder

CHAPTER 1

INTRODUCTION

1.1 Background

Palm oil mill is one of the important industries for Malaysian economy. According to Chinese Chamber Bulletin (2011), the totals of palm oil mills in Malaysia are 421 in 2011 with 5 000 109 hectares of land were explored for palm oil plantation. Malaysia is currently the second highest net exporter of oil and fats according to Malaysian Palm Oil Council (MPOC, 2011). Generally, the process of palm oil mill can be divided into several stages or sections.

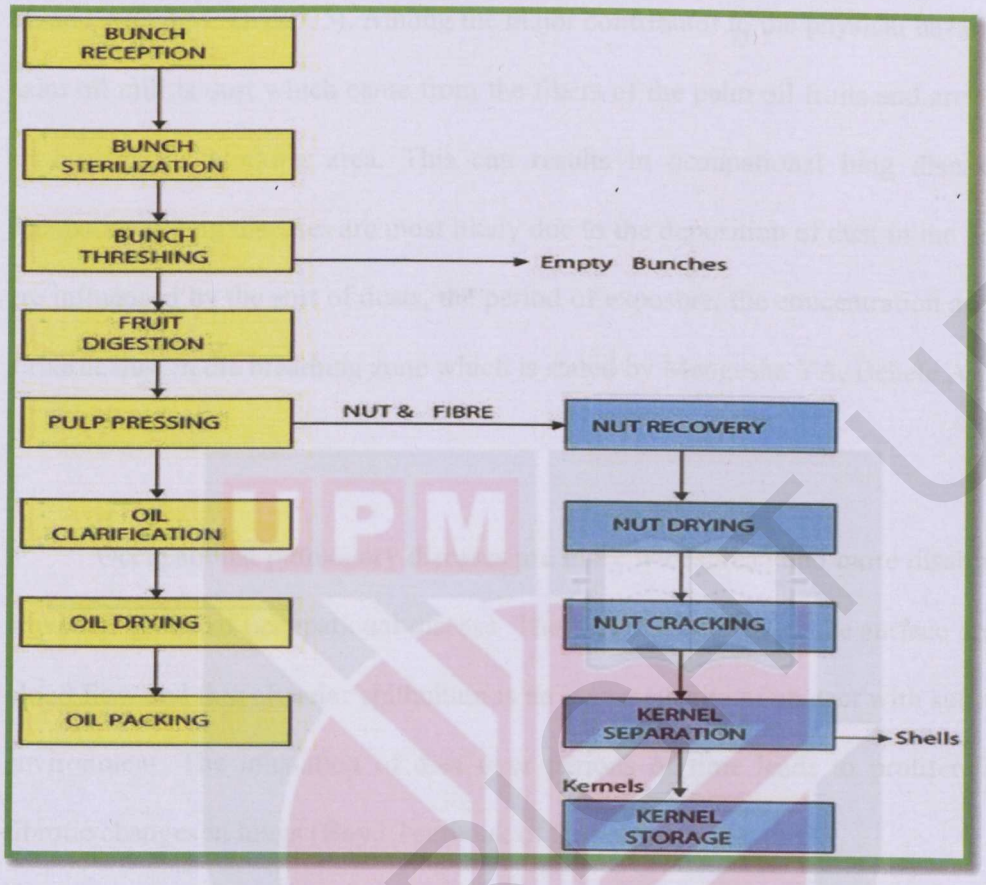

Figure 1.1 Palm Oil processing (Source: FAO, 2004)

Similar to other industries, palm oil mill workers are subjected to the occupational hazards. Among the hazards in the palm oil mill are physical, chemical, biological, psychosocial and ergonomic. The workers of agricultural industry are highly exposed to harmful factors in their work environment, such as dust, unfavorable microclimatic condition, excessive noise and insufficient light as reported by Sultan A

M. and Abdul M. D. (2005). Among the major contributor to the physical hazards in the palm oil mill is dust which came from the fibers of the palm oil fruits and are scattered all around the working area. This can results in occupational lung diseases. The occupational lung diseases are most likely due to the deposition of dust in the lungs and are influenced by the sort of dusts, the period of exposure, the concentration and size of airborne dust in the breathing zone which is stated by Mengesha YA, Bekele A (1998).

Occupational pulmonary diseases are more widespread and more disabling than any other group of occupational disease. The lung with its extensive surface area, high blood flow and thin alveolar epithelium is an important site of contact with substance in environment. The inhalation of dust over periods of time leads to proliferation and fibrotic changes in lungs (Boyd Textbook of Pathology1977).

As suggested by Vyas S. (2000), the pulmonary function tests have opened a new era towards scientific approach in diagnosis, prognosis and management of pulmonary disorders by the early recognition of their alteration in industry workers who are constantly exposed to various dust pollutants and to institute protective and preventive measures to minimize the hazards of exposure to polluted environment. However, there is no specific study been conducted on the hazard of dust among the workers in palm oil mill. Hence this study is carried out to measures the status of

individual lung function among workers in palm oil mill according to their work sections. The results from this study will serve as a reference to help employer to improve the working environment in palm oil mill so that it will be convenient for their health and productivity.

1.2 Problem statements

Numerous studies such as Vyas S. (2012), Prowse K et al. (1989) Taytard A et al (1988), and Renke W.(1988) states that industrial dusts are known to cause an increased morbidity and mortality among exposed population all over the world. Hence, occupational exposure to the dust is detrimental to the workers. It is important to take account to since the exposure to dusts can declined respiratory symptoms. Besides, occupational exposure may also cause reversible early airway obstruction by Das PKL and Jha N (2009). From the study, evidence reported that the workers complaints on respiratory problems such as cough with sputum, dry cough, breathlessness and wheezing.

The issues of respiratory problems in industrial workers are overwhelming. This can be seen by Nagoda M et al. (2012), a study in Kano textile worker, Nigeria, the

prevalence of respiratory symptoms was higher in exposed group than in control. Also, the study showed a strong association between substances inhaled in factory environment (dust) and frequency of respiratory symptoms.

1.3 Study Justification

Also, in Malaysia, there are no studies conducted on occupational exposures and deterioration of lung function among palm oil mill workers. This study is important as a baseline data for the assessment of lung function among the workers in palm oil mill. Singh et al. (2013) found that there is clear significant difference of workers exposed to dust as compared to controls. The dust from fiber of palm oil fruit is hazardous to the workers since the dust will be scattered around the palm oil mill.

1.4 Conceptual Framework

This study is to determine the prevalence of respiratory symptoms and lung function among workers in palm oil mill (Figure 1.2).

Generally, in occupational setting, there are five types of hazard that workers can be exposed. It depends on the condition of their workplace which are physical, chemical, ergonomic, biological and psychosocial. For the palm oil mills, one of the main hazards is physical which comprises of dust and it appears to be main issue in this work environment. Effects of dust can be categorized into two that is cardiopulmonary and respiratory health effects. In this study, respiratory health effects were focused on. To measure the effects, lung function test was used and the abnormality is measured. The respiratory symptoms are measured by questionnaire and their relationships with some factors are measured.

Workers who are exposed to the high level of dust during work will tend to get respiratory symptoms which can lead to occupationally lung diseases such as Chronic Pulmonary Disorder (COPD).

