



**UNIVERSITI PUTRA MALAYSIA**

***RISK FACTORS CONTRIBUTING TO MUSCULOSKELETAL  
DISORDERS AMONG HOTEL ROOM ATTENDANTS IN KLANG  
VALLEY***

**NUR SHAHIDA BINTI MOHAMAD PAUZI**

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AMONG HOTEL ROOM ATTENDANTS IN KLANG VALLEY**

**BY**

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**Thesis submitted in fulfillment of the requirement for the degree of  
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Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.**

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# **RISK FACTORS CONTRIBUTING TO MUSCULOSKELETAL DISORDERS AMONG HOTEL ROOM ATTENDANTS IN KLANG VALLEY**

**Nur Shahida Binti Mohamad Pauzi and Ng Yee Guan**

**Introduction:** This study involved hotel room attendants in Klang Valley as hotel industries in this area and its hospitality has been positively increasing in term of the rate of occupancy in Malaysia. Hotel room attendants are responsible for making sure that the guest rooms are well prepared in terms of the tidiness and the cleanliness of the rooms. Their routine works include changing sheets and making beds, remove dust and dirt from the furniture, clean the toilets and bathtubs, washing the bathroom floors, vacuuming the room floors, as well as pushing heavy supply trolleys. Their job task require them to be expose to ergonomics risk factors such as awkward posture, repetitive movement, and forceful exertion. **Objective:** The primary objective of this study is to determine risk factors associated with musculoskeletal disorder among hotel room attendants. **Methodology:** The instruments used was questionnaire which consists questions on socio-demographics background, occupational information, lifestyle, and medical information as well as Rapid Entire Body Assessment. **Result and Discussion:** Results of ergonomics risk assessment indicates that 37 (33.3%) falls under very high risk level, 66 (59.5%) of respondents were in high risk level and 8 (7.2%) of respondents were in medium risk level. A high prevalence of musculoskeletal disorders (MSDs) was self reported in which 96 (86.5%) of the respondents had experienced musculoskeletal symptoms meanwhile only 15 (13.5%) did not. The risk factors that significantly associated with musculoskeletal disorders were rheumatoid arthritis( $p=0.038$ ), marital status  $p=(0.036)$ , years of working ( $p\leq 0.05$ ) and age ( $p\leq 0.05$ ). **Conclusion:** In conclusion, the results showed a high prevalence of MSDs among room attendants in the hotel industries in Klang Valley and correspondingly high level or ergonomics risks. It is recommended that the management take and implement action such as work training and to have additional staffs in order for them to reduce the MSDs prevalence.

**Keywords:** Hotel room attendants, Rapid Entire Body Assessment (REBA), Nordic Musculoskeletal Questionnaires(NMQ), Musculoskeletal Disorders(MSD), Klang Valley

# **FAKTOR RISIKO MENYUMBANG KEPADA PENYAKIT MUSCULOSKELETAL TERHADAP TUKANG CUCI BILIK HOTEL DI LEMBAH KLANG**

**Nur Shahida Binti Mohamad Pauzi and Ng Yee Guan**

**Pengenalan:** Para tukang cuci bilik hotel bertanggungjawab memastikan bilik tetamu disediakan dengan baik dari segi keselesaan dan kebersihan setiap bilik. Kerja-kerja rutin mereka termasuk menukar cadar dan mengemas katil, membersihkan habuk dan kotoran di setiap perabot, membersihkan tandas dan kolam mandi, memcuci lantai bilik mandi, memvakum lantai bilik, dan juga menolak troli bekalan yang berat. Tugas harian mereka terdedah kepada faktor risiko ergonomik seperti postur yang janggal, pergerakan berulang kali, dan penggunaan tenaga yang kuat. Kajian ini melibatkan tukang cuci bilik hotel di Lembah Klang dimana industri hotel di kawasan ini dan peratusan tetamu ke industri hotel di Lembah Klang telah meningkat secara positif. **Objektif:** Objektif kajian ini adalah untuk menentukan faktor risiko yang berkaitan dengan gejala muskuloskeletal di kalangan tukang cuci bilik hotel. **Metodologi:** Kajian ini menggunakan borang soal selidik iaitu Nordic Musculoskeletal (NMQ), borang soal selidik berkaitan sosio-demografi, dan Rapid Entire Body Assessment (REBA) yang digunakan untuk menilai tahap risiko ergonomi. **Keputusan dan Perbincangan:** Tahap risiko ergonomik yang dialami oleh petugas bilik juga menunjukkan bahawa 37 (33.3%) menunjukkan tahap risiko yang sangat tinggi, 66 (59.5%) responden berada dalam tahap risiko tinggi dan 8 (7.2%) responden berada dalam tahap risiko yang sederhana. Kajian ini memnunjukkan kadar gejala sakit otot yang sangat tinggi (MSDs) di mana 96 (86.5%) responden mengalami gejala muskuloskeletal manakala hanya 15 (13.5%) pula tidak mengalaminya. Faktor risiko lain yang dikaitkan dengan gangguan muskuloskeletal adalah arthritis rheumatoid ( $p=0.038$ ), status perkahwinan ( $p=0.036$ ), tempoh tahun bekerja ( $p\leq 0.05$ ), dan faktor umur ( $p\leq 0.05$ ). **Kesimpulan:** Kesimpulannya, kadar gejala muskuloskeletal terhadap tukang cuci hotel di Lembah Klang adalah tinggi dan risiko ergonomik juga menunjukkan bahawa mereka terdedah di paras bahaya. Dicadangkan bahawa pihak pengurusan untuk mengambil tindakan pengubahsuaian seperti menjalankan latihan kerja dan menambah kakitangan tambahan supaya gejala MSD dapat dikurangkan.

**Kata kunci:** Tukang Cuci Bilik Hotel, Rapid Entire Body Assessment (REBA), Questionnaires Nordic Musculoskeletal (NMQ), Musculoskeletal Disorders (MSD), Lembah Klang

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background Of Study**

Hotel room attendants; also known as hotel housekeepers can be categorized as one of the most important workforce in the hotel industries. They were needed in order to take the responsibilities of making sure that the guest rooms are well prepared in terms of the tidiness as well as the cleanliness of the rooms. Their routine works includes changing sheets and making beds, emptying wastebaskets, remove dust and dirt as of the furniture, clean the toilets, taps and bathtubs, washing the bathroom floors, vacuuming the room floors, as well as pushing heavy supply trolleys (Hsieh, Apostolopoulos, & Sönmez, 2013). Besides, a study conducted by Hsieh et al. (2013) have estimated that the room attendants need to ensure approximately 12-16 guestrooms were done per shift where every room will take less than 30 minutes to be done. Their work load however will be increase if the hotels have more rooms to be settle down.

These workers were also exposed to various types of hazard such as physical hazard, chemicals hazard, biological hazard, psychosocial hazard, and ergonomics hazard. This study will focus on ergonomics hazard faced by the hotel room attendance as several studies have proved that the tasks that the hotel room attendants involved in were physically demanding work such as repetitive movement, lifting, lowering, stretching and

bending, as well as pushing and pulling supply trolleys in which may contribute to the musculoskeletal disorders among housekeepers (Hsieh et al., 2013).

## **1.2 PROBLEM STATEMENT**

Based on the official annual report of the Social Security Organization (SOCSO), the number of musculoskeletal diseases (MSDs) cases has been increasing year by year. The number of cases in 2012 was 448 and increased by 69 cases in the year 2013 (517 cases). From the year 2013 to 2014, the number of cases had increased by 158 cases which makes a total number of 675 cases reported in the year 2014. Between the years 2014 to 2015, the number of cases increased was quite small compared to the other years which is 33 cases. However the cases continue to increase vigorously in the year 2016 with the increment of 298 cases, thus makes the total number of cases in the year 2016 equal to 1006 cases. Up to year 2017, the total number of musculoskeletal disorders has been reported were equal to 1354 which which increased by 348 cases from the previous year. Overall, the percentage of MSDs cases over total occupational disease cases has taken approximately 19% to 23% out of 100%. Hence, in order to mitigate the MSDs cases, it is crucial to know the factors that may contribute to MSDs among workers and mitigation measures can be implemented.

Based on number of accidents and benefits paid according to industry by DOSH, hotel services shows fluctuation records by years. However, the increasing and decreasing number of cases did not show a huge difference between one another which means the number of these cases reported were high every year. The number of accident reported in

the year 2012 was 1212 of people followed by 1189 people in 2013, 1178 people in 2014, 1193 people in 2015 and 1125 of people in 2016.

Even though the annual report from SOCSO did not give the specific number of MSDs cases for hotel industries, the annual economic statistics from Department of Statistics Malaysia (2018) had shown that the number of persons engaged in accommodation services (comprises of all types of hotels) were high. The number of persons engages in the accommodation sector in 2017 was equal to 139410 persons which shows an increment of 3.3% from the year 2015 (130675 persons).

Based on the working nature of hotel room attendants, their work demand such as many rooms need to be clean up, as well as the short time within the check-out (12.00 PM) and check-in time (2.00PM) of the guests may cause them to do their work in rush. This situation might also worsen the housekeepers if the guests did not check-out on the respected time and this will make the housekeepers have limited time to tidy up the room before the next guests come in.

The musculoskeletal disorders develop by the room attendants could affect the productivity of their work performance which subsequently leads to lower quality of cleaning and lower satisfaction from the customers which will also affect their incomes paid by the employer. Furthermore, the MSDs also will cause high level of absenteeism which potentially leads to high compensation rates to be charged to the respective hotel industry and will affect the economics status of the hotels.

There are also several studies that have been conducted towards hotel housekeepers to assess their nature of work with the work-related musculoskeletal disorders and it has been prove that there is an association between ergonomics risk factors and musculoskeletal disorders (MSDs) (Nasrull, Rahman, Syahir, & Jaffar, 2017; Hsieh et al., 2013; Abdol Rahman, Muhamad Jaffar, Hassan, Ngali, & Pauline, 2017; Oxenbridge & Moensted, 2011; Liddle, 2014). Study conducted by Nasrull (2017) showed that majority of the housekeepers have high prevalence of developing musculoskeletal disorders involving low back (60% of 65 respondents), wrists/hands (41.5% of 65 respondents) and knees (36.9% of 65 respondents) (Nasrull, Rahman, Syahir, & Jaffar, 2017).

### **1.3 STUDY JUSTIFICATION**

This research shows a baseline data of the prevalence of musculoskeletal disorders (MSDs) and also the real scenario or problems faced by the room attendants that related to the ergonomics risk factors arise in their workplace. Based on the problem identified, this allow the hotel industries to take note for better administrative management, engineering controls that aids in the work task of housekeepers thus increasing the quality and productivity of their work. By looking into these measures, it will subsequently increase the reputation of tourism industries in the future. Furthermore, this study would bring benefits as the problems that lead to work-related musculoskeletal among hotel room attendants in Malaysia is still not well established and the ergonomics risks that faced by them is has not been adequately characterized yet.

## **1.4 OBJECTIVES**

### **1.4.1 General Objectives**

To determine the association of risk factors contributing to musculoskeletal disorders among hotel room attendants in Klang Valley.

### **1.4.2 Specific Objectives**

- i. To identify the socio-demographic characteristics, occupational information, occupational history, social lifestyle and medical history of hotel room attendants.
- ii. To determine the ergonomics risk level of the job task among hotel room attendants.
- iii. To determine the prevalence of work-related musculoskeletal symptoms experienced by the housekeepers.
- iv. To determine the risk factors associated with musculoskeletal disorders among hotel room attendants.

## **1.5 HYPOTHESIS**

There is a significant association between risk factors with musculoskeletal disorders among hotel room attendants.

## **1.6 CONCEPTUAL FRAMEWORK**

Figure 1.1 shows the conceptual framework of the study which was being used as guide to provide a broad overall view in this study to determine the association of risk factors contributing to musculoskeletal disorders among hotel room attendants in Klang Valley.

