WORK ENVIRONMENTS AND BACK PAIN AMONG NURSES IN HOSPITAL UNIVERSITI SAINS MALAYSIA

Dr Suhaimi Samsudin

Master in Public Health

Department of Community Medicine

School of Medical Sciences, Universiti Sains Malaysia,

Health Campus, 16150 Kelantan, Malaysia

Introduction: Profession as a nurse needs dedication and patience to endure all the challenges. This profession exposes them to many occupational hazards including biological, chemical, physical, ergonomic and psychosocial. As much as sick people rely on nurses to take good care of them, it is not being given importance to secure nurses health in return. From study of occupational health problems among nurses in Malaysia the most emphasize hazards is hepatitis B, acquired immunodeficiency syndrome, tuberculosis, cytotoxic drugs, anesthetic agents, needle stick injury, back pain, and stress

Objectives: In this study, the general aim is to determine prevalence of back pain and also association of work environments toward back pain among nurses in Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan, Malaysia.

Patients and Methods: This was a cross sectional study involved 130 nurses from wards and clinics in Hospital Universiti Sains Malaysia which was conducted from September 2012 till May 2013. All respondents were chosen through simple random sampling from ward and clinic nurses lists. Validated English version and Malay translation of Modified Nordic Musculoskeletal Questionnaire and Roland Morris Disability Questionnaire for back pain characteristics and severity were used in this study. Prevalence of back pain was determined with its 95% CI while associated factors and its relation with back pain was analyzed using multiple logistic regression analysis.

Results: Out of 130 respondents, majority were Malays (90.8%) and females (94.6%). Age of respondents ranged from 23 to 58 years old with mean of 41.5(SD=10.56) years old. Prevalence of nurses having back pain in life for this study was 71.6% (95% CI: 61.1,82.1) with low back pain type was the highest

among all back pain (48.6%, 95% CI: 37.0,63.1). From multivariate analysis using multiple logistic regression, significant associated factors for back pain after controlling for potential confounders were total household income (OR: 3.54, 95% CI 1.23,10.15, p=0.019) and BMI (OR: 4.47, 95% CI 1.55,12.86, p=0.005).

Conclusion: Prevalence of back pain among nurses in HUSM is high, corresponds with other studies in Malaysia and South East Asia. In this study, significant associated risk factors are total household income and BMI.

Dr Mohd Yusof Sidek: Supervisor

Associate Prof Dr Wan Mohd Zahiruddin Wan Mohd: Co-Supervisor

WORK ENVIRONMENTS AND BACK PAIN AMONG NURSES IN HOSPITAL UNIVERSITI SAINS MALAYSIA

By:

DR. SUHAIMI BIN SAMSUDIN

Research Project Submitted In Partial Fulfillment of the Requirement for the Degree of Master of Public Health (MPH)

UNIVERSITI SAINS MALAYSIA 2012/2013

ACKNOWLEDGEMENTS

Alhamdulillah, praise to ALLAH S.W.T for completion of this research project. I would like to express my deepest gratitude and thanks to all individuals that direct or indirectly involve in this project who have helped me through this journey from preparation, conducting study and till this report been made. My special appreciation to my supervisor, Dr. Mohd Yusof Haji Sidek, Lecturer, Department of Community Medicine, School of Medical Sciences, USM for continuous guidance, suggestion, advice, comment, cooperation, contribution, encouragement, and moral support for making this research possible and successful. Special thanks to my co-supervisor AP Dr. Wan Mohd Zahiruddin Wan Mohd for his support, advise, expert guidance and cooperation in making this research project reality. I also would like to acknowledge AP. Dr. Shamsul Bahri Hj Mohd Tamrin, Department of Occupational and Environmental Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia for his permission to use his Malay translation of NMQ and RMDQ questionnaire. To all lecturer in Department of Community Medicine, School of Medical Sciences, USM, thank you for your guidance and cooperation. My appreciation to Director of Hospital Universiti Sains Malaysia (HUSM), Matron, Sisters and all respondents (nurses) to allow me to do research in HUSM wards and clinic, and provide important valuable response in this study.

Last but not least, special thank to my beloved wife Puan Wan Saliza Wan Din for her continuously support, encouragement and patient for me to finish this research. Also thank to my childrens Nur Aina Aiyani, Mohd Jamali Imran and Mohd Irfan Zakwan for the support and patience.