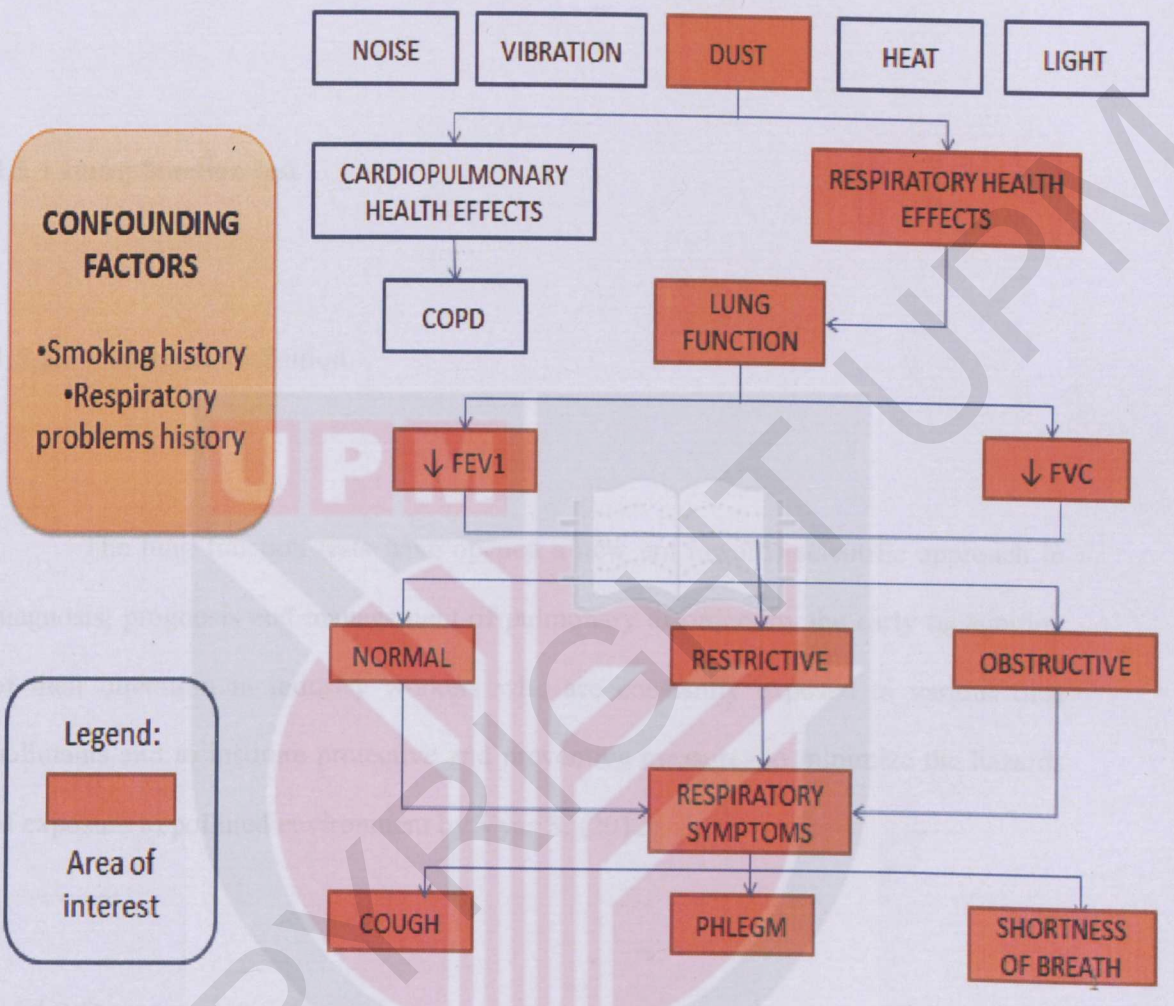

Figure 1.2 Conceptual framework of the variables related to the study

1.5 Definition

1.5.1 Lung function test

1.5.1.1 Conceptual definition

The lung function tests have opened a new era towards scientific approach in diagnosis, prognosis and management of pulmonary disorders by the early recognition of their alteration in industry workers who are constantly exposed to various dust pollutants and to institute protective and preventive measures to minimize the hazards of exposure to polluted environment by Vyas S. (2012).

1.5.1.2 Operational definition

Spirometry is a common type of pulmonary function test (PFT) that measures how well a person can move air in and out of their lungs. In occupational settings, spirometry can be used to establish a baseline before assigning a worker to job tasks

that are physically demanding, that require use of a respirator, or that may expose the worker to respiratory hazards.

1.5.2 Respiratory symptoms

1.5.2.1 Conceptual definition

Respiratory symptoms are common symptoms of lung or heart conditions, emotions, or injury. Respiratory symptoms may accompany other symptoms affecting the respiratory system including: absence of breathing (apnea), cough that gets more severe over time, difficulty breathing, loose, wet cough that produces thick white or yellow phlegm, rapid breathing (tachypnea), shortness of breath and wheezing (whistling sound made with breathing).

Breathing problems may occur in conditions affecting the lungs alone or may be seen in association with more generalized conditions, such as dehydration or infections. (Local Health, 2013)

1.5.2.2 Operational definition

There are several ways to assess respiratory symptoms. In this study, respiratory symptoms are assessed by questionnaire. In the questionnaire it is included the early symptoms regarding respiratory health effects such as coughing, phlegm, wheezing and shortness of breath.

1.5.3 Anthropometry

1.5.3.1 Conceptual definition

Anthropometry is the science that defines physical measures of a person's size, form, and functional capacities. As applied to occupational injury prevention, anthropometric measurements are used to evaluate the interaction of workers with tasks, tools, machines, vehicles, and personal protective equipment, especially in regard to determining degree of protection afforded against hazardous exposures. (Centers for Disease Control and Prevention, 2012)

1.5.3.2 Operational Definition

The measurement of human body based on the parameters needed in the centimeter (cm). The anthropometry component is to collect high quality body measurement data using standardized examination procedures and calibrated equipment. Accurate data are fundamental to the evaluation of anthropometric trends over time.

1.6 Research Objectives

1.6.1 General Objective

To determine the prevalence of respiratory symptoms and lung function among workers in palm oil mill.

1.6.2 Specific Objectives

i. To determine the socio-demography of respondents.

ii. To determine the distribution of lung function abnormalities and respiratory symptoms according to work station.

iii. To determine the distribution of exposure to dust according to work station

iv. To determine the relationships between occupational exposures to dust and lung function.

v. To determine the relationships between occupational exposures to dust and respiratory symptoms.

vi. To determine the differences of lung function and exposures to dust between work station

1.7 Hypothesis

1. There is trend in distribution of lung function abnormalities according to work station.
2. There is trend in distribution of respiratory symptoms according to work station.
3. There is trend in distribution of exposure to dust according to work station.
4. There is a significant relationship between occupational exposures to dust and lung function.
5. There is a significant relationship between occupational exposures to dust and respiratory symptoms.
6. There is significant differences of lung function, exposures to dust and respiratory symptoms between each work station respectively.

CHAPTER 2

LITERATURE REVIEW

2.1 Palm oil mill process

Figure 2.1 shows overall process of palm oil extraction starting with loading ramp where the fruits are loaded into a ramp and will go into a sterilizer for sterilizing purposes. Next, the bunch will be digested and pressed so that the pulp will separated into nut and fibre. This process will produce the first stage oil which will then further clarify to produce a high quality of oil. The nut will be recovered as kernel and it is further extracted to produce more oil. The fibre produce earlier will be the main concern for contributing to physical hazards in the palm oil mill.

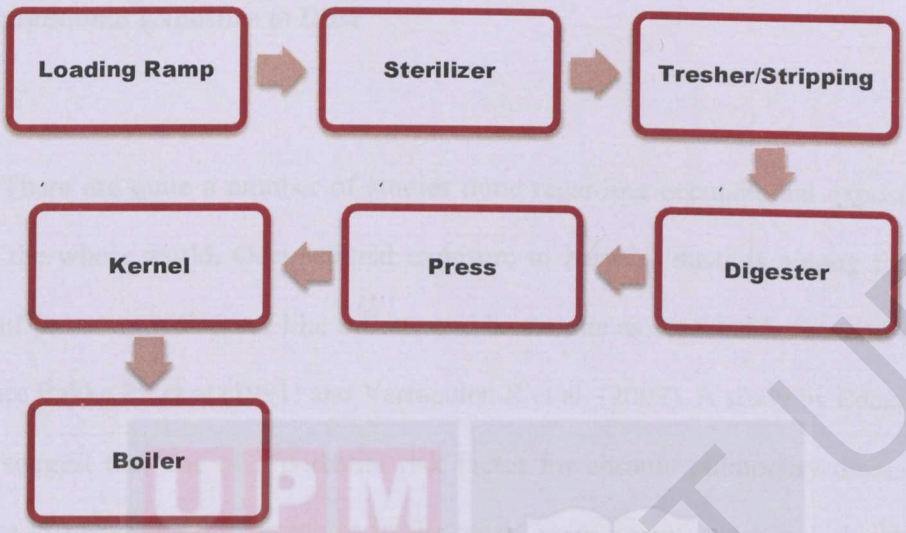

Figure 2.1 Palm oil mill process

The palm oil extraction process, in summary, involves the reception of fresh fruit bunches from the plantations, sterilizing and bunches threshing to free the palm fruit, mashing the fruit and pressing out the crude palm oil. The crude oil is further treated to purify and dry it for storage and export (Food & Agriculture Organization, 2013).

2.2 Occupational Exposure to Dust

There are quite a number of studies done regarding occupational exposures to dust in the whole world. Occupational exposure to harmful dusts is among the main causes of pulmonary diseases like asthma and bronchitis as reported by several studies which are Bakke PS et al (1991) and Vermeulen R et al. (2002). A study by Beckett WS (2000) suggest that one of a potential risk factor for chronic pulmonary diseases are exposure to respirable dust particles in the work environment and hence the workers may develop various respiratory disorders as the result of long term exposure to respirable mineral and organic dusts in an occupational environment.

Due to various construction activities, the dust that are floating in their vicinity enter into their respiratory pathway through nose and mouth leading to chronic respiratory disease and brings to the reduction of ventilator capacities. Several previous studies done by Milanowski J (2002), Rastogi (2003), Dehghan F et al (2008), Ahmed A.H. et al (2009), and Boskabady M.J. et al (2010) have shown increased respiratory symptoms among workers of different category.

As being documented in other studies, the respiratory health effects in workers exposed to a variety of dusts in small and large-scale industries, which generate dust

during their production process is significant. From studies by S.A. Meo and A.M. AL-Dress (2005), and Subbarao et al (2009), the diseases of the respiratory system induced by occupational dusts are influenced by the type of dust, dose, duration of exposure and genetic factors.

Milanowski J (2002) reported that even in the twenty-first century, millions of people are working daily in a dusty environment. Hence, they are exposed to different types of health hazards like fumes, gases, and dust which are risk factors in developing occupational lung diseases.

Other than that, a study in Nepal was conducted by Das PKL and Jha N (2009) to evaluate the lung function of jute mill workers which were exposed to industrial dust as other workers in similar type industries.

Previous studies by Kogevinas M (1996) and Manjula et al (2013) have demonstrated that 11-19% of respiratory diseases in men and 4-5% in women is due to occupational exposure and Balmes J (2007) states that chronic obstructive pulmonary disease in 15-20% of cases is caused as the result of occupational exposure.

2.3 Lung Function test

In occupational respiratory disease, spirometry is one of the most important diagnostic tools and measurement of dynamic lung functions is more important than of static lung volumes. A study by Cotes J.E. (1979) states that lung function tests are beneficial in the early recognition of pulmonary dysfunctions even if the workers may be normal clinically.