From the conceptual framework, this study focused on hotel room attendants rather than other types of workers in this sector. Hotel room attendants are exposed to many types of hazard such as physical, biological, chemical psychosocial and ergonomics hazard. Despite of other types of hazards, this research focused on ergonomics hazard in causing musculoskeletal disorders of hotel room attendants. This study also take into consideration of other work related factors that contributes to musculoskeletal disorders (MSDs) such as ergonomics risk factors, current occupation information such as working duration, years of working and job training; occupational history such as previous years of work; and medical history such as rheumatoid arthritis of the hotel room attendants.

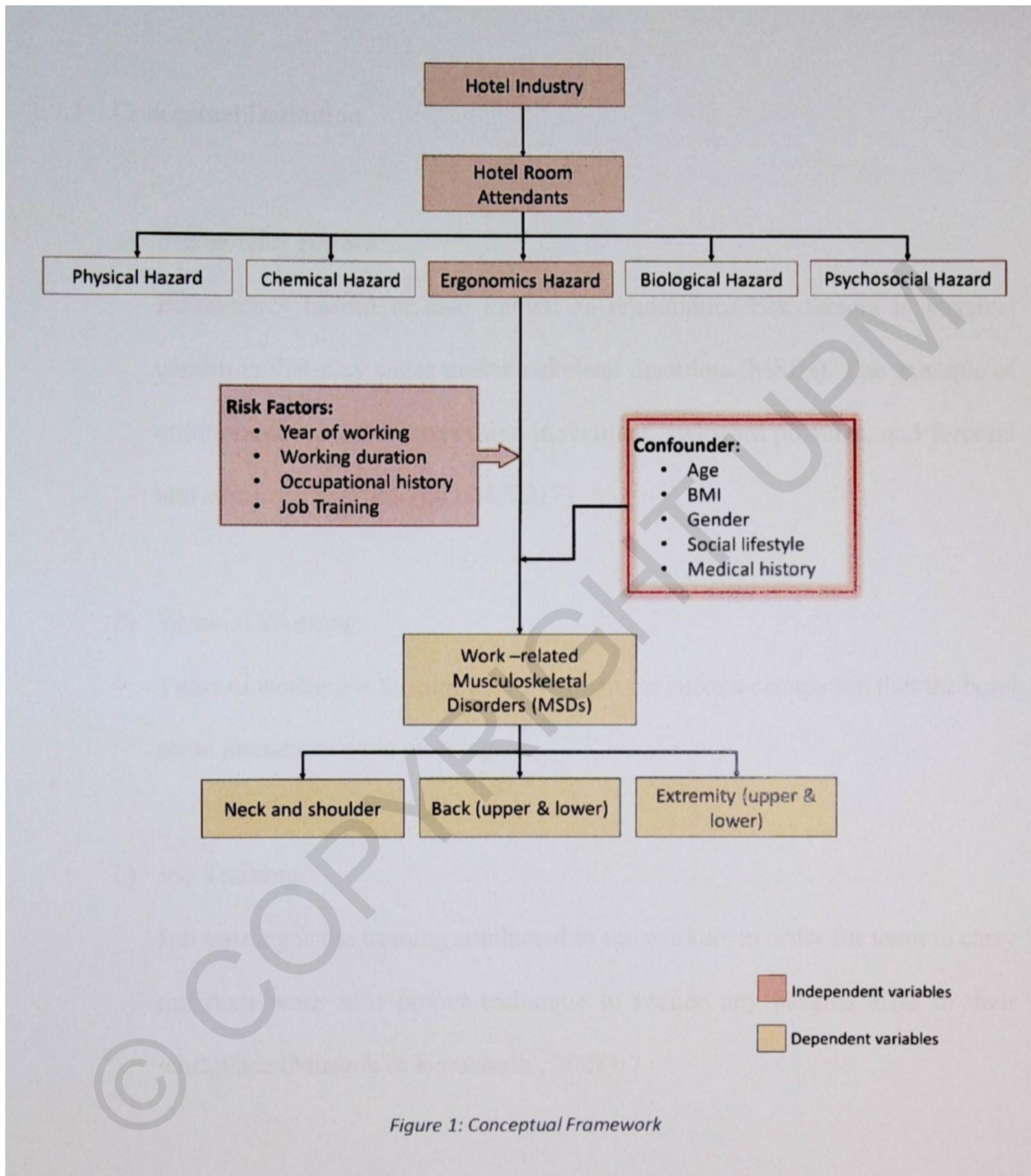


Figure 1: Conceptual Framework

## **1.7 DEFINITION OF TERMS**

### **1.7.1 Conceptual Definition**

#### **a) Ergonomics Hazard**

Ergonomics hazard or also known as ergonomics risk factors is physical condition that may cause musculoskeletal disorders (MSDs). The example of ergonomics hazard are repetitive movement, awkward postures, and forceful and sustained exertion (DOSH, 2017).

#### **b) Years of Working**

Years of working is the number of years in the current occupation that the hotel room attendants were working.

#### **c) Job Training**

Job training is the training conducted to the workers in order for them to carry out their work in a proper technique to reduce any hazards arise in their workplace (Mustafa & Kamarudin, 2008).

#### **d) Work- related Musculoskeletal Disorders (WRMSDs)**

Work -related musculoskeletal disorders are the work environment and performance of work that contributes to injuries or disorders of the muscles (Centre for Disease Control and Prevention, 2018).

## 1.7.2 Operational Definition

### a) Ergonomics Hazard

Ergonomics hazard or the level of ergonomics risk factors were obtained from the observation by using video camera which were analyzed using ergonomics tool which is Rapid Entire Body Assessment (REBA). This instrument summarizes the assessment of posture, load and repetition into five categories of ergonomics risk level as follow:

Score	Level of MSD Risk
1	Negligible Risk, no action required
2-3	Low Risk, change may be needed
4-7	Medium Risk, investigate and implement change later
8-10	High Risk, investigate and implement change
11 +	Very High Risk, implement change

### b) Years of Working

Years of working was obtained from the adapted questionnaire that has been answered by the hotel room attendants.

### c) Job Training

Job training information was obtained from the adapted questionnaire that has been answered by the hotel room attendants.

**d) Work- Related Musculoskeletal Disorders**

**The prevalence of WRMSDs was obtained by using Nordic Musculoskeletal Questionnaire that were distribute after the observation of the room attendants was done.**

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## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 HOTEL INDUSTRY**

Hotel industries is a type of hospitality industries that fall under accommodation categories. The primary purpose of hotel industries is to provide travelers with shelter, food, refreshment, and similar services and goods, offering on commercial basis things that are customarily furnished within households but unavailable to people on a journey away from home (Dictionary of American History). Hotel development involved a variant of hotel types which are luxury hotels and commercial hotels. Luxury hotels usually located in the urban area and with the luxury establishment, they manage to provide the highest satisfaction to the customers. Meanwhile, commercial hotels, more simply furnished and less expensive than the luxury hotels (Dictionary of American History).

#### **2.2 OCCUPATIONAL SAFETY AND HEALTH IN HOTEL INDUSTRY**

Occupational safety and health (OSH) practices are very important in the hotel industry (Ambardar & Raheja, 2017). OSH is related to all actions involving the improvement and maintenance of health and safety, the prevention and reduction of potential health and safety hazards, and risks in the workplace where OSH helps in maintaining the highest degree of physical, mental and social well-being of workers (Ambardar & Raheja, 2017). There are many hazards that may arise from the exposure of

the work environment such as physical hazard (noise, vibration and heat), ergonomics hazard (repetitive movement, prolonged and static posture, awkward posture, forceful exertion and excessive bodily motions), chemical hazard (cleaning agents, poison and toxics), work place organization (repetition of work, supervision, and training) to psychosocial hazard (stress and violence).

## **2.3 RISK FACTORS OF MUSCULOSKELETAL DISORDERS**

### **2.3.1 Socio- demographic**

Socio-demographic is the characteristics of the respondents which includes age of the respondents, gender, marital status, education, level of income and body mass index (BMI). A right demographic question will allow researcher to discover meaningful data which can help in making better decisions (Dobronte, 2013).

### **2.3.2 Occupational**

Occupational information includes, year of working, duration of work and also job training. The work can affect the health of all people through work related injuries or through acute or chronic exposure of hazards in the work place. The diagnosis of occupational history provides better added information to the clinician (Goldman, R. H., Peters, J. M., 1981)

### 2.3.3 Lifestyle

Lifestyle is the way of individual's living their daily life. It is also the patterns of the individual work and behaviour patterns and the activities, attitudes, interests, and opinions (Business Dictionary, n.d.). Prolong, static posture or repetitive motion in the leisure time activities can cause musculoskeletal disorders.

### 2.3.4 Medical History

Medical history is a record of information about one's health. The medical history information may includes allergies, illnesses, surgeries, immunizations and results of medical examinations. Besides, it also includes the medicine taken by a person and their current and past illnesses (National Cancer Institute Dictionary, n.d.).

### 2.3.5 Ergonomics

Ergonomics risk factor is the characteristics that may contribute to musculoskeletal disorders (MSDs). However, if only one risk factor present, it may not result in MSDs. When two or more ERFs present at one time, it then will increase the risk of getting musculoskeletal disorders (Department of Occupational Safety and Health, 2017). WMSDs arise from the awkward movements at any parts of musculoskeletal systems such as bending, straightening, gripping, holding, twisting, clenching, reaching, lifting, lowering, stretching, and pushing. The underlying cause of WMSDs is that the common movements were put in a hazardous situation during carrying out the work such

as continual repetition, forceful manner, speed of the movements and lack of time for recovery between them (Canadian Centre for Occupational Health and Safety, 2018).

## **2.4 WORK-RELATED MUSCULOSKELETAL DISORDERS**

Based on the CCOHS (2018), they defined work-related musculoskeletal disorders (WMSDs) as a group of painful disorders of muscles, tendons, and nerves. WMSDs happens when there was excessive use of musculoskeletal systems which it can also develop gradually as a result of repeated trauma. Any accident- related injury that cause traumatic injuries to the musculoskeletal systems were not assumed to be work-related musculoskeletal disorders. The other various names of work-related musculoskeletal disorders are; repetitive motion injuries, repetitive strain injuries, cumulative trauma disorders, occupational cervicobrachial disorders, overuse syndrome regional musculoskeletal disorders and soft tissue disorders.

### **2.4.1 Prevalence of Musculoskeletal Disorders- Worldwide**

The global prevalence of other musculoskeletal disorders which excluded rheumatoid arthritis cases and osteoarthritis was 8.4% (95% uncertainty interval (UI) 8.1% to 8.6%). Disability-adjusted life years increased from 20.6 million (95% UI 17.0 to 23.3 million) in 1990 to 30.9 million (95% UI 25.8 to 34.6 million) in 2010. The burden of other musculoskeletal disorders increased with age. Globally, other MSDs disability burden (years of life lost) ranked sixth (Smith, e., Hoy, D. G., Cross, M., Vos, T., Naghavi, M., Buchbinder, R., Woolf, A. D., March, L., 2014).

#### **2.4.2. Prevalence of Musculoskeletal Disorders- Malaysia**

**The prevalence of MSDs in Malaysia can be obtained from the official annual report of the Social Security Organization (SOCSO). The total number of musculoskeletal diseases cases in the year 2017 was equal to 1354 cases.**

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## 2.5 SUMMARY OR RELATED STUDIES

Author (Year)	Title (Number of Respondents)	Findings
Nasrull , Syahir, & Jaffar (2017)	Musculoskeletal symptoms and ergonomic hazards among room attendants in hotel industries  (N= 65)	Housekeepers were reported to have prevalence of musculoskeletal disorder which the prevalence involving low back are 60%, hands/wrists (41.5%), knees (36.9), neck (3.1%) and shoulders (12.3%).
Hsieh et al. (2013)	The world at work: hotel cleaners	Hotel cleaners are exposed to a numerous of high work-induced hazards resulting in adverse physical, ergonomic, chemical, biological and psychosocial disorders and conditions.
Abdol Rahman, Muhamad Jaffar, Hassan, Ngali, & Pauline (2017)	Exposure level of ergonomic risk factors in hotel industries  (N= 65)	Room attendants carry out physically demanding task thus this study shows that most of the room attendants were exposed to high level of ergonomic risk factors for leg, back, forceful and vibration.