TABLE OF CONTENTS

Title Page

ACKNOWLEDGEMENTS……. ii

TABLE OF CONTENTS …… iii

LIST OF TABLES …….. vii

LIST OF FIGURES ……...……... viii

LIST OF APPENDICES……. ix

LIST OF ABBREVIATIONS……..... x

ABSTRACT…… xi

ABSTRAK…….. xiii

CHAPTER ONE …….. 1

1. INTRODUCTION ……..…… 1

1.1 Background of the study …… 1

1.2. Pathogenesis……. 3

1.3 Rational of the study……..... 5

CHAPTER TWO …….. 6

2. LITERATURE REVIEW …..……. 6

2.1. Global prevalence of back pain ….…….……. 6

2.1.1 Prevalence of back pain among nurses worldwide……...…….. 7

2.1.2 Prevalence of back pain in Malaysia .....……..... 9

2.1.3 Associated factors of back pain among nurses ……..…….. 10

2.2 Conceptual framework 10

CHAPTER THREE 12

3. OBJECTIVES 12

3.1 General objective 12

3.2 Specific objective 12

3.3 Research hypothesis 13

3.4 Research questions 13

CHAPTER FOUR 14

4. METHODOLOGY 14

4.1 Research location 14

4.2 Research design 14

4.3 Population and sample 15

4.3.1 Reference and source population 15

4.3.2 Sample size estimation 15

4.3.3 Sampling method 17

4.3.4 Study criteria 17

4.4.5 Operational definition 18

4.4 Research tools 21

4.5 Data collection procedure 22

4.6 Statistical data analysis 24

4.6.1 Data entry 24

4.6.2 Univariate analysis 24

4.6.3 Multivariate analysis 24

4.7 Ethical Consideration 25

CHAPTER FIVE 26

5. RESULTS 26

5.1 Descriptive characteristics of respondent 26

5.1.1 Socio-demographic characteristics of respondents 26

5.1.2 Anthropometric characteristics of respondents 28

5.1.3 Occupational places, working hour and experience of respondents 28

5.1.4 Workplace characteristics of respondent 29

5.1.5 Back pain severity and characteristics 30

5.2 Factors associated with back pain (univariable) 31

5.2.1 Relations of socio-demographic and back pain 31

5.2.2 Relations of anthropometric characteristics and back pain 32

5.2.3 Relations of occupational places, working hour and experience of respondents and back pain 33

5.2.4 Relations of workplace characteristics and back pain 34

5.3 Factors associated with back pain (multivariable) 35

CHAPTER SIX 37

6. DISCUSSIONS 37

6.1 Prevalence of back pain 37

6.2 Back pain severity and characteristics 38

6.3 Factors associated with back pain 40

6.3.1 Factor associated with back pain (univariate) 40

6.3.2 Factor associated with back pain (multivariate) 45

6.4 Limitations of the study 46

6.4.1 Study design 46

6.4.2 Information bias and health workers effect 46

CHAPTER SEVEN 47

7. CONCLUSION AND RECOMMENDATIONS 47

7.1 Conclusion 47

7.2 Recommendations 47

REFERENCES 48

APPENDICES 53

LIST OF TABLES

Table 2.1 Prevalence of back pain among nurses 8

Table 4.1 Two proportion table 16

Table 5.1 Socio-demographic characteristics of the respondents..... 27

Table 5.2: Anthropometric characteristics of respondents 28

Table 5.3 Occupational places, working hour and experiences of respondents 28

Table 5.4: Workplace characteristics of respondents 29

Table 5.5: Back pain severity and characteristics 30

Table 5.6: Relationship of socio-demographic and back pain 31

Table 5.7: Relationship of anthropometric characteristics and back pain 32

Table 5.8: Relationship of occupational places, working hour and experiences of respondents and back pain 33

Table 5.9: Relationship of workplace characteristics of respondents and back pain 34

Table 5.10 Associated factors for back pain by multivariable analysis 36

LIST OF FIGURES

Figure 2.1 Conceptual framework of the study 11

Figure 4.1 Flow chart of data collection process 23

LIST OF APPENDICES

APPENDIX A. Research information 53

APPENDIX B. Proforma .....
60

APPENDIX C. Permission letter (e-mail) from Assoc. Prof. Dr Shamsul Bahri Hj

Mohd Tamrin.....
69

APPENDIX D. Ethical approval letter (USM) .....
71

APPENDIX E. Approval letter from HUSM Director .....
73

APPENDIX F. SSPS output for model fitness .....
74

APPENDIX G. SSPS output for interaction .....
75

APPENDIX H. ROC .....
76

LIST OF ABBREVIATIONS

BMI	body mass index
CCU	cardiac care unit
CI	confidence interval
CSSD	central sterile supply department
HDW	high dependency ward
HUSM	Hospital Universiti Sains Malaysia
IASP	International Association for the Study of Pain
ICU	intensive care unit
MNMQ	Modified Nordic Musculoskeletal Questionnaire
MSD	musculoskeletal disorder
NICU	neonatal intensive care unit
OR	odds ratio
PS	Power and Sample Size Calculation Software
RMDQ	Rolland Morris Disability Questionnaire
ROC	receiver operating characteristics
SD	standard deviation

SE	standard error
SPSS	Statistical Package for Social Science

ABSTRACT

Introduction

Profession as a nurse needs dedication and patience to endure all the challenges. This profession exposes them to many occupational hazards including biological, chemical, physical, ergonomic and psychosocial. In this study, the general aim is to determine prevalence of back pain and also association of work environments toward back pain among nurses in Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan, Malaysia.

Methods

This was a cross sectional study involved 130 nurses from wards and clinics in Hospital Universiti Sains Malaysia which was conducted from September 2012 till May 2013. All respondents were chosen through simple random sampling from ward and clinic nurses lists. Validated English version and Malay translation of Modified Nordic Musculoskeletal Questionnaire and Roland Morris Disability Questionnaire for back pain characteristics and severity were used in this study. Prevalence of back pain was determined with its 95% CI

while associated factors and its relation with back pain was analyzed using multiple logistic regression analysis.