It is also used for screening workers with exposures to agents associated with pulmonary diseases. Lung function is influenced by factors such as sex, age, height, weight, environment and ethnicity Mashalla Y et al. (1992). Benefits of using lung function test is that its provides a clearer understanding of pulmonary function in subjects of different races, age, sex, occupation and profession as stated by T. Mariammal et al (2012).

Community based studies have demonstrated increased relative risks for respiratory symptoms consistent with chronic obstructive pulmonary disease (COPD) as well as for excess annual declines in Forced Expiratory Volume in one second (FEV1)

associated with occupational exposure to dust or gases. This is reported by Mohamed E and Dalia A. (2009).

As the lung functions measures for FEV1, FVC and ratio for FEV1/FVC, previous studies by Pellegrino R. et al (2005) has found that a reduction in FEV1/FVC and FEV1 is an indicator of obstructive abnormalities, and a reduction in FEF25−75 is an indicator of small airway obstruction

Other than that, various studies by Koo J. W. et al. (2000), Zuskin E. et al. (1998), Dehghan F. et al. (2009), and Myers J. E. and Cornell J. E. (1998), reported lower FVC, FEV1, FEV1/FVC ratio, PEFR, and PIFR. The lowering in FVC, FEV1, and FEV1/FVC% suggests a combination of obstructive and restrictive patterns in their lungs.

In 2005, a study by Sakar A. et al was conducted on ceramic workers which showed reduced spirometric indices in exposed workers but this decrease was not significant either.

2.4 Respiratory Symptoms

Minov et al. (2006), Karadzinska-Bislimovska et al. (2007) and Mijakoski et al. (2011), found a higher prevalence of nasal symptoms in bakers than in office workers with significant difference for runny nose, as well as higher prevalence of respiratory symptoms with significant difference for cough and phlegm. There was significant association between these symptoms and duration of workplace exposure in bakers.

In another study by Tanaffos (2009), we noticed increased prevalence of respiratory complaints like cough, sputum, wheezing and dyspnea among production unit workers compared to executive employees and this difference was statistically significant. Also, a study by Kayhan et al. (2013) found that respiratory irritants represent a major cause of occupational obstructive airway diseases related to irritative agents causing occupational asthma.

2.5 Occupational respiratory disease

Occupational respiratory diseases are usually caused by extended exposure to irritating or toxic substances that may cause acute or chronic respiratory ailments stated

by Karjalainen (2003) and Park K (2007). The incidence depends upon the chemical composition of dust, size of the particles, duration of exposure and individual susceptibility as reported by Kasper DL (2008). One of identified cause to the disease are the dust originating from work operation like drilling, blasting and grinding becomes airborne and inhalation of particles may induce accelerated lung function decline as stated by Ulvestad B (2001).

Based on a study by Schwartz D. A. and Peterson M. W.(1998), the development of occupational respiratory disease is dependent on several factors including the chemical nature and physical state of the inhaled substance, the size and concentration of the dust particles, the duration of exposure, and individual susceptibility.

Respiratory diseases are common entities in occupational industries, because the lungs are the route of entry for noxious particles and gases. These agents can be inhaled in the form of fibers or dusts. Work-related or occupational asthma is defined by Kayhan et al (2013) as a chronic inflammatory disorder of the airways with recurrent episodes of respiratory symptoms such as coughing, wheezing, chest tightness, dyspnea, shortness of breath at rest, and reversible airflow limitations caused by a particular occupational environment.

CHAPTER 3

METHODOLOGY

3.1 Study design

This is a cross sectional study which was designed to determine the prevalence of respiratory symptoms and lung function among workers in palm oil mill using the lung function test.

3.2 Study location

This study was conducted in three palm oil mills in Peninsular Malaysia which were permitted by Felda Management Sdn Bhd.

3.3 Study population

The study population were the workers in palm oil mill in Peninsular Malaysia.

3.4 Sampling

3.4.1 Study framework

This study framework was obtained from a list of all the workers in palm oil mills. The name list was obtained from the management office of each palm oil mills respectively.

3.4.2 Sampling unit

The sampling unit met the inclusion criteria which are; male, aged between 19 to 69 years old, cardiovascular and acute respiratory disease.

3.4.3 Sampling method

The sampling method was stratified sampling where the respondents were selected based on the inclusion criteria`s.

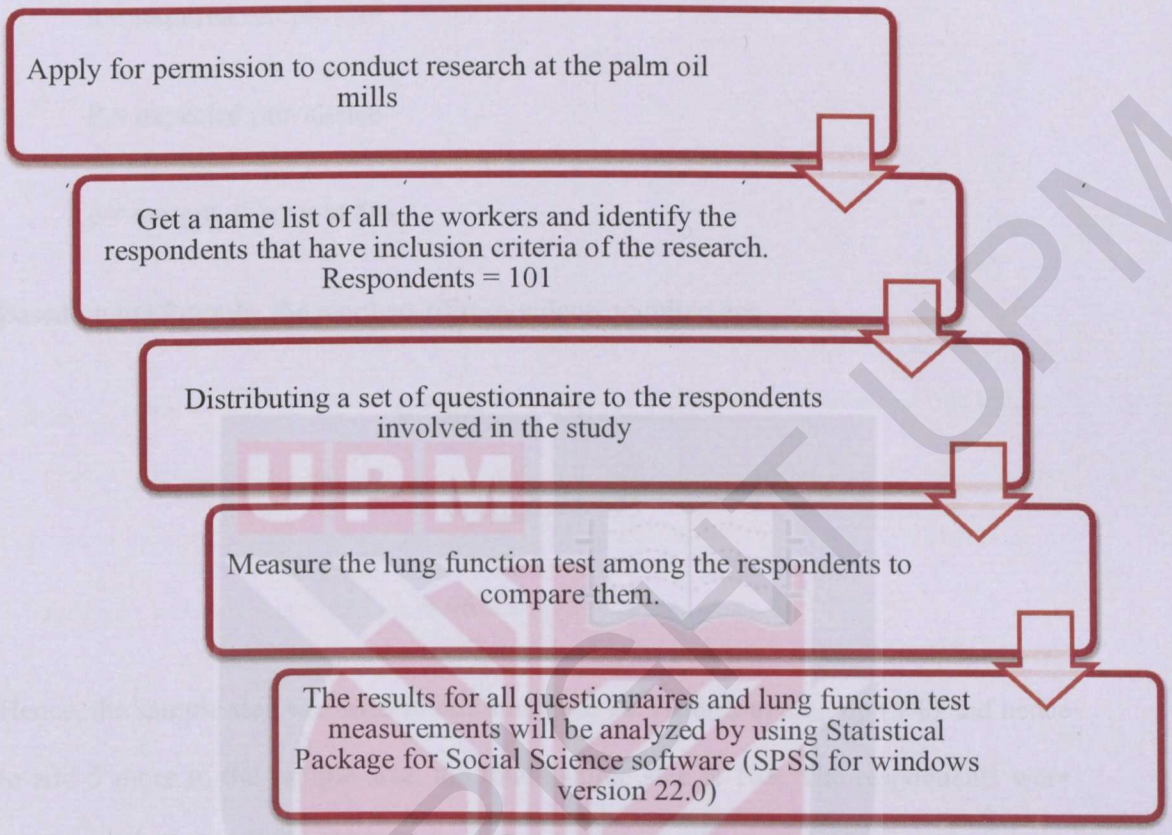

Figure 3.3 The flow chart of the research procedure

3.4.4 Sample size

By using the formula by Kirkwood (2009);

$$n = P (1 - P) / e^2$$

n = required sample size

P = expected prevalence

e = margin of error at 5%

Based on the formula, the numbers of respondents required are:

$$n = 0.4\ (1 - 0.4) / 0.5^2$$

$$= 0.4\ (0.6) / 0.025$$

$$= 96$$

Hence, the sample size was used in this study are 96. After rounding up (5%) and hence to add 5 more to the sample size, the total sample size is 101. The respondents were chosen according to inclusion criteria and exclusion criteria.

3.4.5 Exclusion criteria

The exclusion criteria were female workers and with respiratory diseases such asthma, bronchitis and wheezing.

3.5 Study instrumentation and data collection

3.5.1 Questionnaire

A self-administered questionnaire was used for the respiratory symptoms. Emphasis is laid on enquiry regarding occurrence of chest tightness, chest compression, wheezing, cough and phlegm appearing in them and the frequency of occurrence, day of occurrence, duration and relationship with work was recorded.

3.5.2 Anthropometry

Age, body weight and height were recorded in the questionnaire. Body weight was recorded by standard weighing machine without shoes; body height was recorded by standard procedure without shoes to nearest 0.5 cm.

3.5.3 Spirometer

SpirolabII was used to measure the lung function status of the palm oil mill workers. The procedures are as follows:

a) Procedure

After taking a detailed history and anthropometric data, the workers were informed about the whole maneuver. The workers were encouraged to practice this maneuver before performing the pulmonary function test. The test was performed with the subject in standing position without using a nose clip. The test was repeated three times after adequate rest and results were obtained in the spirometer. The measured parameters were:

i) forced vital capacity (FVC),

ii) forced expiratory volume in one second (FEV1), and

iii) forced expiratory ratio (FEV1/FVC %)

3.5.4 Dust Measurement

For dust measurement, a direct reading instrument is used. The dusts level is measured according to each work station with the instrument are placed near the breathing zone of the workers. The results are recorded and analyzed later.