<p>Oxenbridge, Mcom, Lindegard, &amp; Barts (2011)</p>	<p>The relationship between payment systems, work intensification and health and safety outcomes: a study of hotel room attendants. (N=209)</p>	<p>The study shows that psychosocial factors relating to work overload, time pressure and payment systems resulting to the musculoskeletal injuries among housekeeper. Housekeepers which were paid on number of room cleaned tends to fasten their works in order to avoid being unpaid overtime.</p>
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## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 STUDY DESIGN**

This is a cross-sectional study to determine the risk factors that contribute to musculoskeletal disorders among hotel room attendants from September 2018 until May 2019.

#### **3.2 STUDY LOCATION**

This research has been conducted in hotels that were located in Klang Valley. The specific districts involved were federal territory of Kuala Lumpur, federal territory of Putrajaya, district of Petaling, district of Klang, district of Hulu Langat, and district of Sepang.

#### **3.3 SAMPLING METHOD**

##### **3.3.1 Sampling Strategy**

This study involves multistage sampling design to select the study location as well as the respondents. First and foremost, the district in Klang Valley had been chosen by using cluster sampling. Klang Valley consists of 7 districts (clusters) which are federal

territory of Kuala Lumpur, federal territory of Putrajaya, district of Petaling, district of Klang, district of Hulu Langat, district of Sepang and district of Gombak. From the 7 clusters, 6 clusters (except the district of Gombak) were randomly chosen by using simple random sampling. The second step; from the chosen clusters, simple random sampling were used to obtained hotels based on the number of respondents required. From each hotels, respondents were chosen based on the inclusion and exclusion criteria before further steps being taken.

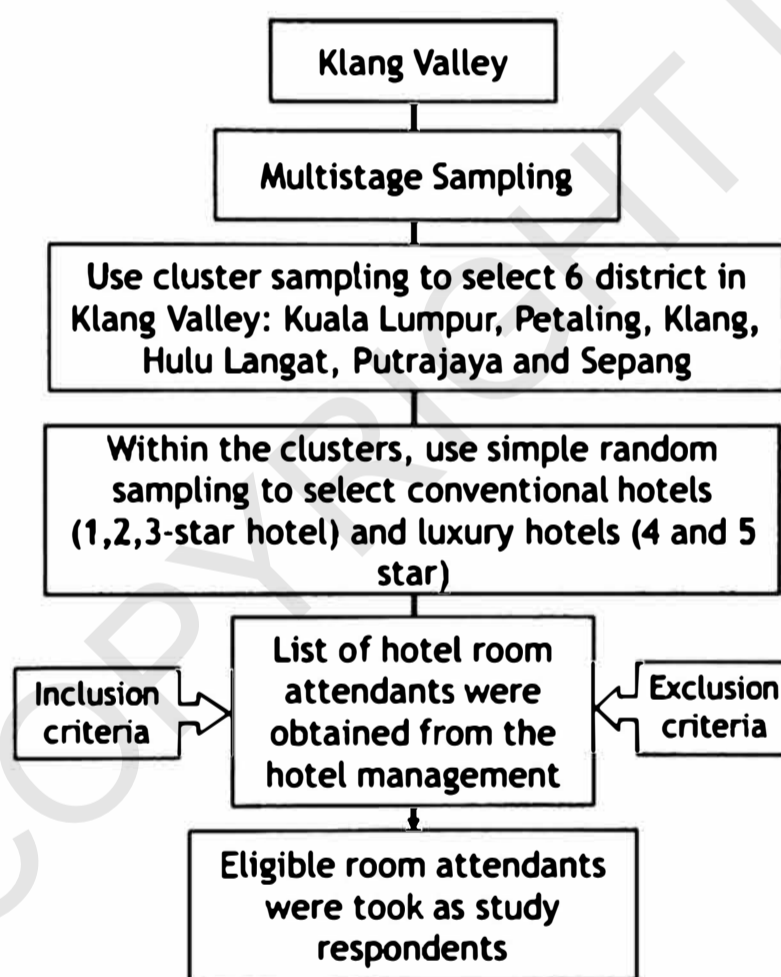


Figure 2: Sampling strategy to recruit study respondents

### 3.3.2 Sampling Population

The sampling population were hotel room attendants from the selected hotel.

### **3.3.3 Sampling Frame**

List of hotel room attendants obtained from **management team** of hotels located in **Klang Valley**

### **3.3.4 Sampling Unit**

#### **3.3.4.1 Inclusion Criteria**

The hotel room attendants were chosen based on those who had working at the current workplace for at least 1 year. The age of selected respondents were between 18 to 60 years old.

#### **3.3.4.2 Exclusion Criteria**

The hotel room attendants who had experienced the injuries which are not related to current occupation, disabled workers, and pregnant workers were excluded in this study.

### **3.4 SAMPLE SIZE – CALCULATION**

Based on Lemeshow, Klar and KLawanga (1990), the sample size is calculated by using the following formula:

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

Where;

**n** = estimated population

**P** =  $(P_1 + P_2)/2$

**P<sub>1</sub>** = estimated proportion (larger)

**P<sub>2</sub>** = estimated proportion (smaller)

**z<sub>1-β</sub>** = standard errors associated with power (the value is 0.842 for 80% power)

**z<sub>1-α/2</sub>** = standard errors associated with confidence intervals (the value is 1.96 for 96% confidence intervals)

If;

**P** = 0.5075 (Nasrull, Rahman , Syahir and Jaffar, 2017)

**P<sub>1</sub>** = 0.6 (Nasrull, Rahman , Syahir and Jaffar, 2017)

**P<sub>2</sub>** = 0.415 (Nasrull, Rahman , Syahir and Jaffar, 2017)

**Z<sub>1-β</sub>** = 0.842

**Z<sub>1-α/2</sub>** = 1.96

$$n = \frac{\left\{ 1.96 \sqrt{2(0.5075)(0.4925)} + 0.842 \sqrt{0.6(0.4) + 0.415(0.585)} \right\}^2}{(0.185)^2}$$

**n = 113 respondents**

**In considering any likelihood of drop out by the respondents, 20% of the sample size is added. Thus;**

$$100 \times \frac{113}{80}$$
$$= 141.25 \text{ respondents}$$

**Based on the expected sample size calculation, total number of respondents was 141 respondents. However, this study had achieved 78.72% of response rate which were equal to 111 respondents.**

### **3.5 INSTRUMENTS**

#### **3.5.1 Questionnaire**

**A set of questionnaire (as attached in Appendix F) consists of the following sections were used for data collection.**

- i. Socio-Demo, Occupational History, Social Lifestyle**

**Sociodemographic characteristics was obtained to determine the gender, age, race, marital status, working experience occupational history as well as their social lifestyle.**

ii. **Musculoskeletal Symptoms Questionnaire**

Nordic Musculoskeletal Questionnaire (NMQ) was used to determine the prevalence of musculoskeletal symptoms. This questionnaire was adapted from Kuorinka, Jonsson, Kilbom (1987) in the journal titled Standardized Nordic Questionnaires for the Analysis of Musculoskeletal Symptoms. This questionnaire focus on 9 body parts and specifically asked the symptoms experienced within 12 month and 7 days. The 9 locomotive organ that involved in the questionnaire are as follow:

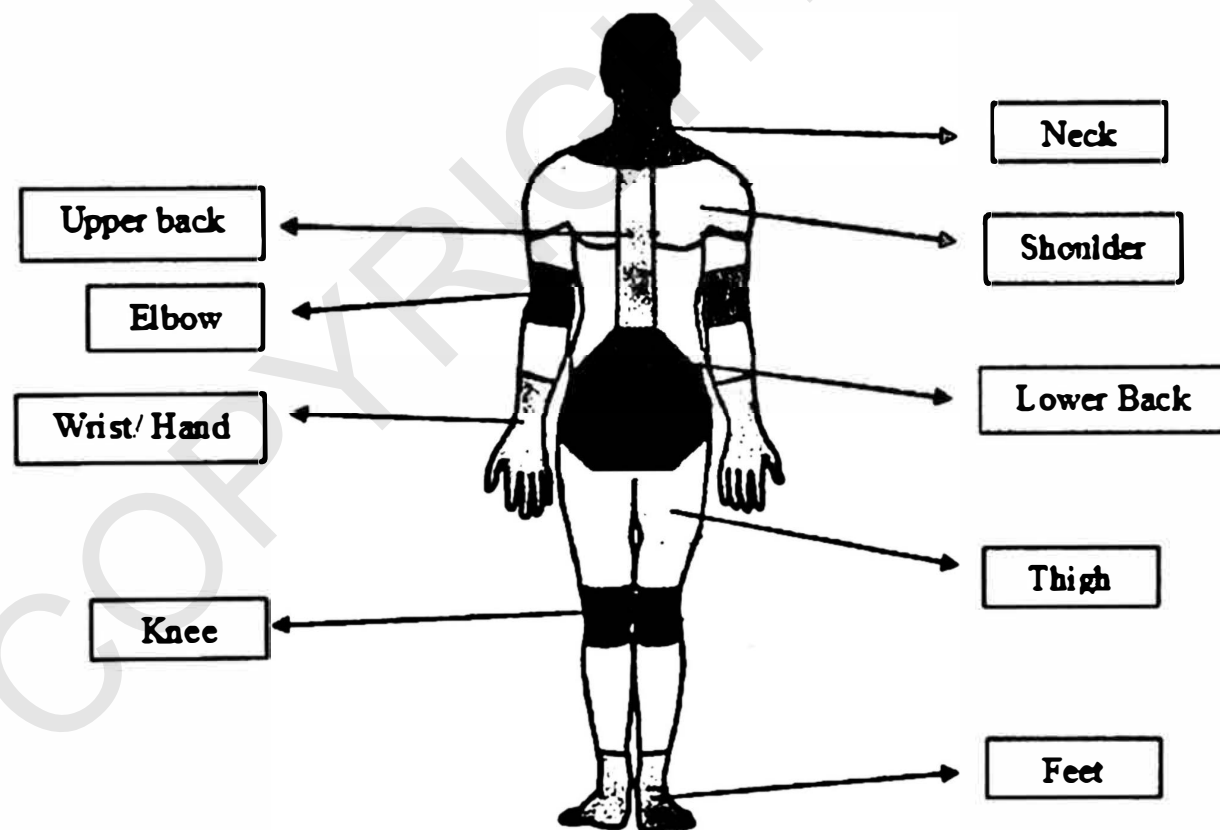


Figure 3: Parts of locomotive organ involved in the NMQ

### 3.5.2 Anthropometer

For the measurement of weight and height, the SECA Body Weighting Scale as well as SECA Body Meter will be used. The results of these measurement were used to determine Body Mass Index (BMI) as follow:

$$BMI = \frac{\text{weight in kg}}{(\text{height in meters})^2}$$



Figure 4: SECA Body Weighting Scale

Figure 5: SECA Body Meter

### 3.5.3 Ergonomics Risk Assessment Tools

#### Rapid Entire Body Assessments (REBA)

Data are collected for body posture, forces used, types of movement, repetition and coupling based on the observation from the video recording. The selection of the postures that been chose to be evaluated were based on the most difficult postures and work task, the longest sustained posture for a period of time and the posture that involve

with highest force load. Upon select the posture, REBA score had been calculated, and the level of risk had been determined correspond to the suggestion of action should be taken by the tools.