Results

Out of 130 respondents, majority were Malays (90.8%) and females (94.6%). Age of respondents ranged from 23 to 58 years old with mean of 41.5(SD=10.56) years old. Prevalence of nurses having back pain in life for this study was 71.6% (95% CI: 61.1,82.1) with low back pain type was the highest among all back pain (48.6%, 95% CI: 37.0,63.1). From multivariate analysis using multiple logistic regression, significant associated factors for back pain after controlling for potential confounders were total household income (OR: 3.54, 95% CI 1.23,10.15, p=0.019) and BMI (OR: 4.47, 95% CI 1.55,12.86, p=0.005).

Conclusion

Prevalence of back pain among nurses in HUSM is high, corresponds with other studies in Malaysia and South East Asia. In this study, significant associated risk factors are total household income and BMI.

Keywords

Nurse, prevalence, back pain, HUSM, work environment, Modified Nordic Musculoskeletal Questionnaire, Roland Morris Disability Questionnaire

ABSTRAK

Pengenalan

Profesion sebagai jururawat memerlukan dedikasi dan kesabaran untuk menahan semua cabaran. Kerjaya ini mendedahkan mereka kepada banyak bahaya pekerjaan termasuk bahaya biologi, bahaya kimia, bahaya fizikal, bahaya ergonomik dan bahaya psikososial. Dalam kajian ini, objektif umum adalah untuk menentukan prevalens sakit belakang dan hubung-kaitnya dengan persekitaran kerja di kalangan jururawat di Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan, Malaysia.

Kaedah kajian

Ini adalah kajian keratan rentas yang melibatkan 130 jururawat dari wad dan klinik di Hospital Universiti Sains Malaysia (HUSM) yang di jalankan bermula dari bulan September 2012 hingga Mei 2013. Semua responden yang dipilih adalah secara rawak mudah dari senarai jururawat di wad dan klinik. Soal-selidik bahasa Inggeris dan

terjemahan Melayu yang telah disahkan untuk soalan “Modified Nordic Muskuloskeletal” dan soalan “Roland Morris Disability” telah digunakan untuk ciri-ciri sakit belakang serta tahapnya. Untuk prevalen sakit belakang, statistik deskriptif, purata dan sisihan piawai bagi nombor dan peratusan bagi setiap kategori data telah dikira. Untuk menentukan faktor-faktor yang berkaitan dan hubung-kaitnya terhadap sakit belakang, analisis regresi logistik berganda dijalankan.

Keputusan

Dari semua 130 responden, majoriti adalah Melayu (90.8%) dan perempuan (94.6%). Umur responden adalah dari 23 hingga 58 tahun dengan purata umur responden adalah 41.5 (SD = 10.56) tahun. Prevalen jururawat mempunyai sakit belakang dalam kehidupan untuk kajian ini adalah 71.6% (95% CI: 61.1,82.1) dengan sakit belakang bawah adalah yang tertinggi di kalangan semua sakit belakang (48.6%, 95% CI: 37.0,63.1). Daripada analisis multivariat menggunakan regresi logistik berganda, faktor-faktor yang berkaitan untuk sakit belakang adalah jumlah pendapatan isi rumah (OR: 3.54, 95% CI 1.23,10.15, p = 0.019) dan BMI (OR: 4.47, 95% CI 1.55 , 12.86, p = 0.005).

Kesimpulan

Prevalen sakit belakang di kalangan jururawat di HUSM adalah tinggi, sesuai dengan kajian lain sakit belakang di kalangan jururawat di Malaysia dan di Asia Tenggara. Dalam kajian ini, faktor risiko yang penting yang berkaitan adalah jumlah pendapatan isi rumah dan BMI.

Kata kunci

Jururawat, prevalen, sakit belakang, HUSM, persekitaran pekerjaan, “Modified Nordic Musculoskeletal Questionnaire”, “Roland Morris Disability Questionnaire”.

CHAPTER ONE

1. Introduction

1.1 Background of the study

Medical field is about treating patient from illness state to achieve healthy state. This process involve many steps and procedures that important and it need full commitment from all medical staffs. Although when word treatment, hospital or clinic come out from one mind it usually will reflect work of the doctors. But in reality all health profession including doctor, nurse, medical attendant, physiotherapist, pharmacist, dietician and many others profession that direct or indirectly involve in treatment process of the patient (Håland Haldorsen *et al.*, 2002). During this treatment process, most of the time patient been taken care by nurses 24 hours a day and 7 days a week. This wonderful dedication of work in treating patient causing them to forget that they also human being that can get ill due to occupational hazard (Simpson, 2009).

Nurses occupational hazard including biological hazards, chemical hazards, physical hazards, ergonomic hazards and psychosocial hazards. Biological hazards define as any biological risks that are posed by such things as bacteria, viruses, fungi and prion. Nurses are particularly at risk from biological hazards because of the nature of their work. On a daily basis, nurses deal with all sort of biological hazards from patients' excretions, secretions, specimens, wounds, dressings and bed-linen, all of which may or may not be infected. Exposure to biological hazards can be cause in many ways and by

several routes. These include ingestion, inoculation, bites, inhalation, by contact with cuts and abrasions in the skin and through splashes of the hazard (Ramsay *et al.*, 2006).