3.6 Data analysis

All statistical analysis was performed by SPSS version 22. Descriptive data was expressed as frequency and percentage. Pearson correlation and Spearman's rho was used for association in parametric and non-parametric data respectively. ANOVA was used to compare the difference between more than two variables and a p-value of <0.05 as significant level was used.

3.6.1 Type of data analysis

Objectives	Tests
To determine the socio-demography of respondents.	Descriptive Analysis
To determine the distribution of lung function abnormalities, respiratory symptoms and exposure to dust according to work station.	Descriptive Analysis
To determine the relationships between occupational exposures to dust and lung function.	Pearson correlation
To determine the relationships between occupational exposures to dust and respiratory symptoms.	Spearman's rho
To determine the differences of lung function and exposures to dust and between work station	One way ANOVA

3.7 Quality Control

Quality control is important in every measurement especially when using instrument. These were so to ensure the result of the data that was obtained throughout the study is avoided with biases and error. In this study, the quality controls were questionnaire, spirometer and anthropometric measurement. Before this study was conducted, a pilot study was carried. Also, the spirometer was calibrated before use and checked for any malfunction.

3.7.1 Questionnaire

Self-constructed questionnaire was used to know the information background, general health status as well as the prevalence of respiratory symptoms among the respondents. The form was used in Bahasa Malaysia so that the respondents can easily understand the question given. The questionnaire had undergone constructive testing and reliability testing.

For the constructive test, pre-test was conducted. The function of this test was to know either the subjects understand the questions in the questionnaire or not. Next, the

questionnaire was edited based on the criticism from the respondents and were given to answer it again. As for the next day, the same questionnaire was given again to ensure the answer is the same.

3.7.2 Anthropometric measurement

The anthropometric measurements were taken using electronic weight scale and height tape. For each respondent, the measurements were taken three times in order to determine the average measurement.

3.7.3 Spirometer

The maneuvers for this test are used based on U.S Occupational Safety & Health Administration (OSHA). Apart from that, the spirometer is checked for calibration and accuracy.

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3.7.4 Dust measurements

The DustTrak used were calibrated before used and several measurement are taken or the average.

3.8 Ethical issues

Before the start of any data collection procedures for this research, human subject's approval was obtained from the university's Ethics Committee of Medicine and Health Sciences Faculty, University Putra Malaysia. As shown in Appendix 1 (ref: UPM/TNCPI/RMC/1.4.18.1 (JKEUPM/F2)). All participants were given a consent form (Appendix 2) to read and sign. The consent stated that participation in the research study was voluntary and the form also included the study's purpose, risks and benefits, and the participant's role in the study, as well as their freedom to withdraw from the study at any time. This researcher told participants that there are no known risks to participating other than the possibility that they would feel uncomfortable recalling stressful events.

3.9 Study limitation

This study assess only on respiratory symptoms and lung function as well as the exposure to dust among the palm oil mill workers but not specifically as the respiratory disorders present among them. Other than that, sample size is not fulfilled due to dropping out of the respondents. However, from the sample size, 94% of it was fulfilled. This study has limitation which is the access to the palm oil mill is difficult to obtained. Ii is because the information is very restricted and confidential. The approval for the access also obtained later than planned. However, this issue has been overcome. Apart from that, insufficient equipment and time constraint for collecting the data were the most contributing limitation in this study. Therefore, some improvisation has been made to meet the need of the study.

CHAPTER 4

RESULTS

4.1 Respondent background

Table 4.1 shows some characteristics of the subjects in this study. In this present study, it was found that the health profiles and living condition in the working environment of palm oil mill workers were poor. These workers were compromised to work in such situation may be due to poor socioeconomic status and low education level.

Table 4.1 Socio demographic on the subject

Variables	Frequency	Percent	Mean
Race			
Malay	111	100	1.78
Educational level			
None	2	1.8	1.00
Primary/UPSR	11	9.9	1.00
Secondary/PMR/SPM/STPM	93	83.8	2.91
Sijil/Diploma/Ijazah	5	4.5	1.00
Salary (RM)	93	83.8	1363.85
Status			
Single	24	21.6	1.80
Married	87	78.4	1.70
Total	**111**	**100.0**	

4.2 The distribution of lung function abnormalities according to work station

Among the various section of the mills, workers in sterilization has the highest number of workers with restrictive patterns of lung function status (62.5%), whereas workers in others and press work sections had the least (22.2%) as shown in Figure 4.1.

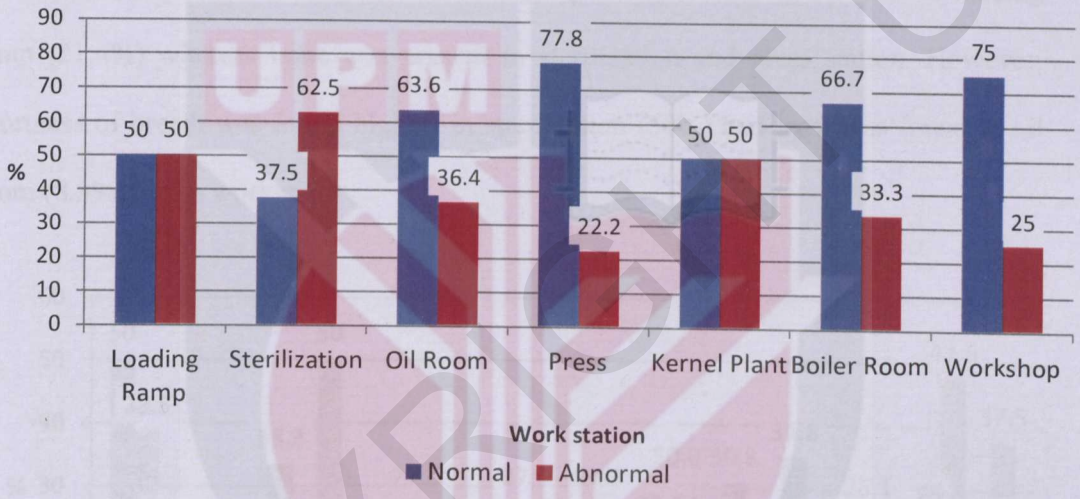

Figure 4.1 Distribution of Lung Function according to work section

4.3 The distribution of respiratory symptoms according to work station

The distribution of workers with respiratory symptoms was as shown in Figure 4.2. Coughing was present highest in loading ramp (50%) and the least (8.3%) are least in oil room section. In workshop, phlegm has the highest present in workers (47.6%) and least are in boiler room (17.4%). Wheezing was present highest also in loading ramp (21.4%) whereas none was present in sterilization and press station. However, shortness of breath was found highest in sterilization (50%) and least was found in oil room (8.3%) of the workers.

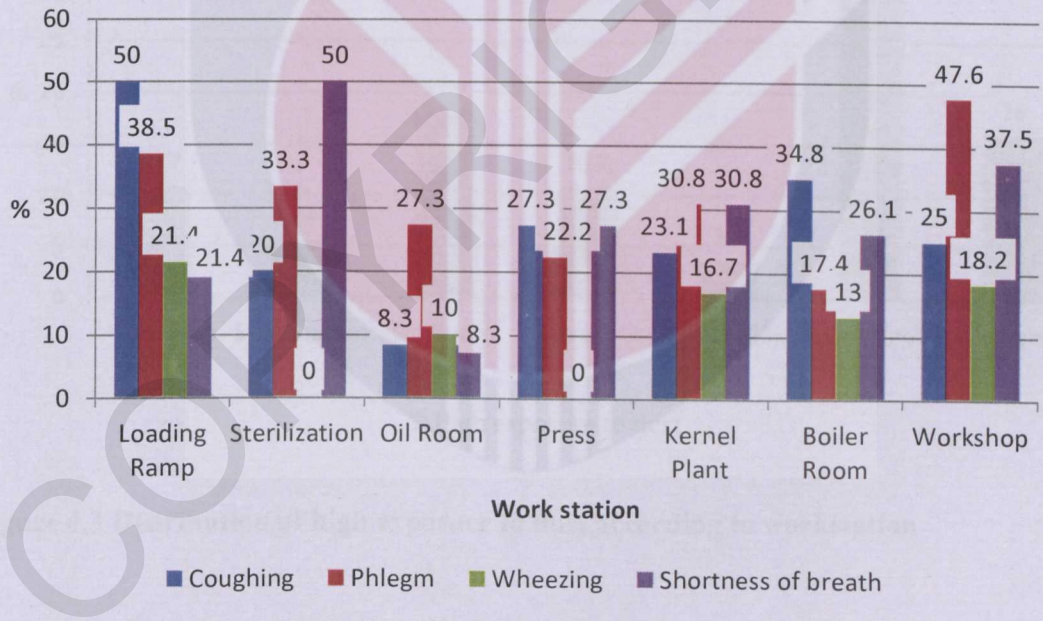

Figure 4.2 Distribution of respiratory symptoms by work station

4.4 The distribution of exposures to dust according to work station

In Figure 4.3, it shows the distribution of workers with high exposure to dust. Hence, it can be concluded that workers in boiler room has the majority of workers whom exposed to high concentration of dust (35.7%). Second to boiler room is oil room station (17.9%) which is located beside boiler room in every mill. Workshop is the next with 16% and followed by loading ramp as well as press with 10.7% each. Sterilization recorded 5.4% and the least is kernel plant (3.6%).