The selected pictures that was prior observed and chosen in this study were analyse by following the steps as shown below:

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**A. Neck Trunk and Leg Analysis**

**Locate Neck Position**

Step 1a: Adjust:  
If neck is twisted: +1  
If neck is side bending: +1

**Locate Trunk Position**

Step 2a: Adjust:  
If trunk is twisted: +1  
If trunk is side bending: +1

Trunk Score

**Locate Leg Position**

Adjust:  
30-60 degrees: Add +1  
>60 degrees: Add +2

Leg Score

Look up posture score in Table A

Table A		Neck											
		1				2				3			
Trunk Posture Score	Legs	1	2	3	4	1	2	3	4	1	2	3	4
	1	1	1	2	3	4	1	2	3	4	3	3	5
2	2	2	3	4	5	3	4	5	6	4	5	6	7
3	2	4	5	6	7	4	5	6	7	5	6	7	8
4	3	5	6	7	8	5	6	7	8	6	7	8	9
5	4	6	7	8	9	6	7	8	9	7	8	9	9

**Add Force/Load Score to Obtain Score A**

If load < 11 lbs.: +0  
If load 11 to 22 lbs.: +1  
If load > 22 lbs.: +2  
Adjust: If shock or rapid build up of force: add +1

**B. Arm and Wrist Analysis**

**Locate Upper Arm Position**

Step 7a: Adjust:  
If shoulder is raised: +1  
If upper arm is abducted: +1  
If arm is supported or person is leaning: -1

Upper Arm Score

**Locate Lower Arm Position**

**Locate Wrist Position**

Step 9a: Adjust:  
If wrist is bent from midline or twisted: Add +1

Look-up Posture Score in Table B

Table B		Lower Arm					
		1			2		
Upper Arm Score	Wrist	1	2	3	1	2	3
	1	1	1	2	2	1	2
2	1	2	3	2	3	4	4
3	3	4	5	4	5	5	5
4	4	5	5	5	6	6	7
5	6	7	8	7	8	8	8
6	7	8	8	8	9	9	9

**Add Coupling Score to Obtain Score B**

Well fitting Handle and mid range power grip. **good: +0**  
Acceptable but not ideal hand hold or coupling acceptable with another body part. **fair: +1**  
Hand hold not acceptable but possible. **poor: +2**  
No handles, awkward, unsafe with any body part.

**Match Score A and B to obtain Table C Score**

Table C		Score A												Score B											
Score A	Score B	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

**Add Table C Score with Activity Score**

+11 or more body parts are held for longer than 1 minute (static)  
+1 Repeated small range actions (more than 4x per minute)  
+1 Action causes rapid large range changes in postures or unstable base

**REBA Score**

Figure 6: Procedure to determine ergonomics risk level

After REBA score was obtained, it was compared with the description of the level of MSDs risk as shown in the table below.

**Table 3.5.3: REBA Score respected to level of musculoskeletal disorders risk**

Score	Level of MSD Risk
1	Negligible Risk, no action required
2-3	Low Risk, change may be needed
4-7	Medium Risk, investigate and implement change later
8-10	High Risk, investigate and implement change
11 +	Very High Risk, implement change

#### 3.5.4 Video Camera

Video camera has been use to record the respondents while they carry out the housekeeping tasks. Observation from the video recording will be useful in doing the ergonomics assessments.

### 3.6 DATA COLLECTION PROCEDURE

Before this study being conducted, ethics approval from the Ethics Committee for Research Involving Human Subjects (JKEUPM), Universiti Putra Malaysia was obtained (Appendix A). Besides, this study also was obtained support from the Department of Occupational Safety and Health under the Ministry of Human Resource in which may assist while getting approval from hotel industries (Appendix C). Respondents recruited

was from all types of hotels in Klang Valley as explained in sampling flow chart. The subject consent letter was then had been distributed to the respondents for their agreement to participate. Then the hotel room attendants had been recorded while they were carrying out their task which took around 20 to 40 minutes. After they had completed all of their work cleaning a room, an interviewer- assisted questionnaire (Appendix F) had been conducted which took around 5 to 10 minutes to complete. Some other questions apart from the constructed questionnaire also had been asked to the room attendants during this short interview session to gain more information from them. During this session also, the respondents also need to take anthropometric measurements for their BMI calculation. Upon data collection was done, ergonomics risk assessments had been carried out by observing the video records. Then, Rapid Entire Body Assessment (REBA) tool had been used to assess the ergonomics risk levels based on video observation. All the data obtained was then being analyzed by using Statistical Package for the Social Sciences (SPSS) by using descriptive and chi-square test analysis.

### **3.7 QUALITY CONTROL**

#### **3.7.1 Questionnaire**

- i. Sociodemographic, Occupational History, Social Lifestyle and Medical History Questionnaire**

The questionnaire were adapted from Ng (2015) in a thesis entitled **Effectiveness of Integrated Ergonomics Intervention Approach in Reducing**

**Musculoskeletal Disorders among Oil Palm Harvesters in Johor Bahru, Malaysia.**  
The questionnaire were then being translated into Bahasa Melayu and some added question had been constructed. This questionnaire has been validated by expert panel which focus on content validity and been tested for its reliability towards hotel room attendants where the pre-test result obtained were more than 0.7.

**ii. Musculoskeletal Symptoms Questionnaire**

The musculoskeletal symptoms questionnaire was adapted from Kuorinka, Jonsson, Kilbom (1987) in the journal titled Standardized Nordic Questionnaires for the Analysis of Musculoskeletal Symptoms. This questionnaire had done its test and retest method for its validity and reliability and showed a result of non-identical answer between 0-20%. This questionnaire also has been validated and tested same as the previous section (socio-demo, occupational history, medical history and social lifestyle) of the questionnaire. During the reliability test was conducted, the researcher try to avoid researcher bias by making sure the instruction conveyed was not leads the respondents to answered it bias.

### **3.7.2 Anthropometer**

#### **i. SECA Body Meter**

To ensure the validity of the measurement, the procedure will be followed as instructed in the user manual. The respondents will stand on a flat surface (without wearing shoes), head must be against the headboard where the respondent should looking straight upward, trunk and pelvis are properly aligned with the surface of the wall, and finally the measurement will be taken at eye level of investigator.

#### **ii. SECA Body Weighting Scale**

The measurements will be taken with respondent standing on the measuring tools without wearing shoes as well as he/she must put off any gadgets out from pockets or any other stuffs that will distract the measurement. The respondent should stand with the head looking forward, put hands at the respective sides, and body should not lean against any object or walls. The zero weight on the beam scale will be frequently check especially before the respondent stat on the tools. The zero scale also will be manually adjusted to avoid any parallax error.

### 3.7.3 Ergonomics Risk Assessment Tools

Based on Hignett and McAtamney (2000) and Stanton *et. al.*,(2004), Rapid Entire Body Assessment (REBA) was established in two stage. First stage involve three ergonomists independently coding the 144 posture combination then they discuss and resolve any conflicts in score. The second stage involve two workshop with 14 health professionals using REBA to code over 600 examples of work postures.

## 3.8 DATA ANALYSIS

### 3.8.1 Statistical analysis

#### i. Socio-demographic

The socio- demographic, occupational history, social lifestyle and medical history data has been analyze using IBM SPSS version 22. The used for descriptive statistic were frequency, percentage, mean and standard deviation of the data. For the bivariate analysis to test the hypothesis, Chi- square Test and Spearman Correlation Test were used.

#### ii. Nordic Musculoskeletal Questionnaire (NMQ)

NMQ data also had been analyze by using descriptive statistics in SPSS to obtain the prevalence data such as the frequency as well as percentage of the data.

The data obtain will show the frequency of respondents that experienced musculoskeletal symptoms and will also show the prevalence of musculoskeletal disorders in each part of locomotive organ that they feel.

iii. **Rapid Entire Body Assessment (REBA)**

After getting the REBA score and classified into corresponding ergonomics risk level, it has been analyzed using descriptive statistics to identify the frequency and percentage of the ergonomics risk level experienced by the hotel room attendants. After obtaining the ergonomics risk level, it also have been analyze by using chi- square with the musculoskeletal disorders to know the association between these two variables.

### **3.9 ETHICAL APPROVAL**

This study was obtained approval from Ethical Committee for Research Involving Human Subjects (JKEUPM) of University Putra Malaysia. Moreover, the permission to conduct this research also had been prior obtained from the hotel industries before the research been conducted. For the individual consent, the respondents involve in the study had been inform about the purpose of the study by verbally explain as well as the distribution of written consent form have been distributed and obtained from the respondents. All the private and confidential information of the respondents were kept safely and did not be revealed to any irresponsible person.

## **CHAPTER 4**

### **RESULT**

#### **4.1 Demographic Characteristics, Working Information, Lifestyle and Medical History of the Respondents**

There were 77 (69.4%) male room attendants and 34 (30.6%) female room attendants were involved in this study. 84 (75.7%) of the respondents were between 18 to 35 years old; meanwhile, 25 (22.5%) were between 36 to 55 years old. There were also 2 (1.8%) of the respondents were above 55 years old. The mean and standard deviation of their age was 30.4 and 9.64 respectively. For the body mass index (BMI), 78 (70.3%) of the respondents categorized in underweight and normal weight BMI category, meanwhile another 33 (29.7%) respondents we categorized under overweight and obese BMI. However, most of the respondents we in the normal BMI category in which mean of the total BMI is within the normal range (24.14). Besides, for the marital status, 50 (45%) of the respondents were married, and the rest 61 (55%) of them is not married.

Based on the information obtained, 107 (96.4%) of respondents have working experienced less than 3 years and 2 (1.8%) more than 3 years. Mean of years of working is 2.77 years (SD=3.950) meanwhile the mean for the working duration is 9.99 (SD±1.80) per day. As for work training on safety and health, only 10 (9%) of the respondents had the training meanwhile another 101 (91%) of the respondents never got any training program related to their safety and health.

Based on information gathered, 24 (21.6%) of the respondents were smoking, and 87 (78.4%) is not a smoker. For leisure time activity, 92 (82.9%) of respondents involve in activity such as cooking, exercise, farming and fishing meanwhile 19 (17.1%) others are not. For the medical history part, 22 (19.8%) of them were diagnosed to have rheumatoid arthritis and another 89 (80.2%) respondents were free from the disease.

Table 4.1: The socio-demographic characteristics, working information, lifestyle and medical history of the respondents.







<b>Variables</b>	<b>Frequency (n=111)</b>	<b>Percentage (%)</b>	<b>Mean</b>	<b>SD</b>
<b>Gender</b>				
Male	77	69.4		
Female	34	30.6	-	-
<b>Age (years)</b>				
18 - 35	84	75.7		
36 – 55	25	22.5	30.34	9.64
55 and above	2	1.8		
<b>BMI</b>				
Underweight & Normal	78	70.3		
Overweight & Obese	33	29.7	24.14	4.66

<b>Marital Status</b>				
Married	50	45	-	-
Single	61	55	-	-
<b>Years of Working</b>				
1-3	93	83.8		
≥3	18	16.2	2.77	3.95
<b>Duration of working (hours)</b>				
8	35	31.5		
≥8	76	68.5	9.99	1.80
<b>Training</b>				
Yes	10	9.0		
No	101	91.0	-	-
<b>Activity During Leisure Time</b>				
Yes	92	82.9		
No	19	17.1	-	-
<b>Smoking</b>				
Yes	24	21.6		
No	87	78.4	-	-
<b>Rheumatoid Arthritis</b>				
Yes	22	19.8		
No	89	80.2	-	-

## 4.2 Ergonomics Risk Levels of Housekeeping Work Task

### 4.2.1 Example of Ergonomics Risk Factors (ERFs) of Housekeeping Work Task.

Table 4.2.1: ERFs Experienced by Hotel Room Attendants

 <p>a) Cleaning bath tubs involved with repetitive movement and bend forward more than 60°.</p>	 <p>b) Tuck-in bed sheet with back bend forward more than 90° which involved in awkward posture.</p>	 <p>c) Wiping furniture with upper and lower arm raised more than 90° which involved in awkward postures and repetition.</p>
 <p>d) Reaching under desk while vacuuming with extra load being carried at back involved awkward posture.</p>	 <p>e) Fit the duvet with its cover involve repetitive movement of the upper-limb involved with awkward postures and repetitive movements.</p>	 <p>f) Cleaning and polishing the toilet floor with back bend forward more than 60° involved in awkward postures and repetitive movements.</p>

#### 4.2.2 Rapid Entire Body Assessment (REBA) Score

The REBA score shows that the respondents were exposed to three different risk level out of 5 levels of the score in REBA tool. More than half of the total respondents (59.5%; n = 66) were exposed to high-risk level. Meanwhile, 37 (33.3%) of them were exposed to very high risk level and another 8 (7.2%) of them were exposed to medium ergonomics risk level.