Nurses are exposed to a wide array of chemicals and drugs at work. Hazardous chemicals include anesthetic gases, disinfectants, latex, cleaners, medications like anti-retroviral and chemotherapeutic drugs, devices that contains mercury, and sterilization chemicals. Some regulations restrict nurses exposure to chemicals. Actually, not everybody on the health care team knows how dangerous their workplace can be. As much as sick people rely on nurses to take good care of them, it is not being given importance to secure nurses health in return. But among all this hazards the most emphasize hazards is hepatitis B, acquired immunodeficiency syndrome, tuberculosis, cytotoxic drugs, anesthetic agents, needle stick injury, back pain, and stress from study of occupational health problems among nurses in Malaysia (Tan, 1991).

Back pain define as any pain, ache, tension or stiffness at back that can be fell anywhere along your spine, from your neck down to your hip from International Association for the Study of Pain (Breivik, 2002). Almost all people got back pain once in their lifetime, and study show lifetime prevalence of back pain as high as 80%. (Rubin DI, 2007). In recent study in Turkey show back pain prevalence among nurses is the highest among hospital staff (Karahan *et al.*, 2009). Prevalence of back pain among nurses vary from 40.6% to 85.5% within a year (Yip, 2001; Videman *et al*., 2005; Smith *et al*., 2006; de Castro *et al*., 2009; Karahan *et al*., 2009; Sopajareeya *et al*., 2009). There is study show that by becoming a nurse prevalence of back pain increased from 31% at entry to nursing school to 72% at the end of the school and further to 82% after 5 years

as a nurse (Videman *et al*., 2005). There are many factor that associated with back pain and for nurses most of this activities involved working with patients. Nurses work activity led to back pain include monotonous working position such as standing most of the time, walking all the time or even sitting. And treatment job of nurses not only involve one patient only, but all patient in her/his ward, clinic or even in the department. Although all nurses have high risk for back pain, nurses who work in shift and have 6 or even more than that of night shift or overtime and on-call activities have higher risk to develop back pain than other nurses that did not do shift work (Sopajareeya *et al.,* 2009). Other nurses related work activity that associated with back pain is lifting heavy load, carry or transfer patient in bed or from bed, adequate treatment equipment in workplace, workplace environment and also nurses working experienced (Karahan *et al*.,2009; Sopajareeya *et al*., 2009). Nurses socio-demographic characteristics such age, gender, races, marital status, number of children, education levels, total house income and body mass index (BMI) also play a main role in predisposing patient toward having back pain (Smith *et al*., 2006).

1.2 Pathogenesis

Anatomy back of human made up of the bones, muscles, ligaments, tendons and nerve that incredibly strong, protecting the highly sensitive nerve roots, yet highly flexible, providing for mobility on many different planes (Standring *et al.*, 2005). Most of us take advantage of strength, structure and flexibility of spine for granted in our everyday lives until something goes wrong. Once back pain occur, we're driven to know what's wrong and what it will take to relieve the pain and prevent a recurrence. Many different structures in the spine can cause back pain, it can be from nerve, muscle, ligament, bone or disc (Adams, 2004).

Back of human can be divided into 3 segments that consist of neck (cervical), middle back (thoracic) and lower back (lumbar). In cervical area there are seven vertebral bodies (bones) that start smaller in size at the base of the skull and they get bigger when closer to thoracic area. Most of the rotation of the cervical spine comes from the top two segments (C1-C2) whereas most of the flexion/extension movement comes from C5-C6 and C6-C7 of the vertebra. Acute neck pain is most often caused by a muscle, ligament or tendon strain (soft tissue), and will usually heal with time and non-surgical treatments needed to alleviate the neck pain. But if the pain is persistent and lasts longer more than two weeks to three months, or with radiculopathy (mainly arm pain, numbness or tingling) there is often a specific anatomic problem from bone or nerve (Manchikanti *et al.*, 2001).

The 12 vertebral bodies in the upper back make up the thoracic spine or the middle back. The firm attachment of the rib cage at each level of the thoracic spine provides stability and structural support to the upper back and allows very little motion. The thoracic spine is basically a strong cage and it is designed to protect the vital organs of the heart and lungs. The upper back is not designed for motion, and subsequently, injuries to the thoracic spine are rare. However, irritation of the large back and shoulder muscles or joint dysfunction in the upper back can produce very noticeable back pain (Manchikanti *et al.*, 2001; Adams, 2004).

Lower back or lumbar region consist of 5 vertebra bodies that are big and strong. The lower back has a lot more motion than the thoracic spine and also carries all the weight of the torso, making it the most frequently injured area of the spine. The motion in the

lumbar spine is divided between five motion segments, although a disproportionate amount of the motion is in the lower segments (L3-L4 and L4-L5). Consequently, these two segments are the most likely to breakdown from wear and tear (e.g. osteoarthritis). The two lowest discs (L4-L5 and L5-S1) take the most strain and are the most likely to herniate. This can cause lower back pain and possibly numbness that radiates through the leg and down to the foot (sciatica). The vast majority of episodes of lower back pain are caused by muscle strain. Even though a muscle strain doesn't sound like a serious injury, trauma to the muscles and other soft tissues in the lower back can cause severe back pain. The good news is that soft tissues have a good blood supply, which brings nutrients to the injured area, facilitates the healing process and often provides effective relief of the back pain (Manchikanti *et al.*, 2001; Adams, 2004).