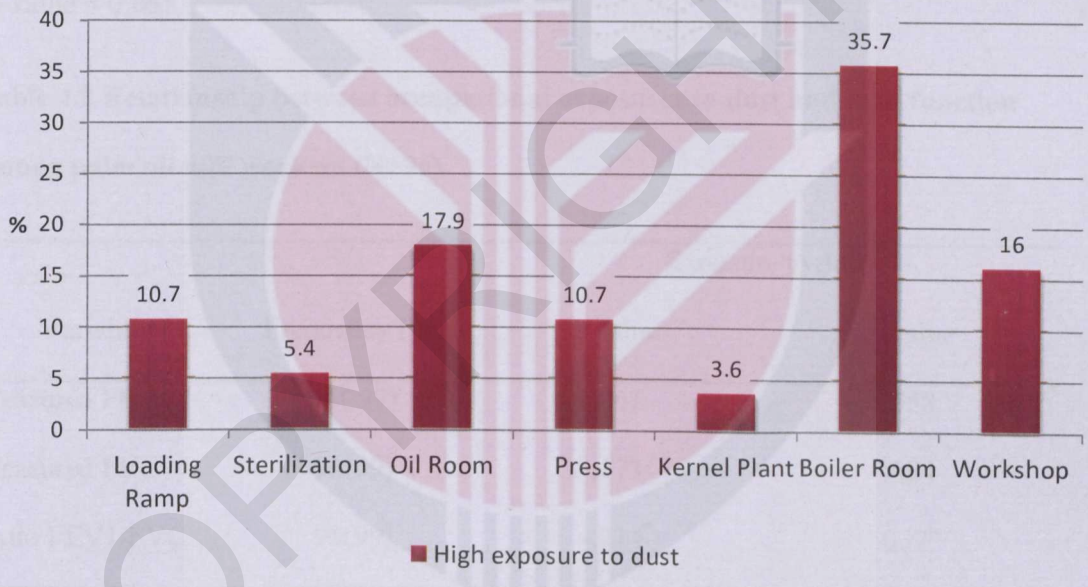

Figure 4.3 Distribution of high exposure to dust according to workstation

4.5 Occupational exposures to dust and lung function among palm oil mill workers

In Table 4.2, shows the relationship between occupational exposures to dust and lung function. There is no significant between exposures to dust and measured FEV1 as well as exposures to dust and measured FVC. However, the association between exposure to dust and ratio FEV1/FVC variables were found statistically significant. (p-value < 0.05)

Table 4.2 Relationship between occupational exposures to dust and lung function among palm oil mill workers (N=96)

		Exposure to dust	
Variables	Frequency (%)	*r* value	p-value
Measured FEV1	95(99)	.061	.558
Measured FVC	95(99)	.173	.094
Ratio FEV1/FVC	95(99)	-.214*	.037*

p-value is significant at p < 0.05

4.6 Occupational exposures to dust and respiratory symptoms

Table 4.3 shows the relationship between occupational exposures to dust and respiratory symptoms which suggest that there are significant relationship detected (p-value < 0.05) in coughing at night as well as wheezing sometimes during cold. However, there is no significant relationship between other symptoms such as coughing and shortness of breath to exposure to dust.

Table 4.3 Relationship between occupational exposures to dust and respiratory symptoms (N=96)

Variables	Exposures to dust	
	r value	p-value
COUGHING		
Frequent	.083	.385
Cough 4-6 times a day	.040	.677
Coughing at morning	.034	.726
Coughing at night	.233*	.014*
Coughing for 3 months continuously	.033	.837
PHLEGM		
Frequent	.040	.689
Phlegm 2 times a day	.022	.818
Phlegm at morning	-.010	.917
Phlegm at night	.069	.475
Phlegm for 3 months continuously	.122	.431
Increasing cough and phlegm for more than 3 weeks	.096	.340
WHEEZING		
During cold	.080	.420
Sometimes during cold	.228*	.021*
Almost everyday	-.139	.164
SHORTNESS OF BREATH		
During fast walking/climbing	.003	.974
Walk slowly due to it	.252	.178
Stop during walking	.317	.088
Stop to breath after 30 meter of walking	.219	.244

p-value is significant at $p < 0.05$

4.7 Comparison of lung function and exposures to dust between work stations

The results as shown in Table 4.4, it shows that there is a statistically difference in the mean of ratio FEV1/FVC between the different work station (F=5.973, p-value = 0.16). The post-hoc test revealed that the mean of ratio FEV1/FVC is statistically significant different between boiler room and sterilization work station. However, there is no significant different in between other groups of work station (p-value > 0.05).

Table 4.4 Comparison of lung function by work station

Variables		Mean	F	Sig
FEV1	Loading Ramp	0.4220		
	Sterilization	0.3990		
	Oil Room	0.3646		
	Press	0.4261	.236	.975
	Kernel Plant	0.3469		
	Boiler Room	0.4107		
	Workshop	0.000		
FVC	Loading Ramp	0.4364		
	Sterilization	0.4201		
	Oil Room	0.3988		
	Press	0.4569	.473	.852
	Kernel Plant	0.4112		
	Boiler Room	0.4759		
	Workshop	0.000		
Ratio	Loading Ramp	0.000		
FEV1/FVC	Sterilization	0.000		
	Oil Room	0.000		
	Press	0.000	5.973	.016*
	Kernel Plant	0.000		
	Boiler Room	0.000		
	Workshop	0.000		

p-value is significant at $p < 0.05$

By referring to Table 4.5, the difference between exposure to dust and different groups of work station is statistically significant (F= 4.267, p-value = 0.00). After further analysis by post-hoc test, it is found that there is statistically significant different mean of exposure to dust between the work station of boiler room and kernel plant. There is no significant different in between other groups of work station in their mean of exposure to dust (p-value > 0.05).

Table 4.5 Comparison of exposure to dust by work station

Variables		Mean	F	Sig
Exposure to dust	Loading Ramp	1.0310		
	Sterilization	1.0213		
	Oil Room	0.9793		
	Press	1.0422	4.267	.000*
	Kernel Plant	0.9673		
	Boiler Room	1.2725		
	Workshop	0.9762		

p-value is significant at $p < 0.05$

CHAPTER 5

DISCUSSION

5.1 Respondent background

In this study, there were 96 males at the palm oil mills involved. All the respondents were Malay ethnicity and majority of them had secondary educational level of background. Respondents were taken from 19 to 69 age years old because it is the range of age where people do working. Information on their salary and marital status is also recorded as socio economic factors.

5.2 The distribution of lung function abnormalities according to work station

The respiratory symptoms and abnormal pulmonary function tests was used to identify the respiratory disorders among the workers. Based on Figure 4.1, although the lung function test results show that most workers are normal, there are some of them who possess respiratory symptoms. As compared to previous studies by Renke W (1988), Prowse K et al. (1989) and Das PKL, Jha N (2009), the abnormal pulmonary function tests observed were mainly restrictive changes, however, there are few cases had combined obstructive and restrictive impairment. A worker with obstructive pattern of impairment occurs as a result of damage to the small airways or bronchioles, resulting in a decreased ability to exhale air. A worker with restrictive pattern of impairment describes a condition in which there is a reduction in the volume of air that can be taken in and then pushed out of the lungs (a breath). It is possible for both patterns of impairment to occur at the same time. Pre-existing conditions, such as asthma, chronic bronchitis and allergies can aggravate the situation. These are explained in an article by Subbarao P., Mandhane P.J., and Sears M.R.(2009).

5.3 The distribution of respiratory symptoms according to work station

In this study, noticed a trend of respiratory symptoms such as coughing, wheezing, phlegm and shortness of breath. As overall, majority of the workers in loading ramp and sterilization were having coughing and shortness of breath symptoms. This might be due to their nature of work which some of the workers in varies work section do not exposed directly to the source of hazard that is palm oil fruit fibers. This is in harmonized to a study by Halvani and colleagues (2008) showed that respiratory complaints in study group are high. However, more deep studies should be done to understand more on the respiratory status of palm oil mill workers.

5.3 The distribution of exposure to dust according to work station

It is found that workers are exposed to high concentration of dust. In general, workers in boiler room were the most exposed. The main cause is the fibers and shells from the palm fruit itself which they use as a fuel in the boiler. Having to work directly to the furnace also contributes to the findings.

5.5 Occupational exposures to dust and lung function among palm oil mill workers

In this study, there is no significant between exposures to dust and measured FEV1 as well as exposures to dust and measured FVC. However, the association between exposure to dust and ratio FEV1/FVC variables were found statistically significant. According to a study by Coplu et al (2005) suggests that exposure to dust was associated with both respiratory symptoms and lung function status.

5.6 Occupational exposures to dust and respiratory symptoms

This study shows that there is no significant association between occupational exposures to dust and respiratory symptoms. This is contradict to a study by Sakwari et al. (2011), which reported that the respiratory symptoms found in their study, as in the other studies, might be associated with dust exposure, as most complaints were from the exposed group. Those study and previous studies show that symptoms may be present among exposed coffee workers even at low level of dusts. This may be due to the healthy lifestyle the workers are engaged into and also the situation in the mill itself.