Table 4.2.2: REBA Score

<b>Variables</b>	<b>Frequency (n=111)</b>	<b>%</b>
<b>REBA Score</b>		
Medium Risk	8	7.2
High Risk	66	59.5
Very High Risk	37	33.3

#### 4.3 Prevalence of Musculoskeletal Disorders

The prevalence of musculoskeletal disorders among hotel room attendants were determined using the Nordic Musculoskeletal Questionnaire (NMQ) within 12 months of working. The result showed there is 96 (86.5%) of the respondents experience musculoskeletal symptoms meanwhile only 15 (13.5%) of them did not report to have any MSDs cases.

Based on the result, the highest prevalence of MSDs experienced was at the lower back region with the percentage of 63.1 percent. Followed by the second highest percentage is 45.9 % at the shoulder, hand/wrist region (35.1%), upper back (32.4%), neck (30.6%), knee (27.9%), followed by the elbow (26.1%) and lastly thigh with the lowest prevalence of 19.8%.

**Table 4.3.1: Prevalence of MSD Cases within 12 months of working**

<b>Variables</b>	<b>Frequency (n=111)</b>	<b>Percentage (%)</b>
<b>MSD Cases</b>		
<b>Yes</b>	96	86.5
<b>No</b>	15	13.5
<b>Total</b>	111	100

Figure 7: Prevalence of MSDs respective to specific body region within 12 months.

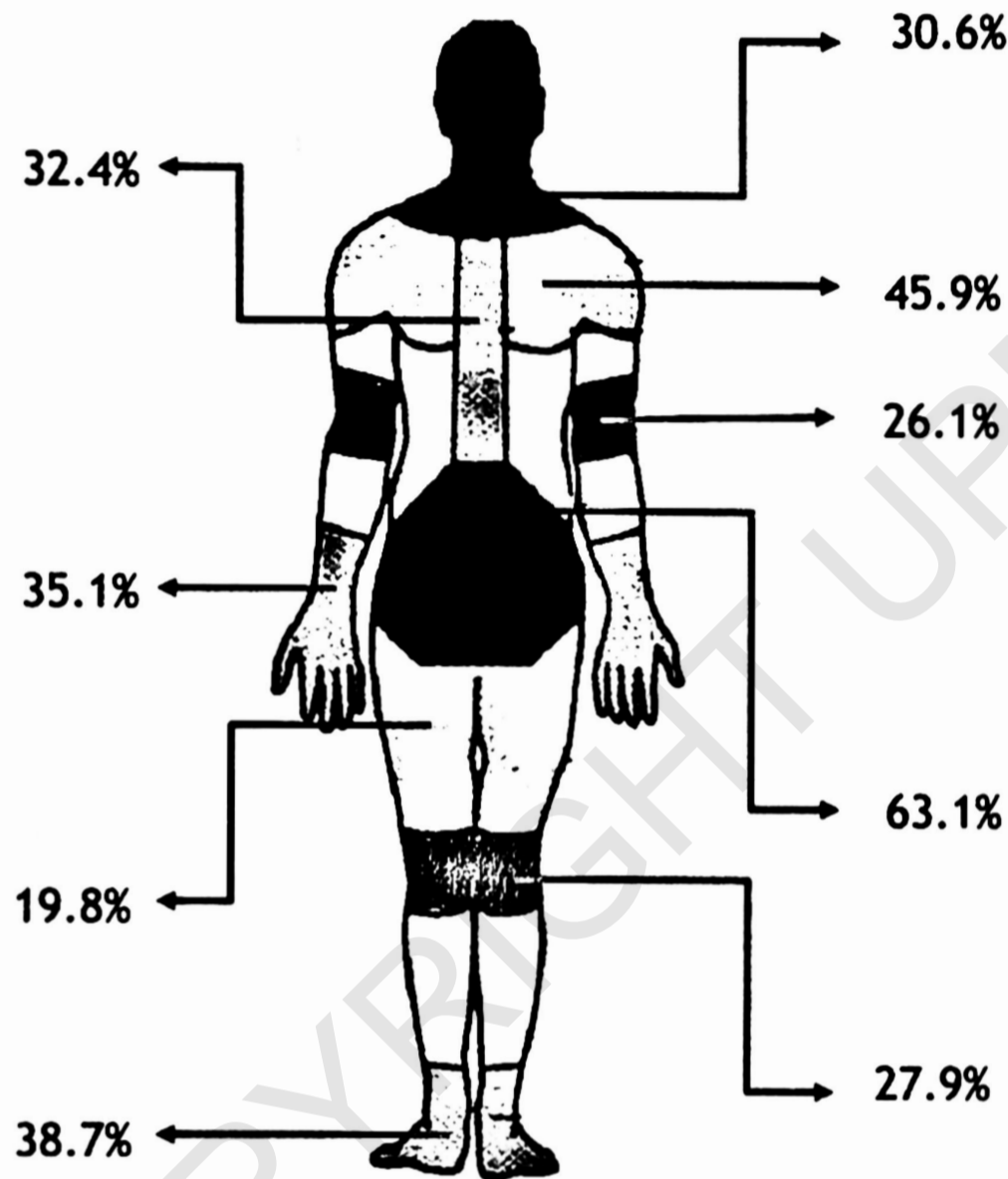


Figure 7

#### 4.4 Association of risk factors and musculoskeletal disorders (MSDs)

Based on the Table 4.4.1 below, risk factors were being analysed by using chi-square test. Only two variables shows that the risk factors influenced the MSDs cases among hotel room attendants which were marital status and rheumatoid arthritis. It shows that both have a significant difference at p-value equal to 0.036 and 0.038 respectively.

Thus, the null hypothesis is rejected where there is an association between marital status and rheumatoid arthritis with musculoskeletal disorders among hotel room attendants.

Table 4.4.1: Factor associated with MSDs cases using Chi-Square Test (n=111).

<b>Variables</b>	<b>X<sup>2</sup></b>	<b>Phi &amp; Cramer's Value</b>	<b>p value</b>
<b>Gender</b>	4.687	0.205	0.062
<b>BMI</b>	3.213	0.142	0.234
<b>Education level</b>	0.973	0.181	0.304
<b>Marital status</b>	4.395	0.199	0.036*
<b>Rheumatoid Arthritis</b>	4.287	0.197	0.038*
<b>Working Duration</b>	7.017	0.212	0.054
<b>Leisure time activity</b>	0.175	0.040	0.960
<b>Smoking</b>	1.404	0.112	0.397
<b>Training</b>	0.116	0.032	1.000
<b>Ergonomics risk level</b>	2.284	0.143	0.319

\*Significant at  $p \leq 0.05$

Spearman correlation test were used to analyse continuous variables such as age, BMI, duration of works and years of working with respect to pain in specific body region. Based on the Table 4.4.2., only two variables which are age and years of working correlate with lower back pain shows a significant difference at p value equals to 0.050 and 0.019 respectively. Besides, from Table 4.4.3, age and years of working also shows correlation with upper back pain with a significant difference equal to 0.010 and 0.038 respectively.

In addition, these two risk factors (age and years of working) also shows a significant difference with knee pain with p value 0.006 and 0.001 as shown in Table 4.4.4.

Table 4.4.2: Variables that contributed to MSDs at lower back region by using Spearman Correlation Test (n=111).

<b>Variables</b>	<b>r</b>	<b>p value</b>
<b>Age</b>	-0.187	0.050*
<b>Years of Working</b>	-0.223	0.019**

\*Significant at  $p \leq 0.05$

\*\*Significant at  $p \leq 0.01$

Table 4.4.3: Variables that contributed to MSDs at upper back region by using Spearman Correlation Test (n=111)

<b>Variables</b>	<b>r</b>	<b>p value</b>
<b>Age</b>	-0.242	0.010**
<b>Years of Working</b>	-0.197	0.038*

\*Significant at  $p \leq 0.05$

\*\*Significant at  $p \leq 0.01$

**Table 4.4.4: Variables that contributed to MSDs at knee region by using Spearman Correlation Test (n=111).**

<b>Variables</b>	<b>r</b>	<b>p value</b>
<b>Age</b>	-0.261	0.006*
<b>Years of Working</b>	-0.303	0.001**

\*Significant at  $p \leq 0.01$   
 \*\*Significant at  $p \leq 0.001$

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## **CHAPTER 5**

### **DISCUSSION**

#### **5.1 Work Nature of Hotel Room Attendants And Ergonomics Risk Levels Of Housekeeping Work Task.**

Based on the result of this study, it shows that hotel room attendants in Klang Valley were exposed to significant ergonomics hazard such as awkward posture, repetitive movement, and forceful exertion during the housekeeping task such as making beds, cleaning toilets, wiping and cleaning furniture, vacuuming as well as pushing and pulling trolleys. Based on a study by Abdol Rahman et al. (2017), their study shows that most room attendants were exposed to high levels of ergonomics risk factor for leg, back, force and vibration. During conducting the ergonomic risk assessment in, the most frequent task and high risk during screening had been assessed. Based on the ergonomics risk level of the job task experienced by the room attendants in this study, 33.3% of the respondents were posed high risk level of ergonomics risk, 59.5% of them having high risk ergonomics level and only another 7.2% of total respondents were exposed to a medium level of ergonomics risk factors. Room attendants mostly were experienced high exposure level of ergonomics risk for leg, back, forceful and vibration (Kautsar, Gustopo, & Achmadi, Abdol Rahman et al., 2017). It was clearly shown that 92.8% of the respondents need to have the implementation of action by the management to change the working condition in order to reduce the prevalence of musculoskeletal disorders among them.

## **5.2 Musculoskeletal Disorders among Hotel Room Attendants**

Based on the result obtained, the percentage of respondents having musculoskeletal symptoms is 86.5% (96 respondents) meanwhile only 13.5% (15 respondents) does not experience any symptoms at any body parts. The prevalence of MSDs in this study during 12 months of working was highest in low back region with the percentage of 63.1 followed by shoulder pain 45.9 percent, hand/wrist region (35.1%), upper back (32.4%), neck (30.6%), knee (27.9%), elbow (26.1%) and lastly thigh with lowest prevalence of 19.8 percent. Based on the previous study conducted by Nasrull et al. (2017), housekeepers reported the prevalence of musculoskeletal disorders with a low back prevalence of 60%, hands/ wrists (41.5%), knee (36.9), shoulders (12.3) and neck (3.1%).

Based on the observation, lower back pain experienced by hotel room attendants were caused by prolong bending and forceful exertion of the task that they are carried out such as cleaning toilet floor by using no handhold equipment and polishing toilets walls. During the face to face interview, the respondents also complained that back pain they faced were caused by forceful exertion that they put when pulling and pushing bed while tidying up the bed. Moreover, shoulder pains were caused by their exposure during making sure the duvet (blanket) and its cover fit together perfectly. In making sure the duvet fits with its cover, they need to repetitively use upper-limb force and in the condition with the upper arm and lower arm raised more than 90 degrees above the head. An additional load weight also plays a big role in the contribution of shoulder pain as the

blanket is around 5kg and above. The Center for Occupational Health and Safety CCOHS (2016) stated that major risk factors for repetitive movement injuries associated with housekeeping tasks are excessive body motions and heavy physical workload that pose a high risk of back trouble, while strong upper limb motions in awkward positions could pose a high risk for neck or shoulder and arm troubles.