1.3 Rationale of the study

When human age increases more than 30 years old, there are significant obvious spine degenerative changes in view of histology review (Boos et al., 2002). But work of nurses is the same from their age of start working till they pension. Nurses have to do all monotonous working position, such as standing most of the time, walking all the time or even sitting, lifting heavy load, carry or transfer patient in bed or from bed, night shift or overtime and on-call activities (Alexopoulos *et al.*, 2003). This is why prevalence of back pain among nurses is higher if compared to other hospital staff (Karahan *et al*.,2009). In view of the information, this research project done to determine prevalence of back pain among nurses and to study relation of work environments toward developing back pain. Identified factors from this study should be used for prevention and specific therapeutic intervention for nurses in HUSM and also for all nurses in Malaysia for them to gives better cares to all their patients.

CHAPTER TWO

2 Literature Review

2.1 Back pain

Globally almost all adult population has history of back pain once from their lifetime (Rubin DI, 2007). It is one of the major causes work absenteeism, reduce quality of life and healthcare resource utilization that causing an enormous financial burden from work restrictions and lost productivity (Hoy *et al.*, 2010). In develop country such United State of America back pain is the second most common neurological ailment after headache and it cost USD 50 billion each year for treatment of low back pain only (Dagenais *et al.*, 2008). Back pain can be classified into acute, sub-acute and chronic. Acute back pain is most often caused by a muscle, ligament or tendon strain (soft tissue), and will usually heal with time and non-surgical treatments needed to alleviate the neck pain. But if the pain is persistent and lasts longer more than two weeks to three months, or with radiculopathy (mainly arm pain, numbness or tingling) there is often a specific anatomic problem from bone or nerve (Manchikanti *et al.*, 2001).

From several research about back pain, there is significant result or outcome that show career as nurses were highest to develop back pain if compare with other occupation. Example in 1999 study, among all female workers in United State, back pain prevalence was highest in nursing area (Guo *et al.*, 1999). In Turkey highest back pain prevalence

among hospital staff in Turkey is nurses (Karahan A. *et al*., 2009). And there is one interesting study show that by becoming nurses prevalence of back pain increase tremendously after 5 years of working. This study show back pain prevalence increased from 31% at entry of nursing school to 72% at the end of the school and further to 82% after 5 years as a nurse (Videman *et al*., 2005).

2.1.1 Prevalence of back pain among nurses worldwide

From all study about back pain among nurses done in the current millennium, prevalence of back pain in nurses vary from 40.6% to 85.5% within a year depending of where this study been done as show in table 2.1 below. In develop country such as US, back pain prevalence reported as high as 82% among nurses within a year (Videman *et al*., 2005). In Japan also back pain prevalence was high, study done in year 2006 show Japan nurses back pain prevalence was 85.5% highest among all develop countries (Smith *et al*., 2006). In developing country such as Turkey, prevalence of back pain among nurses also high but not as high in develop country such as US and Japan. In 2009 study in Turkey show prevalence of back pain among turkey nurses was 77.1% within a year. In this study also show that among all hospital staff prevalence of back pain was highest in nurses (Karahan A. *et al*., 2009). For the asia pacific region, prevalence of back pain was lowest in Hong Kong, their back pain prevalence among nurses is only 40.6% within a year (Yip, 2001). Other countries in this region show prevalence of back pain is between 44.9% to 79.4% within a year. Nurses in a Thai Public Hospital back pain prevalence were 61.5% and in Philippines 78.2% of their nurses experience back pain within a year period.

Table 2.1 Prevalence of back pain among nurses

Author	Setting	Prevalence of back pain
(Videman *et al*., 2005)	United State	A prospective cohort study show back pain prevalence increased from 31% at entry to nursing school to 72% at the end of the school and further to 82% after 5 years as a nurse
(Smith *et al*., 2006)	Japan	Prevalence of back pain was 85.5% for past 12-month period
(Karahan A. *et al*., 2009)	Turkey	Study in Turkey done among hospital staff show nurses have highest back pain prevalence that is 77.1%
(Yip, 2001)	Hong Kong	Back pain prevalence among nurses in Hong Kong was 40.6%
(De Castro *et al*., 2009)	Philippines	In Philippines 78.2% nurses experience back pain
(Sopajareeya *et al*., 2009)	Thailand	Nurses in a Thai Public Hospital back pain prevalence was 61.5%
(Rahmah *et al*., 2008)	Port Dickson	Prevalence of back pain among nurses was 79.4%
(Samat *et al*., 2011)	Kelantan	Prevalence of back pain among dental personnel was 44.9%

2.1.2 Prevalence of back pain in Malaysia

In Malaysia there is little study of back pain among nurses although it is quite common and prevalence in Malaysia is quite high. Although there are many other study about back pain among other professional in Malaysia, prevalence of it not as high as in nurses profession. For teacher profession prevalence of low back pain was 40.4% from a cross sectional study conducted in nine primary schools in the Klang Valley 2010 (Samad *et al.*, 2010). From study of work related musculoskeletal symptoms among batik worker in Kelantan in year 2000 only 34.4 % have low back pain (Musa *et al.*, 2000). Prevalence of back pain among Malaysian bus driver was found to be 60.4% in 2005 (Tamrin *et al.*, 2007).