5.7 Comparison of lung function and exposures to dust between work stations

The mean in ratio FEV1/FVC and between the different work stations was significantly difference in boiler room and sterilization probably due to high exposure compared to other work stations. This is similar in another study by Nagoda et al (2012). ANOVA analysis found a significant difference between the mean of the exposure to dust in the boiler room and kernel plant was higher than in the other areas. The post hoc method revealed no significant difference between the boiler room and oil room station, and no difference between the loading ramp, sterilization, press and workshop. This result is supported by HO AHMED *et al.* (2012). It was probably because these sections were dustier than the remaining work stations in the mill.

5.8 Conclusion

In general, the conclusions are summarized as follows:

1. Lung function test were conducted and the results is recorded in order to achieve the first objective. It is collected from respondents which does not have any smoking history and respiratory problems history. Since majority of workers has abnormalities in lung function status, hence, there is a need to consider a proper screening program.
2. Workers had high respiratory symptoms reported in this study.
3. High exposures to dust are detected at boiler room compared to other stations.
4. The exposure to dust is identified as a health hazards among the workers. However, further study is required to identify the factors that determine the consistent presence of occupational lung hazards related to respiratory symptoms.
5. Workers had no significant association between exposures to dust and respiratory symptoms.
6. The outcomes also indicated that there is differences between studied variables and work station; Lung function (boiler room and sterilization work station) and Dust (boiler room and kernel plant).

To conclude, palm oil mill workers were mainly exposed to physical hazards which is organic dust produced by extraction process. Therefore, recognition of the hazards associated with occupational lung disease and prevention of exposure must be a high priority.

5.9 Recommendations

1. As for the socio-demographic data, a large pool of population (samples from each state in Malaysia and race) should be considered for the study regarding the extent of better results of data.
2. There is a need to consider a proper screening program and periodic examination for lung function test such as stated by Dehghan F et al (2009).
3. A suggestion for the management is to gives out and wear N95 mask which can prevent from inhaling particulates. The more we can prevent, the better it is. It is under the duty of employer under OSH Act1994 Section 15 (General Duties of Employer) to provide a safe working environment for the workers to do their job. Also, a long-term follow up studies with larger samples and accurate test should be conducted to confirm our findings in this present study.
4. These occupational hazards are significant causes of morbidity, disability, early retirement, and death. They are entirely preventable by changing the old ventilation system with a new one and also by maintaining them, it would be a good help.
5. Clinical tests conducted by medical specialist such as Occupational Health Doctors (OHD) are recommended for assessing lung function and respiratory problems more specifically among the workers.

REFERENCE

AlaEldin Hassan Ahmed, Ilham Eltag Bilal, Tarig Hakim Merghani. Effects of exposure to flour dust on respiratory symptoms and lung function of bakery workers. *Sudanese journal of public health January*, 2009. vol 4 no.1

Bakke P, Eide GE, Hanoa R, Gulsvik A. Occupational dust or gas exposure and prevalences of respiratory symptoms and asthma in a general population. ***Eur Respir J*** 1991; 4(3): 273- 8.

Bakke PS, Baste V, Hanoa R, Gulsvik A. Prevalence of obstructive lung disease in a general population: relation to occupational title and exposure to some airborne agents. ***Thorax*** 1991; 46 (12): 863- 70.

Balmes J. Occupational exposures as a cause of chronic airway disease. In: Rom W, editor. Environmental and occupational medicine. USA: Lippincott Williams & Wilkins, 2007: 517.

Beckett WS, Occupational respiratory diseases. ***N Engl J Med*** 2000; 342 (6): 406- 13.

BETTER MEDICINE from Healthgrades, 2013 Respiratory Symptoms. Retrieved from http://www.localhealth.com/article/respiratory-symptoms

Coplu et al.: Lung health in workers exposed to reed dust. Respiratory Medicine (2005) 99, 421-428

D. A. Schwartz and M. W. Peterson, "Occupational lung disease," *Disease*, vol. 44, no. 2, pp. 44–84, 1998

D. Mijakoski, J. Minov, S. Stoleski, Respiratory and nasal symptoms immunological changes and lung function in industrial bakers, Maced J. Med. Sci. (2011) 1–7, http:// dx.doi.org /10.3889/ MJMS.1857-5773.2011.0212.

E. Zuskin, J. Mustajbegovic, E. N. Schachter, J. Kern, J. Doko, and J. Godnic-Cvar, "Respiratory findings in workers employed in the brick-manufacturing industry," *Journal of Occupational and Environmental Medicine*, vol. 40, no. 9, pp. 814–820, 1998.

F. Dehghan, S. Mohammadi, Z. Sadeghi, andM.Attarchi, "Respiratory complaints and spirometric parameters in tile and ceramic factory workers," *Tanaffos*, vol. 8, no. 4, pp. 19–25, 2009.

Faezeh Dehghan, Saber Mohammadi, Zargham Sadeghi, Mirsaeed Attarchi. Respiratory Complaints and Spirometric Parameters in Tile and Ceramic Factory Workers. *Tanaffos,* 2009. 8(4): 19-25

Food & Agriculture Organisation, 2013, FAO Corporate Document Repository. Retrieved from http://www.fao.org/docrep/005/y4355e/y4355e04.htm

Hafiz Omer AHMED : *Dust Exposure and Respiratory Symptoms among Cement Factory Workers in the United Arab Emirates*, Industrial Health 2012, 50, 214 222

Halvani GH, Zare M, Halvani A, Barkhordari A.: *Evaluation and comparison of respiratory symptoms and lung capacities in tile and ceramic factory workers of Yazd*. Arh Hig Rada Toksikol 2008; 59(3) 197-204

J. E.Myers and J. E. Cornell, "Respiratoryhealthof brickworkers in Cape Town, South Africa. Symptoms, signs and pulmonary function abnormalities," *Scandinavian Journal of Work, Environment and Health*, vol. 15, no. 3, pp. 188–194, 1989.

J. Karadzinska-Bislimovska, J. Minov, S. Risteska-Kuc, S. Stoleski, D. Mijakoski, Bronchial hyperresponsiveness in women cooks and cleaners, Arh Hig Rada Toksikol. 58 (2007) 223–231.

J. Minov, J. Karadzinska-Bislimovska, K. Vasilevska, S. Risteska-Kuc, S. Stoleski, Bronchial hyperresponsiveness in workers exposed to organic dusts: effect of smoking, Allergy Hypersensitivity Asthma 4 (1) (2006) 11–20.

J. W. Koo, C. K. Chung, C. Y. Park et al., "The effect of silica dust on ventilator function of foundry workers," *Journal of Occupational Health*, vol. 42, no. 5, pp. 251–257, 2000.

J.E. Cotes, Lung Function Assessment and Application in Medicine, forth ed., Blackwell Scientific Publications, London, 1979.

Janusz Milanowski, Anna Gora, Czeslawa Skorska, Ewa Krysinska-Traczyk, Barbara Mackiewicz, Jolanta Sitkowska, Grazyna Cholewa, Jacek Dutkiewicz. Work related symptoms among furniture factory workers in Lublin region (eastern Poland). *Ann Agric Environ Med*, 2002. 9, 99–103.

Karjalainen A, R. Martikainen, T. Klaukka, et al. Risk of asthma among Finnish patients with occupational rhinitis. Chest, 2003. 123:283-288.

Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jameson JL. Environmental lung diseases. In: *Harrison's principles of Internal Medicine.* 2008. Vol. 2. 16th *ed. New York: McGraw-Hill*, 1521-1527.

Kayhan et al Prevalence of Occupational Asthma and Respiratory Symptoms in Foundry Workers Hindawi Publishing Corporation Pulmonary Medicine Volume 2013, Article ID 370138, 4 pages

Kayhan et al Prevalence of Occupational Asthma and Respiratory Symptoms in Foundry Workers Hindawi Publishing Corporation Pulmonary Medicine Volume 2013, Article ID 370138, 4 pages

Kogevinas M, Antó JM, Soriano JB, Tobias A, Burney P. The risk of asthma attributable to occupational exposures. A population-based study in Spain. Spanish Group of the European Asthma Study. ***Am J Respir Crit Care Med*** 1996; 154 (1): 137- 43.

M Nagoda et al : *Assessment of respiratory symptoms and lung function among textile workers at Kano Textile Mills, Kano, Nigeria.* Nigerian Journal of Clinical Practice 2012; 15(4) ; 373-379

M Nagoda et al, *Assessment of respiratory symptoms and lung function among textile workers at Kano Textile Mills, Kano, Nigeria.* Nigerian Journal of Clinical Practice 2012; 15(4) ; 373-379

M. Singhal, F.Khaliq, S. Singhal, andO. P.Tandon, "Pulmonary functions in petrol pump workers: a preliminary study," *Indian Journal of Physiology and Pharmacology*, vol. 51, no. 3, pp. 244–248, 2007.

Malaysian Palm Oil Council, 2011, Malaysian Contribution to Global Food Security http://www.mpoc.org.my/default.aspx#_7

Manjula, et al.: Health status of portland cement factory workers International Journal of Medicine and Public Health | Jul-Sep 2013 | Vol 3 | Issue 3

Mashalla, Y. J; Mesesa, P. C; Veenekalaas, R.J. Changing relationship between FEV1 and height during adolescene. *East Afr. Med. J.* 1992. 69:240-243.

Mengesha YA, Bekele A. *Relative chronic effects of occupational dusts on respiratory indices and health of workers in three Ethiopian factories*. Am J Ind Med 1998; 34:373–80.