From the findings, it shows that the number of rooms to be cleaned per day were depending on hotel occupancy rates which were between 13 to 26 rooms (21 rooms per person every day) in a mean of 9 hours working duration every day. In general, the duration taken for the room attendants to clean up the room took 20- 40 minutes depending on the situation of the check-out room. This finding was nearly the same to a study carried by (Hsieh, Apostolopoulos, & Sönmez, 2016) to the Latina hotel housekeepers, in which the housekeepers were given 30 min to clean check-out room and 20 minutes to clean a stay-over room. During the interview session also, the respondents complained that sometimes they have to rush to clean up the rooms during the high rates of occupancy until they have no time to take an official break which usually provided 30 minutes to 1 hour for each worker. When this situation happens, they said they were prone more to get pain or discomfort at certain of their body parts such as back, shoulder and feet. Apart from that, they also stated that the average number of off-day provided for them is only one day per week and some respondents were not provided any off-day by their hotel management. Based on the definition and causes of musculoskeletal disorders by Middleworth (2015), MSDs develop when fatigue outweighs the recovery system of workers, causing an imbalance in the musculoskeletal in which workers who lack adequate rest and recovery are at higher risk of getting MSDs.

### **5.3 Risk Factors Associated with Musculoskeletal Disorders**

The total of all 22 workers who were confirmed diagnosed by the doctors to have rheumatoid arthritis also were reported to have association with musculoskeletal disorders. Based on a research by Berman, Bucher, Koyfman, & Long (2018), rheumatoid arthritis (RA) is one of autoimmune disorder with symmetric peripheral polyarthritis which can caused joint destruction and disability. From a previous research conducted by James (1983) titled balancing activity and rest for RA patient, it states that short rest break is recommended among health professional towards RA patient in order to reduce their pain.

From the result, age have significant difference with low back pain ( $p= 0.050$ ), upper back pain ( $p= 0.010$ ), and knee pain ( $p=0.006$ ). This show that middle age adult (mean of age = 30 years old) had chance to have musculoskeletal disorders at these three body parts as mentioned above. In a study of MSDs among hospital nurse conducted by Ghossoub et al. (2016), the result of Pearson correlation test shows a statistical significant between age and musculoskeletal disorders. The development of joint destruction may also likely due to aging cells that make the joint prone to damage and reduce the ability to maintain homeostasis (Richard, 2010). This is because of the imbalanced catabolic and anabolic activity that origins from the inflammatory mediators in the cartilage and surrounding tissues (Richard, 2010).

Besides, years of working also had showed significant differences with low back pain ( $p=0.019$ ), upper back pain ( $p=0.038$ ), and knee ( $p=0.001$ ). This results shows that

the null hypothesis is rejected where years of working may contribute to musculoskeletal disorders of hotel room attendants. Based on a study conducted by Ak, Ba, & Oa (2013) in the study of sewing machine operator and MSDs, years of sewing experience were significantly associated with the prevalence of musculoskeletal disorders. Aligned with a study conducted by Ervasti et. al (2019) where the research states that eight to ten years of exposure to heavy physical effort at work have strong evidence to cause disability due to musculoskeletal disorders. In a study conducted within a female physiotherapist that work more than 15 years states that general physical and psychosocial work-related exposures were strongly associated with musculoskeletal disorders arose from the workplace (Grooten et. al, 2011). These cases may origin from the overuse of the muscle and less recovery time which leads to musculoskeletal imbalance. When musculoskeletal imbalance were persist in a longer time, musculoskeletal disorders consequently can develop (Ergo Plus, n.d.).

By, referring to the result on marital status, this study shows that marital status (mean= single people) is one of risk factors that contributes to MSDs. This is not consistent with a study conducted among personnel of Kerman University that shows the relationship between marital status and the occurrence of MSDs where the single people have 52% less risk of occurrence compared to married people (Madadzadeh, 2017). This situation happened may because of the higher number of respondents getting MSDs due to its nature of the works that exposed to ergonomics risk factors itself rather than the married factor.

On the other hand, the two risk factors; gender and working duration in this study were not statistically significant since it has p-value equal to 0.062 and 0.054 as shown in the result. However, they can be assumed to have clinically significant as their p value were not exceed 0.10 or 0.15 (These, Ronna, Ott, 2016). In a study conducted by Abou-ElWafa, El-Bestar, El-Gilany, & Awad (2012) shows that the duration of work were significantly associated with the musculoskeletal complaints among municipal solid waste collector. On another study conducted by Ojukwu et.al (2017) also proved that job related risk factor such as working duration associated with work related musculoskeletal disorders.

Meanwhile, there is also evidence on the gender risk factor with MSDs as stated on a study conducted by Ervasti et. al (2019), women had the higher risk of premature mortality than men with the total number of death due to MSDs was 226 and 110 respectively. The other study conducted by Khang, Y., and Kim, H., R. (2010) also stated that men have lower percentage which were 14.3% (n = 647) reported musculoskeletal disorders compared to woman with 28.0% (1,505 of 5,373). This might be due to the prevalence of getting arthritis and sciatica diseases were higher in woman compared to man (Khang et. al., 2010).

Besides, for the other risk factor which is work training, only 9% (10 respondents) out of 91% (111 respondents) of total room attendants got a proper training on how to handle the ergonomics hazard arise in their job task which could leads to be the cause of musculoskeletal disorders. This cases also experienced by the laundry employees in hotel industries where only 19.6% of the respondents got proper manual handling methods and

**work postures training which can lead to serious health issues such as pain and discomfort (Ambardar, 2015).**

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## **CHAPTER 6**

### **CONCLUSION, LIMITATION AND RECOMMENDATION**

#### **6.1 CONCLUSION**

This study found that room attendants were exposed to ergonomics hazard that caused them to have a high prevalence of musculoskeletal disorders. The ergonomics risk level of the job task among hotel room attendants is also high in which more than half need the implementation of change to reduce the prevalence of musculoskeletal disorders among them. Years of working, rheumatoid arthritis, marital status, and age have an association with musculoskeletal disorders in which these risk factors show a significant different in the chi-square test and spearman correlation test.

#### **6.2 STUDY LIMITATION**

This study have some limitation where the total number of respondents from luxury hotels is not as much as conventional hotels thus their outcome is not possible to be compared. Besides, the sample size calculation used is not specifically for cluster sampling design thus it might not represent an equal number of selected hotels within the cluster.

### **6.3 RECOMMENDATION**

Refer to the data, it shows that MSDs cases is high among the hotel room attendants in Klang Valley thus mitigation measures should be taken in order to reduce this issue. It is crucial for the management staff to conduct safety training regarding proper working posture and making sure that all the employees is follow it appropriately. Moreover, administrator should also employ additional housekeeping staffs to reduce the workload faced by the employees which consequently may avoid them from working in a harmful situation. This will consequently can help to reduce absenteeism and increase the productivity of their work. For the workers who have rheumatoid arthritis, it is suggested that the hotel management should reduce their working time or allow them to take rest whenever they feel pain and cannot carry out their routine work normally. Generally, job rotation may reduce the musculoskeletal complaints among workers and also may reduce the physical workload.

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**APPENDICES**

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**APPENDIX A:**

**Ethical Clearance**

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**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS  
(JKEUPM)  
UNIVERSITI PUTRA MALAYSIA**

**Research title** : **Risk Factors Contributing to Musculoskeletal Disorders Among Hotel Room Attendants in Kuala Lumpur**

**Study Site** : **Kuala Lumpur**

**JKEUPM Ref No.** : **JKEUPM-2018-354**

**Researcher** : **Nur Shahida binti Mohamad Pauzi**

**Supervisor** : **Dr. Ng Yee Guan**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 2 dated 5/12/2018
2. Respondent Information Sheet & Consent (Malay), Version 2 dated 5/12/2018
3. Proposal (English), Version 1 dated 29/10/2018
4. Questionnaires/ Interviews (Malay), Version 1 dated 29/10/2018
5. Curriculum Vitae of:
  - a. Dr. Ng Yee Guan

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

- Approved
- Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**
- Disapproved

Please note that the approval is **VALID UNTIL 12 DECEMBER 2019**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.
- III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM.

**APPENDIX B:**

**Permission Letter to Conduct Final Year Project**

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**APPENDIX C:**

**Supported Letter from DOSH**

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**APPENDIX D:**

**Respondent's Information Sheet and Consent Letter**

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

## **BORANG 2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN**

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

### **1. TAJUK KAJIAN :**

Risk Factors Contributing To Musculoskeletal Disorders Among Hotel Room Attendants In Klang Valley

### **2. PENGENALAN**

Kajian ini adalah mengenai faktor-faktor yang menyumbang kepada gejala muskuloskeletal yang dijalankan keatas pekerja membersihkan bilik tamu.

### **3. APAKAH YANG PERLU ANDA LAKUKAN?**

Responden perlu menjawab beberapa soalan yang berkaitan dengan diri dan pekerjaan yang akan dibantu oleh pengkaji. Selain itu, responden juga perlu melakukan pekerjaan rutin seperti biasa bagi membolehkan pengkaji membuat pemerhatian atau merekod video sewaktu responden menjalankan kerja harian. Seterusnya, pengkaji akan menggunakan alat menganalisis faktor ergonomik iaitu Rapid Entire Body Assessment (REBA) bagi menganalisa pergerakan responden semasa menjalankan kerja.

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

Pekerja yang mempunyai masalah muskuloskeletal yang bukan berpunca dari faktor pekerjaan sebagai contoh kemalangan jalan raya. Selain itu, pekerja yang telah disahkan oleh doktor yang mempunyai masalah gejala sendi otot yang disebabkan oleh pekerjaan yang sebelumnya juga akan dikecualikan dari menyertai kajian ini. Di samping itu, pekerja yang diklasifikasikan sebagai orang kelainan upaya juga tidak dibenarkan untuk menyertai kajian ini.

**5. APAKAH FAEDAH MENYERTAI KAJIAN INI?**

**a) KEPADA ANDA SEBAGAI PESERTA?**

Anda akan mendapat pengetahuan tentang faktor-faktor yang boleh menyumbang kepada kondisi kesihatan anda iaitu dari segi muskuloskeletal.

**b) KEPADA PENYELIDIK?**

Penyelidik mendapat pengetahuan tentang faktor yang menyumbang kepada berlakunya penyakit muskuloskeletal yang melibatkan pekerja pembersihan bilik di hotel.

**6. ADAKAH IA BERISIKO?**

Kajian ini tidak mendatangkan risiko kepada responden kerana tidak melibatkan pengambilan sebarang penentu kesihatan yang invasif.

**7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?**

Identiti responden akan disimpan dan dijaga sebaiknya dan tidak akan diberikan pada mana-mana pihak yang tidak sepatutnya. Segala maklumat yang diperoleh hanya akan digunakan untuk tujuan penyelidikan sahaja.

**8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?**

Responden boleh menghubungi talian yang tertera:

**Penyeldik:**

**NUR SHAHIDA BINTI MOHAMAD PAUZI**  
Jabatan Kesihatan Persekitaran Dan Pekerjaan  
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**Penyella:**

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Emel; shah86zam@upm.edu.my

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**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)

Tandatangan .....  
(Saksi)

Tarikh :.....