In Malaysia although there is not many study about nurses back pain as been done globally, prevalence of back pain in Malaysia is same as other developing country. In Port Dickson Hospital, prevalence of back pain among nurses was 79.4% within a year (Rahmah *et al*., 2008).Study of back pain among nurses done in Hospital Port Dickson 2007 show high prevalence of back pain (79.4%) but only significant in workplace and heavy lifting as association factors for back pain. Other daily working activity of nurses such as changing patient position at bed, caring or transfer patient from bed or into bed, monotonous work such as standing, sitting and walking only during work did not show significant association. Other than that, in this study there are no risk evaluation between work environments that can be measured as predictor to plan for the intervention and prevention of the back pain in

the future. In Kelantan prevalence of back pain among dental personnel was 44.9% in 2011 (Samat *et al*., 2011).

2.1.3 Associated factors of back pain among nurses

Causation of back pain is very complex. Majority of back pain is due to trauma such as muscle sprain, muscle tear, mechanical strains and sprains. Back pain also can happen due inflammation and infection, Other than that, back pain also can happen due degeneration process, as people age, bone strength and muscle elasticity and tone tend to decrease. The discs begin to lose fluid and flexibility, which decreases their ability to cushion the vertebrae. From previous study of back pain among nurses, factor such as working environments, physical factors, psychosocial factors, and work pressure is the main factor that associated with back pain (Karahan A. *et al*., 2009, Guo *et al*., 1999). Due to limited budget and time constraint, this study will focus on the relationship of work environments and socio-demographic with back pain among nurses. In the future hopefully all other factors can be studied.

2.2 Conceptual framework

Figure 2.1 shows the outline of the conceptual framework of this study. There are various determinant factor causing back pain and in this study work environments and socio-demographic are the factor that will be study.

Nurses in Hospital Universiti Sains Malaysia (HUSM)

Nurses that susceptible towards back pain.
Back pain characteristics and severity

Sociodemographic characteristics:

-Age

-Sex

-Race

-Marital Status

-No. of children

-Total income

-Weight

-Height

Work Environments:

-Ward or clinic

-Shift or normal working hours

-Not enough staff

-Equipment not adequate

-Monotonous work posture

1. Standing at work
2. Walking at work
3. Sitting at work

-Lifting heavy load

-Carry/transfer patient

-Working with medical instruments

Figure 2.1: Conceptual framework of the study

CHAPTER THREE

3. Objective

3.1 General objective

To study the relationship between work environments and socio-demographic with back pain among nurses in Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan.

3.2 Specific objective

1. To determine the prevalence of back pain among nurses in Hospital Universiti Sains Malaysia (HUSM).

2. To determine the back pain characteristic among nurses with back pain in Hospital Universiti Sains Malaysia HUSM using pain scale and Roland Morris Disability Questionnaire (RMDQ)

3. To study the relationship between work environments and back pain among nurses in Hospital Universiti Sains Malaysia (HUSM) using Modified Nordic Questionnaire for Musculoskeletal Disorder

3.3 Research hypothesis

There is an associations between socio-demographic characteristics, work environments and back pain among nurses in Hospital Universiti Sains Malaysia (HUSM).

3.4 Research questions

1. What is the prevalence of back pain among nurses in Hospital Universiti Sains Malaysia (HUSM)?

2. What are the characteristics of back pain among nurses with back pain in Hospital Universiti Sains Malaysia (HUSM)?

3. Is there any association between work environments and back pain among nurses in Hospital Universiti Sains Malaysia (HUSM)?

CHAPTER FOUR

4. Methodology

4.1 Research location

Kelantan is one of Malaysia states that situated at most north-east of Peninsular Malaysia. In 2011 Kelantan have 1.6 million people that live in 10 districts. There is nine general hospital (Hospital Raja Perempuan Zainab II Kota Bharu, Hospital Tengku Anis Pasir Puteh, Hospital Gua Musang, Hospital Kuala Krai, Hospital Tumpat, Hospital Tanah Merah, Hospital Pasir Mas, Hospital Jeli, and Hospital Machang) and one university hospital (Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian) in Kelantan. This study was done in Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan from September 2012 till May 2013. All nurses that work in all wards and clinics in HUSM involved in this study except who is pregnant. According information from matron office, department of nurses, there is 33 wards and 23 clinic in HUSM consist of 1095 nurses.

4.2 Research design

This is a cross-sectional study to investigate the relation of work environments and back pain among nurses in Hospital Universiti Sains Malaysia (HUSM). Study participant is from two different group that is nurses who work in ward and nurses who work in clinic of Hospital Universiti Sains Malaysia (HUSM) during period 2012/2013 and fulfil the study

criteria. The purpose of this study was to differentiate characteristics of work environments between nurses in ward and clinic toward developing back pain among nurses in Hospital Universiti Sains Malaysia (HUSM).

4.3 Population and sample

4.3.1 Reference and source population

Reference population of this study were staff nurse that work in Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan. Source population is nurses working at ward and clinic in Hospital Universiti Sains Malaysia (HUSM) for past one year and accessible for the study.

4.3.2 Sample size estimation

Sample size was calculated using both single proportion and two proportions formula according to research objective. For first objective, sample size was calculated using single proportion formula:

$$n = \left(\frac{Z_{\alpha}}{\Delta} \right)^2 * P(1 - P)$$

Z= 1.96 for (α=0.05, 95%CI)

P= 0.79, prevalence of back pain among nurses in Hospital Port Dickson taken from previous study (Rahmah et al., 2008)

Δ= 0.10 (precision 10%)

n= 64, total sample with 20% dropout n= 77

From the formula above, total estimated sample size was 77 nurses for objective one and two after considering of 20% non-response.