Mohamed E, A.Dalia. Occupational exposures as a cause of chronic obstructive pulmonary disease. *Egyp-tian Journal of Bronchology*, 2009. 3 (1): 11-23.

Mohammad Hossain Boskabady, Majid Khadem Rezaiyan, Iman Navabi, Sara Shafiei,Shahideh Shafiei Arab. Work-related respiratory symptoms and pulmonary function tests in northeast Iranian (the city of Mashhad) carpenters. CLINICS; 2010. 65(10):1003-1007

P. Subbarao, P.J. Mandhane, M.R. Sears, Asthma: epidemiology, etiology and risk factors, CMAJ 181 (2009) E181–E190.

PALM OIL & RELATED PRODUCTS, 2011 1 of 12 National Key Economic Areas under Economic Transformation Program. Retrieved from http://www.chinesechamber.org.my/html/themes/chinesechamber/images/content/bulletin338/Palm_Oil_And_Related_Products.pdf

Park K. Occupational health. In: Park's textbook of preventive and social medicine. 18th *ed. Jabalpur: M/s Banarsidas Bhanot*, 2007.608- 610.

PKL Das, N Jha, *Occupational exposure and pulmonary function of jute mill workers in Sunsari, Nepal*. Nepal Med Coll J 2009; 11(4); 275-277

Prowse K et al. *Respiratory symptoms and pulmonary impairment in male and female subjects with pottery worker's silicosis*. Ann Occup Hyg 1989; 33; 375-85

R. Pellegrino, G. Viegi, V. Brusasco et al., "Interpretative strategies for lung function tests," *European Respiratory Journal*, vol. 26, no. 5, pp. 948–968, 2005

Rastogi, S.K., I. Ahmed, B.S. Pangtey, N, Mathur. Effects of occupational exposure on respiratory system in carpet workers. *Indian Journal of Occupational and Environmental Medicine*, 2003. Vol. 7(1):19 - 26.

Renke W. *Evaluation of physiological changes progress in people of long term exposure to asbestos during 5 years observation*. Bull Institute Maritime Trop Med Gdynia 1988; 39 :155-63

S.A. Meo, A.M. AL-Dress, *Lung function among nonsmoking Wheat flour mill workers*, Int. J. Occup. Med. Environ. Health 18 (3) (2005) 246–251.

Sakar A, Kaya E, Celik P, Gencer N, Temel O, Yaman N, et al. Evaluation of silicosis in ceramic workers. ***Tuberk Toraks*** 2005; 53 (2): 148- 55.

Sakwari et al.: *Dust exposure and chronic respiratory symptoms among coffee curing workers in Kilimanjaro: a cross sectional study*, BMC Pulmonary Medicine 2011, 11:54

Sangeeta Vyas, *A Study of Pulmonary Function Test in Workers of Different Dust Industries.* International Journal of Basic and Applied Medical Sciences ISSN 2012; 2(2); 15-21

Singh et al, *Occupational Exposure to Respirable Suspended Particulate Matter and Lung Functions Deterioration of Steel Workers: An Exploratory Study in India.* ISRN Public Health 2013; 325410; 1-8

SULTAN A MEO and ABDUL MAJEED AL-DREES, *Lung Function Among Non Smoking Wheat Flour Mill Workers.* International Journal of Occupational Medicine and Environmental Health, 2005; 18(3): 259 — 264

T. Mariammal et al Work Related Respiratory Symptoms and Pulmonary Functio Tests Observed Among Construction and Sanitary Workers of Thoothukudi. /Int.J.PharmTech Res.2012,4(3)

Tanaffos (2009) 8(4), 19-25 ©2009 NRITLD, *National Research Institute of Tuberculosis and Lung Disease, Iran*

Taytard A et al, *Respiratory Function and bronchial reactivity in mill workers.* Euro J Epidemiol 1988; 4; 326-30

Ulvestad B, Lund MB, Bakke B, Djupesland PG, Kongerud J, Boe J. Gas and dust exposure in underground construction is associated with signs of airway inflammation. Eur Respir J. 2001. 17:416-421.

Vermeulen R, Heederik D, Kromhout H, Smit HA. Respiratory symptoms and occupation: a cross-sectional study of the general population. ***Environ Health*** 2002; 1 (1): 5.

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

BORANG PERSETUJUAN RESPONDEN

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*)

TQ 001

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

"THE ASSESSMENT OF RESPIRATORY SYMPTOMS AMONG PALM OIL MILL WORKERS USING LUNG FUNCTION TEST"

No. ID Pekerja : .....

ORGANISASI : .....

TARIKH : .....

TANDA TANGAN : .....

ARAHAN SOALAN:

1. Borang soal selidik ini mengandungi sepuluh (10) bahagian iaitu:
   - **BAHAGIAN A: MAKLUMAT DIRI**
   - **BAHAGIAN B: MAKLUMAT PEKERJAAN**
   - **BAHAGIAN C: MAKLUMAT KESIHATAN**
   - **BAHAGIAN D: MAKLUMAT GAYA HIDUP**
   - **BAHAGIAN E: MASALAH GEJALA RESPIRATORI**
2. Anda diminta untuk menjawab semua soalan yang ada di dalam buku ini
3. Untuk menjawab, sila tandakan jawapan di bahagian jawapan yang telah disediakan
4. Borang soal selidik hendakalah dikembalikan kepada pengkaji setelah selesai menjawab semua soalan

Untuk kegunaan penyelidik

BAHAGIAN A: MAKLUMAT DIRI

1.0 ID : [ ][ ][ ][ ] A 1.0

1.1 Tarikh lahir : [ ][ ] [ ][ ] [ ][ ][ ][ ] A 1.1

1.2 No. K/Pasport : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] A 1.2

1.3 No. Telefon : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] A 1.3

1.4 Umur : [ ][ ] tahun A 1.4

1.5 Bangsa : 1. [ ] Melayu 2. [ ] Cina A 1.5
3. [ ] India 4. [ ] Lain-lain

1.6 Warganegara : 1. [ ] Warganegara 2. [ ] Bukan warganegara A 1.6

1.7 Status : 1. [ ] Bujang 2. [ ] Berkahwin A 1.7
3. [ ] Bercerai

1.8 Pendidikan : 1. [ ] Tidak Bersekolah A 1.8
2. [ ] Rendah/UPSR
3. [ ] Menengah/PMR/SPM/STPM
4. [ ] Sijil/Diploma/Ijazah

1.9 Gaji : RM [ ][ ][ ][ ][ ][ ] A 1.9

1.10 Tinggi : [ ][ ][ ] cm A 1.10

1.11 Berat : [ ][ ] kg A 1.11

1.12 Isi rumah : [ ][ ] orang A 1.12

1.13 Jumlah tanggungan: [ ][ ] orang A 1.13
(Termasuk ayah, ibu, isteri, anak, dll.)

1.14 Gaji Komisyen (Jika ada): RM [ ][ ][ ][ ][ ][ ] A 1.14

BAHAGIAN B: MAKLUMAT PEKERJAAN

2.1 Pernahkah anda bekerja di tempat lain sebelum ini? B 2.1

1. ☐ Ya 2. ☐ Tidak

Jika Ya, nyatakan jenis pekerjaan dan tempoh bekerja:

Jenis Pekerjaan	Tempoh Bekerja (Jumlah Tahun)	Tahun Bekerja (Contoh: 2002)

2.2 Apakah jawatan anda sekarang? B 2.2

_____

2.3 Di bahagian mana anda bekerja sekarang? B 2.3

1. ☐ Loading Ramp
2. ☐ Sterilization
3. ☐ Oil Room
4. ☐ Digester
5. ☐ Nut Silo
6. ☐ Nut Cracker
7. ☐ Oil Room
8. ☐ Stor
9. ☐ Press
10. ☐ Kernel Plant
11. ☐ Boiler Room
12. ☐ Depericaper
13. ☐ Workshop
14. ☐ Effluent
15. ☐ Rumah Abu
16. ☐ Lain-lain. Nyatakan:

_____

2.4 Berapa lamakah anda telah bekerja sebagai (pekerjaan seperti di atas)? B 2.4

_____ tahun

2.5 Berapa lamakah anda bekerja di kilang sawit ini? B 2.5

_____ tahun

2.6 Shift kerja:

B 2.6

1. ☐ Normal
2. ☐ Shift

2.7 Berapa hari anda bekerja dalam seminggu?

B 2.7

_____hari

2.8 Adakah anda bekerja lebih masa (OT)?

B 2.8

1. ☐ Ya 2. ☐ Tidak

2.9 Jika Ya, secara purata, berapa kerap anda bekerja lebih masa? B 2.9

1. ☐ Tiada
2. ☐ 1-3 kali sebulan
3. ☐ 3-5 kali sebulan
4. ☐ Lebih dari 5 kali sebulan

2.10 Berapa jamkah anda bekerja dalam sehari? B 2.10

_____ jam

2.11 Adakah anda menggunakan sebarang Peralatan Perlindungan Diri (PPE)? B 2.11

1. ☐ Ya
2. ☐ Tidak

2.12 Tandakan jenis PPE yang digunakan: B 2.12

1. ☐ Kasut keselamatan
2. ☐ Topi keselamatan
3. ☐ Cermin mata keselamataan
4. ☐ Sarung Tangan
5. ☐ Pakaian perlindungan diri
6. ☐ Respirator
7. ☐ Lebih dari 1 PPE
8. ☐ Lain-lain:.....