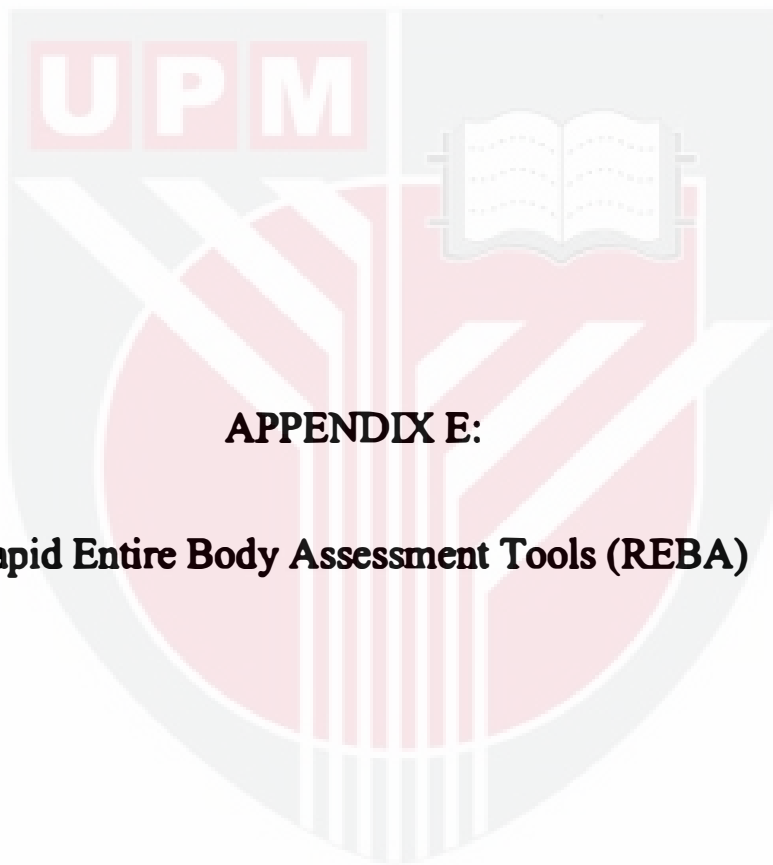
Nama :.....

No. K/P: .....

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

Tarikh .....

Tandatangan .....  
(Penyelidik)

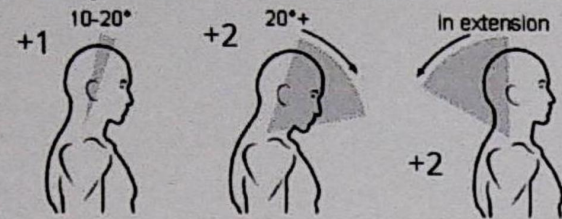


**APPENDIX E:**

**Rapid Entire Body Assessment Tools (REBA)**

**A. Neck, Trunk and Leg Analysis**

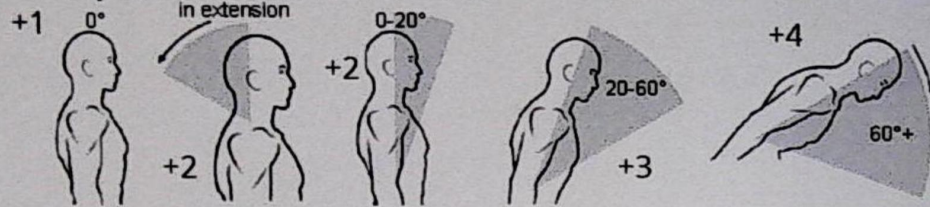
**Step 1: Locate Neck Position**



Step 1a: Adjust...  
If neck is twisted: +1  
If neck is side bending: +1

Neck Score

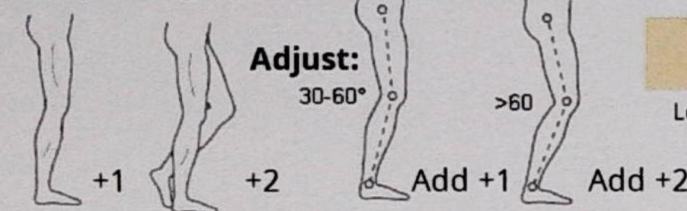
**Step 2: Locate Trunk Position**



Step 2a: Adjust...  
If trunk is twisted: +1  
If trunk is side bending: +1

Trunk Score

**Step 3: Legs**



Adjust:

Leg Score

**Step 4: Look-up Posture Score in Table A**

Using values from steps 1-3 above,  
Locate score in Table A

Posture Score A

**Step 5: Add Force/Load Score**

If load < 11 lbs.: +0  
If load 11 to 22 lbs.: +1  
If load > 22 lbs.: +2  
Adjust: If shock or rapid build up of force: add +1

Force / Load Score

**Step 6: Score A, Find Row in Table C**

Add values from steps 4 & 5 to obtain Score A.  
Find Row in Table C.

Score A

**Scoring**

- 1 = Negligible Risk
- 2-3 = Low Risk. Change may be needed.
- 4-7 = Medium Risk. Further Investigate. Change Soon.
- 8-10 = High Risk. Investigate and Implement Change
- 11+ = Very High Risk. Implement Change

**Scores**

Table A		Neck											
		1				2				3			
Trunk Posture Score	Legs	1	2	3	4	1	2	3	4	1	2	3	4
	1	1	2	3	4	1	2	3	4	3	3	5	6
	2	2	3	4	5	3	4	5	6	4	5	6	7
	3	2	4	5	6	4	5	6	7	5	6	7	8
	4	3	5	6	7	5	6	7	8	6	7	8	9
5	4	6	7	8	6	7	8	9	7	8	9	9	

Table B		Lower Arm					
		1			2		
Upper Arm Score	Wrist	1	2	3	1	2	3
	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
6	7	8	8	8	9	9	

Score A	Table C											
	Score B											
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	8	8	9	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

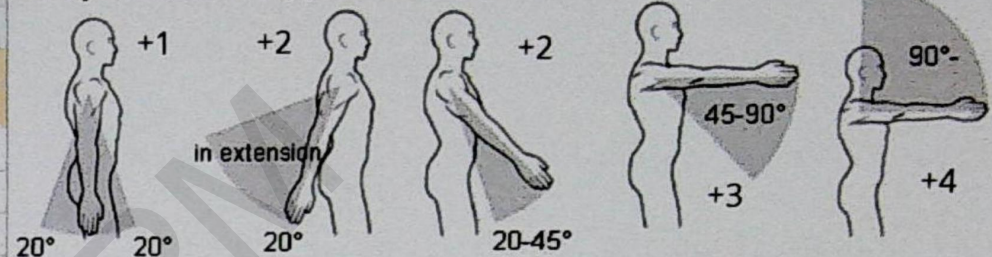
Table C Score

Activity Score

REBA Score

**B. Arm and Wrist Analysis**

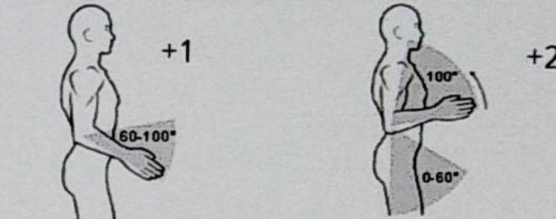
**Step 7: Locate Upper Arm Position:**



Step 7a: Adjust...  
If shoulder is raised: +1  
If upper arm is abducted: +1  
If arm is supported or person is leaning: -1

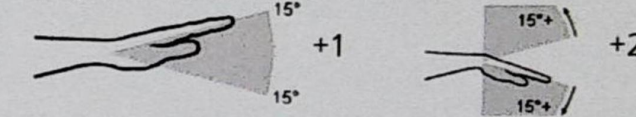
Upper Arm Score

**Step 8: Locate Lower Arm Position:**



Lower Arm Score

**Step 9: Locate Wrist Position:**



Wrist Score

Step 9a: Adjust...  
If wrist is bent from midline or twisted: Add +1

**Step 10: Look-up Posture Score in Table B**

Using values from steps 7-9 above, locate score in Table B

Posture Score B

**Step 11: Add Coupling Score**

Well fitting Handle and mid rang power grip, **good: +0**  
Acceptable but not ideal hand hold or coupling acceptable with another body part, **fair: +1**  
Hand hold not acceptable but possible, **poor: +2**  
No handles, awkward, unsafe with any body part, **Unacceptable: +3**

Coupling Score

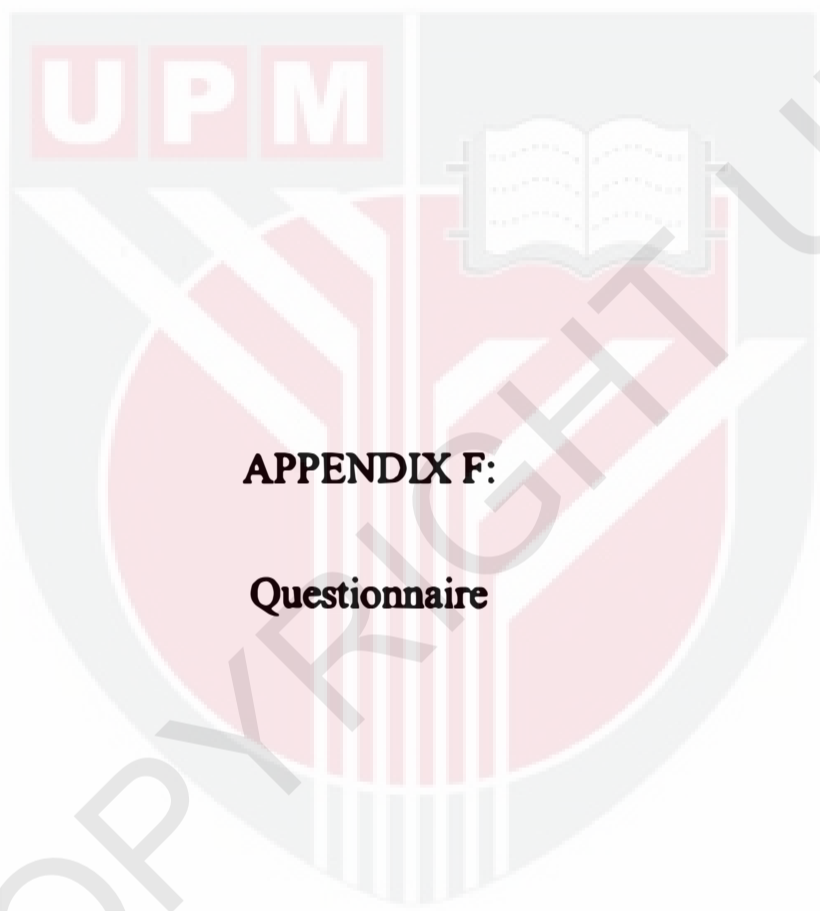
**Step 12: Score B, Find Column in Table C**

Add values from steps 10 & 11 to obtain Score B. Find column in Table C and match with Score A in row from step 6 to obtain Table C Score.

Score B

**Step 13: Activity Score**

- +1 1 or more body parts are held for longer than 1 minute (static)
- +1 Repeated small range actions (more than 4x per minute)
- +1 Action causes rapid large range changes in postures or unstable base



**APPENDIX F:**

**Questionnaire**

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Tarikh:

No ID:



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UNIVERSITI PUTRA MALAYSIA

**BORANG KAJI SELIDIK**

**TAJUK KAJIAN:**

**RISK FACTORS CONTRIBUTING MUSCULOSKELETAL  
DISORDES AMONG HOTEL ROOM ATTENDANTS IN KLANG  
VALLEY**

**NAMA PENYELIDIK:**

NUR SHAHIDA BINTI MOHAMAD PAUZI  
FAKULTI PERUBATAN DAN SAINS KESIHATAN

**ARAHAN SOALAN:**

1. BORANG SOAL SELIDIK INI MERANGKUMI BEBERAPA BAHAGIAN:-  
BAHAGIAN A: MAKLUMAT LATAR BELAKANG  
BAHAGIAN B: MAKLUMAT PEKERJAAN  
BAHAGIAN C: MAKLUMAT GAYA HIDUP  
BAHAGIAN D: MAKLUMAT PERUBATAN
2. ANDA DIKEHENDAKI MENJAWAB SEMUA SOALAN DALAM SOAL SELIDIK INI
3. SILA TANDAKAN JAWAPAN DI BAHAGIAN YANG TELAH DISEDIAKAN
4. SILA KEMBALIKAN BORANG SOAL SELIDIK KEPADA PENYELIDIK SELEPAS MENJAWAB SEMUA SOALAN

**BAHAGIAN A: BIODATA**

1. **Hotel** : \_\_\_\_\_

2. **No. Tel** :

3. **Umur** :  tahun

4. **Warganegara** :  Warganegara  Bukan warganegara

5. **Berat** : \_\_\_\_\_ kg

6. **Tinggi** : \_\_\_\_\_ cm

7. **Status** :  Berkahwin  Belum berkahwin

8. **Pendidikan** :  Tidak bersekolah  
 Sekolah Rendah (7-12 tahun)  
 Sekolah Menengah (13-17 tahun)  
 Universiti ( $\geq$  18 tahun)