For third objective, sample size calculated using two proportion formula using Power and Sample Size Calculation (PS) software version 3.0.10 :

Table 4.1: Two proportion table

Factor	P0	P1	m	n	Total sample size + 20% dropout
Patient transfer activity associated with back pain	0.70	0.88	1	62x2=124	124+26=150

P0 : Proportion of back pain among nurses that do not do patient transfer from literature review (Engkvist *et al*., 2000)

P1 : Expected proportion of back pain among nurses that do patient transfer activity obtained by expert opinion

m = Ratio of control to cases patients (1:1)

Significance level (α) = 0.05

Power (1-β) = 0.80

Total sample estimation for third objective is 150 nurses including 20% non-response respondents. Based on single proportion and two proportion calculation above, total number of nurses needed for this research study is 150 respondents.

4.3.3 Sampling Method

In this research study subject for the research selected using simple random sampling from ward and clinic nurses list. There were 75 subject selected randomly from each ward list and clinic list.

4.3.4 Study criteria

Inclusion criteria

1. Nurses who work in clinic or ward for 1 year and above

Exclusion criteria:

1. Pregnant nurses

2. Sister in ward or clinic and

3. Matron

4.3.5 Operational definition

A. Back pain

In this study, back pain is defined as any pain, ache, tension or stiffness at back that can be fell anywhere along the spine, from the neck down to the hip (IASP). Present of back pain was determined by using self-administered modified Nordic Musculoskeletal Questionnaire with help of manikin picture showing site of back pain from neck till hip region. Respondent were considered having back pain if they thick any of the site of back pain mention above in the questionnaire

B. Clinic

Clinic was defined as a place of work for nurses that work 5 day a week from 8.00 am till 5.00 pm (office hour) and/or where treatment of patient occur for follow-up or only for investigation and supply of treatment equipment such as department of radiology and central sterile supply department (CSSD). For this study it include all clinic in HUSM, transfusion/hemodialysis unit, CSSD and department of radiology.

C. Ward

Ward was defined as a place of work for nurses that open 24 hours and 7 days a week and there is shift working hours for the nurses. Ward also place where patient need more close monitoring or where mode of treatment been serve. For this study it include all ward (normal ward, intensive care unit (ICU), neonatal intensive care unit (NICU), high

dependency ward (HDW) and cardiac care unit (CCU)), emergency department and operation theater.

D. Working Hour

Define as time of nurses working in HUSM. Divided into shift and non-shift.

E. Office hour

Define as working hour of nurses that work from 8am-5pm every day, 5 days a week.

F. Shift

Define as working hour of nurses that work in rotational schedule consist of morning, afternoon and night shift.

G. Age

Define as age of respondents during the study. In this study age divide into two groups 1.) Group of respondents with age of 30 years old and less (≤30) and second group is 2.) Group of respondents with age of more than 30 years old (>30). From literature (Boos *et al.*, 2002) show that there is significant age related changes in intervertebral disc degeneration starting after age of 30 years old.

H. Number of children

Define as total number of child respondents have at the time of study. From study done in Norway, nurses who have children have higher odd risk getting back pain if compared with nurses who does not have (Eriksen *et al.*, 2004).

I. Body mass index (BMI)

Body mass index (BMI) is weight in kg divide to power of two height in meter (kg/m2). In this study BMI been categorize into < 25 and ≥ 25 to differentiate between ideal body weight with overweight of respondents and it relationships toward back pain.

J. Total Income

Total household income of respondents at the time of study. RM 4000 taken as benchmark in this study in view of mean household income for Malaysia was recorded at RM4,025 per month in 2009 (Department of Statistic Malaysia, 2012).

K. Working experiences

Define as years of working experiences as a nurse at the time of study. Five years of experiences taken as benchmark because study done in America show significant association between 5 years working experiences and developing back pain (Videman *et al.*, 2005).

4.4 Research tools

1. Proforma

Proforma on socio-demographic profile, working environments, body mass index, work experiences, pain characteristics and modified Nordic Musculoskeletal Questionnaire was used. It consists of 4 parts which are:

Part 1: Socio demographic data questions including body mass index

Part 2: Work environments that cause back pain questions and working experiences

Part 3: Modified Nordic Musculoskeletal Questionnaire (MNMQ) and

Part 4: Question of back pain characteristics and severity using Roland –Morris Disability Questionnaire (RMDQ)

It was self-administered proforma available in English and Malay language. “MNMQ” and “RMDQ” questionnaire in Malay language is adopted from study of “Faktor risiko ergonomik dengan masalah kecederaan belakang bawah akut dan kronik di kalangan jururawat di Malaysia” by Associate Professor Dr. Shamsul Bahri Hj Mohd Tamrin, Unit Keselamatan dan Kesihatan Pekerjaan Jabatan Kesihatan Komuniti Fakulti Perubatan dan Sains Kesihatan Universiti Putra Malaysia (UPM) that give consent to use this translated questionnaire. This Malay translation of “MNMQ” and “RMDQ” questionnaire reliability and validity test already been done in the study of “Faktor risiko ergonomik dengan masalah kecederaan belakang bawah akut dan kronik di kalangan jururawat di Malaysia” by Associate Professor Dr. Shamsul Bahri Hj Mohd Tamrin.

4.5 Data collection procedure

Permission of research applied thru Director Hospital HUSM. After study approved by HUSM Hospital Director, all nurses name list is given by HUSM Chief Matron. All selected nurses were chosen via simple random sampling from wards and clinics nurses list. Selected nurses were approach personally. Information of study rationale, objectives, methods, procedures, and questionnaire were explained thoroughly to all respondents before informed consents were taken (Appendix A). Proforma given (Appendix B) is self-administered with the answer of yes and no. All proforma collected once respondent finish answered all the questions.

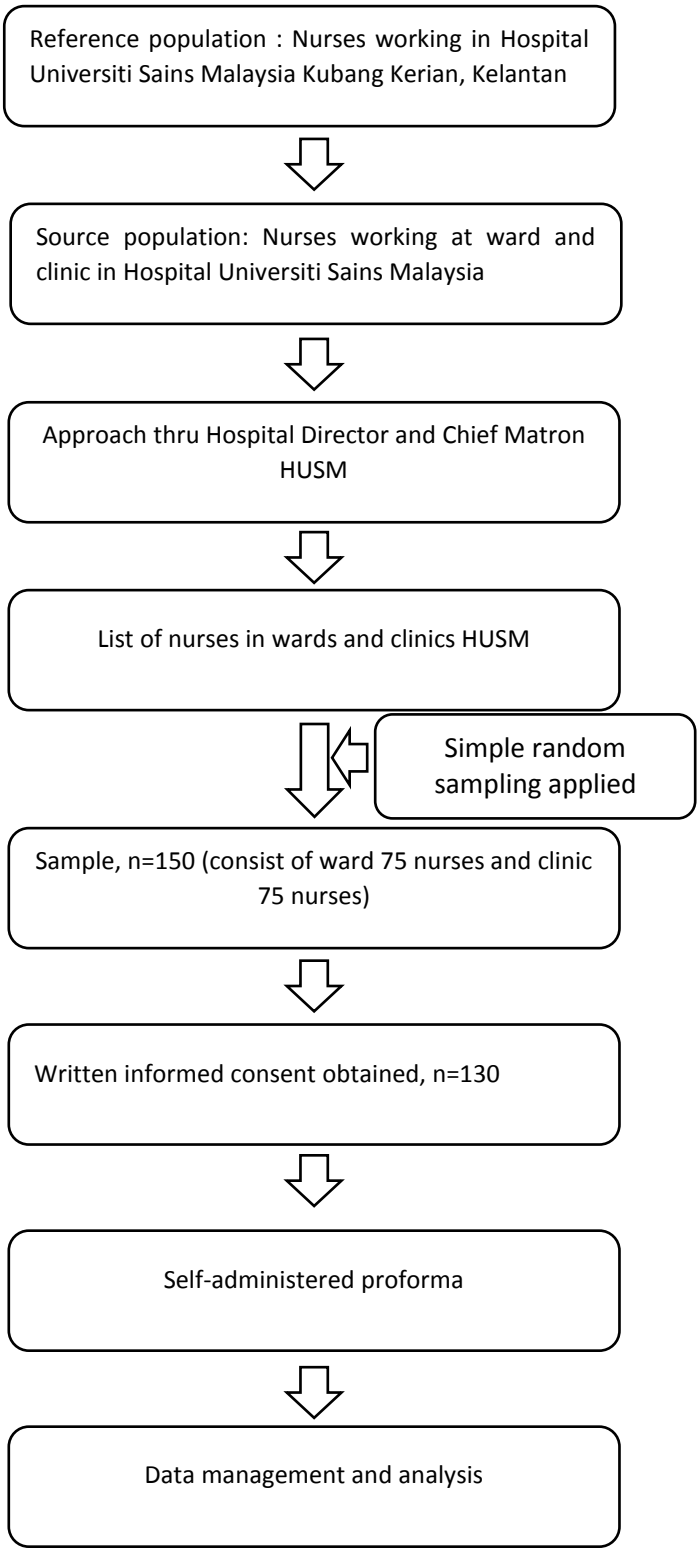

Figure 4.1 Flow chart of data collection process

4.6 Statistical analysis

4.6.1 Data entry

Data entry and analysis done using SPSS version 20. Code “1’ was used for nurses who have back pain and code “0” used for nurses who does not have back pain. From profoma, respondent who answer “yes” was coded as “1” and “0” for who answer no. Data was checked, explored and clean. Descriptive statistic and graphs for each variable was done. For continuous variable, mean and SD was calculated. Frequency and percentage were used for categorical variable.

4.6.2 Univariate analysis

In univariate data analysis, simple logistic regression was used to determined associations of socio-demographic, BMI and work environments with back pain. *P* value of < 0.05 was taken as significant at 95% CI with crude odds ratio (OR) result presented in table.

4.6.3 Multivariable analysis

For multivariate analysis, multiple logistic regression was used. All significant associated factors in univariate and all clinically sound variables were entered. Forward and backward stepwise variable selections were used in building preliminary model. Final preliminary model after forward and backward stepwise method then checked for the interaction of variables and cofounders. For multicollinearity test, two test were done, first test is VIF (variance inlation factor) and second test is checking standard error of regression