2.13 Berapa lamakah anda menggunakan PPE dalam sehari? B 2.13

_____ jam

2.14 Adakah latihan penggunaan PPE diberikan? B 2.14

1. ☐ Ya
2. ☐ Tidak

2.15 Adakah anda terdedah kepada sebarang hazad seperti di bawah: B 2.15

1. ☐ Bahan kimia
2. ☐ Panas melampau
3. ☐ Habuk
4. ☐ Bunyi bising
5. ☐ Binatang berbisa
6. ☐ Lebih dari 1 hazad
7. ☐ Lain-lain:.....

2.16 Bilangan pekerja yang menjalankan skop kerja yang sama: B 2.16

_____ orang

2.17 Adakah anda membuat kerja sambilan? B 2.17

1. ☐ Ya 2. ☐ Tidak

Jika Ya, isikan maklumat berkaitan kerja sambilan di bawah:

Jenis Pekerjaan	Jam bekerja Sehari	Kekerapan bekerja dalam seminggu (hari)

2.18 Adakah latihan mengelakkan masalah otot rangka semasa bekerja diberikan? B 2.18

1. ☐ Ya 2. ☐ Tidak

BAHAGIAN C: MAKLUMAT KESIHATAN

3.1 Adakah anda mengalami sebarang simptom-simptom seperti yang di bawah? Tandakan.

Simptom	1. Ya	2. Tidak	
3.1.1 Keletihan			C 3.1.1
3.1.2 Pening kepala			C 3.1.2
3.1.3 Pedih mata			C 3.1.3
3.1.4 Sesak nafas			C 3.1.4
3.1.5 Berdebar-debar			C 3.1.5
3.1.6 Ruam			C 3.1.6
3.1.7 Loya			C 3.1.7
3.1.8 Muntah			C 3.1.8
3.1.9 Kekejangan otot			C 3.1.9
3.1.10 Strok			C 3.1.10
3.1.11 Pitam			C 3.1.11
3.1.12 Berdengung			C 3.1.12
3.1.13 Sakit telinga			C 3.1.14
3.1.14 Kehilangan pendengaran sementara			C 3.1.15
3.1.15 Batuk			C 3.1.16
3.1.16 Berpeluh			

3.2 Adakah anda menghidap penyakit berikut dan telah disahkan oleh doktor? C 3.2 (a-e)

Penyakit (a)	1. Ya (b)	2. Tidak (c)	Adakah anda pernah mengambil sebarang ubat-ubatan untuk penyakit tersebut?	
			1. Ya (d)	2. Tidak (e)
3.2.1 Darah Tinggi				
3.2.2 Kencing Manis				
3.2.3 Asma/Lelah				
3.2.4 Jantung				
3.2.5 Schizopernia (mental)				
3.2.6 Insomnia (susah tidur)				
3.2.7 Rheumatic Arthritis (sakit sendi)				

3.3 Adakah anda mengalami sebarang kecederaan di mana-mana bahagian anggota badan berikut: C 3.3

0. ☐ Tiada Kecederaan
1. ☐ Kepala
2. ☐ Bahu
3. ☐ Tangan
4. ☐ Tulang belakang
5. ☐ Pinggul
6. ☐ Peha
7. ☐ Lutut
8. ☐ Kaki
9. ☐ Lebih dari 1 bahagian

3.4 Adakah anda menjalani aktiviti-aktiviti berikut: C 3.4

0. ☐ Tidak Berkaitan
1. ☐ Pembedahan telinga
2. ☐ Terdedah bunyi bising
3. ☐ Ketenteraan
4. ☐ Senjata api
5. ☐ Lain-lain: _____
6. ☐ Lebih dari satu aktiviti

3.5 Adakah anda mengambil sebarang ubat-ubatan selain dari yang tersebut dalam soalan **3.2** ? C 3.5

1. ☐ Ya 2. ☐ Tidak

Jika Ya, Natakan jenis ubat:_____

3.6 Adakah anda menghidap apa-apa penyakit lain selain dari yang tersebut di dalam soalan **3.2** ? C 3.6

2. ☐ Ya 2. ☐ Tidak

Jika Ya, nyatakan nama penyakit:_____

3.7 Adakah penyakit tersebut (jika ada) mengganggu pekerjaan dan menyakitkan otot rangka semasa bekerja? C 3.7

1. ☐ Ya 2. ☐ Tidak

BAHAGIAN D: MAKLUMAT GAYA HIDUP *(LIFESTYLE)*

4.1 Adakah anda mengambil sebarang jenis dadah? **D 4.1**

1. ☐ Ya 2. ☐ Tidak

4.2 Adakah anda merokok? **D 4.2**

1. ☐ Ya 2. ☐ Tidak

Jika ya, _____ batang sehari

4.3 Adakah anda melakukan sebarang aktiviti fizikal? **D 4.3**

1. ☐ Ya 2. ☐ Tidak

Jika ya, nyatakan: _____

4.4 Adakah anda mengalami kesukaran untuk tidur? **D 4.4**

1. ☐ Ya 2. ☐ Tidak

4.5 Adakah anda mengalami gangguan ketika tidur? **D 4.5**

1. ☐ Ya 2. ☐ Tidak

Jika ya, nyatakan: _____

4.6 Adakah anda mengambil minuman beralkohol? **D 4.6**

1. ☐ Ya 2. ☐ Tidak

4.7 Dalam masa terluang, adakah anda melakukan aktiviti-aktiviti berikut? **D 4.7**

1. ☐ Berburu
2. ☐ Berkebun
3. ☐ Memasak
4. ☐ Kerja-kerja rumah
5. ☐ Memancing
6. ☐ berolahraga

BAHAGIAN E: MASALAH GEJALA RESPIRATORI

BATUK

5.1 Adakah anda selalu mengalami batuk? (Batuk dibuat untuk berkahak tidak dikira) E 5.1

Ya ☐ Tidak ☐

5.2 Adakah anda batuk sekerap 4 hingga 6 kali sehari, atau lebih dari 4 hari seminggu? E 5.2

Ya ☐ Tidak ☐

5.3 Adakah anda batuk ketika bangun tidur atau pada pagi-pagi hari? E 5.3

Ya ☐ Tidak ☐

5.4 Selalukah anda batuk sepanjang hari atau pada malam hari G 7.4

Ya ☐ Tidak ☐

Jika Ya pada mana-mana soalan di atas (1 – 4) sila jawab soalan 5 dan 6.

Jika Tidak pada semua soalan di atas, sila terus ke soalan 7.

5.5 Adakah anda biasanya batuk sedemikian (soalan 3, 4, 5 atau 6) untuk selama 3 bulan berturut-turut sepanjang tahun? E 5.5

Ya ☐ Tidak ☐

KAHAK (PHLEGM)

5.6 Adakah anda selalu berkahak? (Termasuklah kahak yang ditelan) E 5.6

Ya ☐ Tidak ☐

5.7 Adakah anda berkahak sekerap 2 kali sehari, 4 hari atau lebih dalam seminggu? E 5.7

Ya ☐ Tidak ☐

5.8 Adakah anda berkahak ketika bangun tidur atau pada pagi-pagi hari? E 5.8

Ya ☐ Tidak ☐

5.9 Selalukah anda berkahak sepanjang hari atau pada malam hari? E 5.9

Ya ☐ Tidak ☐

Jika Ya pada mana-mana soalan di atas (7.6 – 7.9) sila jawap soalan 7.10

Jika Tidak pada semua soalan di atas, sila terus ke soalan 7.13.

5.10 Adakah anda berkahak sedemikian (soalan 8, 9, 10 atau 11) untuk selama 3 bulan berturut-turut sepanjang tahun? E 5.10

Ya ☐ Tidak ☐

BATUK SERTA BERKAHAK

5.11 Pernahkah anda mengalami peningkatan batuk-batuk serta berkahak yang berpanjangan lebih dari 3 minggu setiap tahun? (Jika Ya, sila jawab soalan 14) E 5.11

Ya ☐ Tidak ☐

DADA BERBUNYI (WHEEZING)

5.12 Adakah anda terasa dada anda berbunyi seperti wisel :

i.	apabila anda mengalami selsema	Ya ☐	Tidak ☐	E 5.12(i)
ii.	kadang-kala di samping selsema	Ya ☐	Tidak ☐	E 5.12(ii)
iii.	hampir setiap hari (siang atau malam)	Ya ☐	Tidak ☐	E 5.12(iii)

SUKAR BERNAFAS (BREATHLESSNESS)

5.13 Adakah anda mengalami kesukaran benafas apabila berjalan dengan pantas atau semasa mendaki? E 5.13

Ya ☐ Tidak ☐

(Jika jawab Ya pada soalan 7.13, sila jawab soalan 7.14- 7.17. Jika TIDAK sila ke Bahagian H)

5.14 Adakah anda berjalan dengan perlahan-lahan kerana sukar bernafas? E 5.14

Ya ☐ Tidak ☐

5.15 Adakah ada perlu berhenti seketika untuk bernafas semasa berjalan? E 5.15

Ya ☐ Tidak ☐

5.16 Adakah anda perlu berhenti untuk bernafas setelah berjalan sejauh 30 meter (atau selepas beberapa minit) E 5.16

Ya ☐ Tidak ☐

5.17 Adakah anda terasa sukar bernafas semasa meninggalkan rumah atau semasa memakai atau membuka pakaian? **E 5.17**

Ya ☐ Tidak ☐

Terima kasih atas kerjasama anda dalam menjayakan kajian ini.