7. **Jumlah Tangungan** : \_\_\_\_\_ orang

## BAHAGIAN B: MAKLUMAT PEKERJAAN

### 1 Maklumat pekerjaan terdahulu

1.1 Pernahkah anda bekerja di tempat lain sebelum ini?

Ya

Tidak

1.2 Jika Ya, nyatakan seperti dibawah:

Jenis Pekerjaan	Waktu Bekerja (jam)	Tempoh Bekerja (tahun)

\*pilih hanya 2 pekerjaan yang paling lama (jika ada)

### 2 Maklumat pekerjaan sekarang

2.1 Berapa tahunkah anda sudah bekerja di hotel ini?

\_\_\_\_\_ tahun

2.2 Nyatakan waktu bekerja anda dalam sehari.

\_\_\_\_\_

2.3 Jenis bayaran gaji:

Mengikut jam bekerja

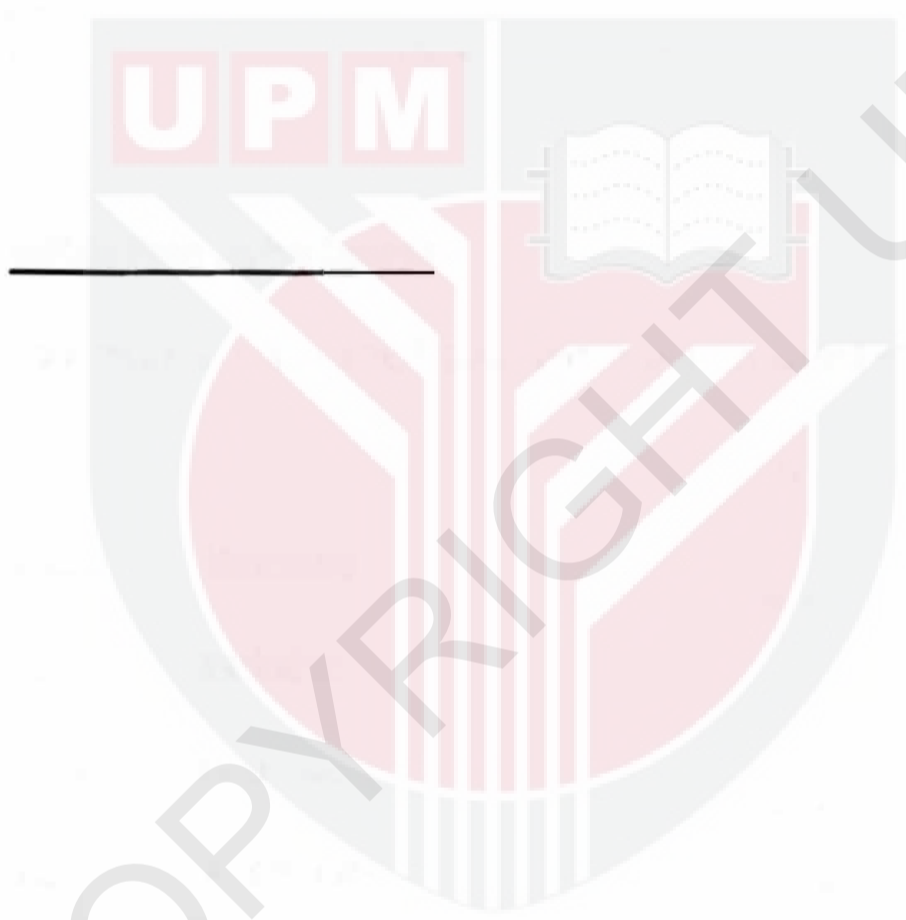
Mengikut bilangan bilik yang dibersihkan

2.3 Adakah anda pernah menerima latihan atau cara-cara untuk melaksanakan pekerjaan anda bagi mengelakkan daripada berlaku kecederaan?

Ya

Tidak

U P M



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**BAHAGIAN D: MAKLUMAT PERUBATAN**

1. Adakah anda menghidap penyakit rheumatoid arthritis (sakit sendi) yang disahkan oleh doktor?

Ya  Tidak

2. Jika Ya, adakah anda pernah mengambil ubat-ubatan untuk sakit tersebut?

Ya  Tidak

3. Pernahkah anda terlibat dalam kemalangan yang melibatkan kecederaan serius pada leher, bahu, tangan, belakang badan, atau kaki?

Ya  Tidak

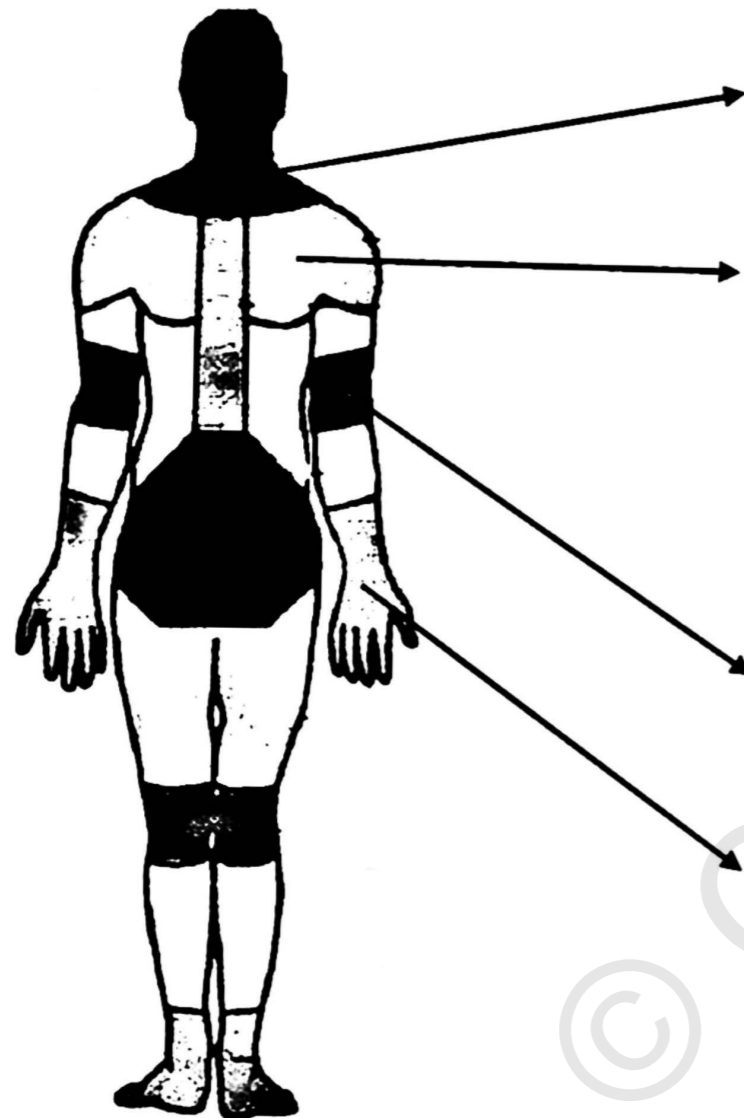


COPY

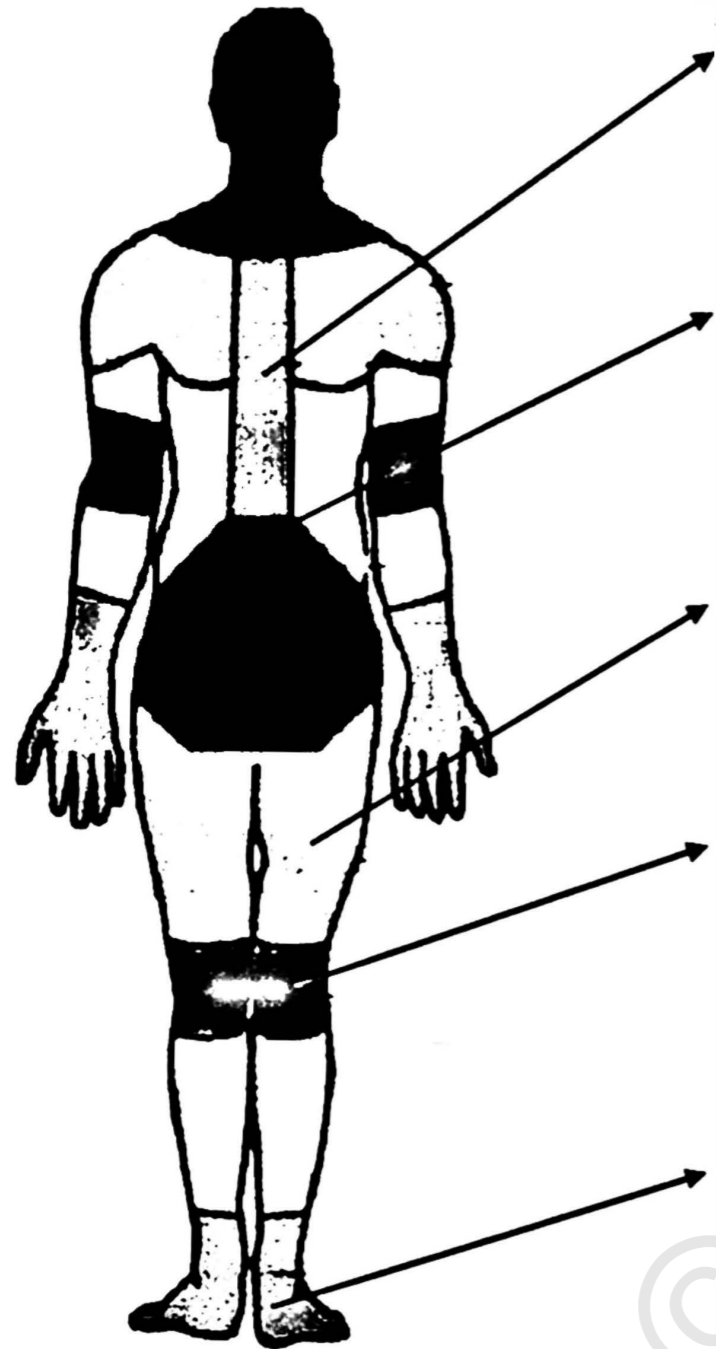
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**BAHAGIAN E: GEJALA OTOT  
SKELETAL PADA ORGAN LOKOMOTIF**



<b>SOALAN 1</b> Setiap responden perlu menjawab bahagian ini	<b>SOALAN 2</b> Perlu menjawab soalan ini jika jawapan di soalan 1 adalah YA	<b>SOALAN 3</b> Perlu menjawab soalan ini jika jawapan di soalan 1 adalah YA
Pernahkah anda berasa tidak selesa atau sakit dalam tempoh 12 bulan yang lepas di bahagian yang berikut?	Adakah anda mengalami kesukaran dalam melakukan pekerjaan secara normal dalam waktu 12 bulan yang lepas?	Adakah anda mengalami masalah (berasa sakit atau tidak selesa) dalam tempoh 7 hari yang lepas?
<b>Tengkuk/ Leher</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Bahu</b> <input type="checkbox"/> Ya, bahu kanan <input type="checkbox"/> Tidak <input type="checkbox"/> Ya, bahu kiri <input type="checkbox"/> Ya, kedua-duanya	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Siku</b> <input type="checkbox"/> Ya, siku kanan <input type="checkbox"/> Tidak <input type="checkbox"/> Ya, siku kiri <input type="checkbox"/> Ya, kedua-duanya	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Tangan/ pergelangan tangan</b> <input type="checkbox"/> Ya, tangan kanan <input type="checkbox"/> Tidak <input type="checkbox"/> Ya, tangan kiri <input type="checkbox"/> Ya, kedua-duanya	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak



<b>Belakang atas</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Belakang bawah</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Paha (satu atau kedua-duanya)</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Lutut (satu atau kedua-duanya)</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak
<b>Kaki/ pergelanagn kaki (satu atau kedua-duanya)</b> <input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak