

**A STUDY ON SAFETY CULTURE: THE  
PERCEPTION AND VARIATION AMONG THE  
EMERGENCY MEDICAL SERVICE IN  
KELANTAN**

**BY**

**DR. SHAHZUWATY BINTI SAAD**

**DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF MEDICINE  
(EMERGENCY MEDICINE)**

**UNIVERSITI SAINS MALAYSIA**

**2015**

## ACKNOWLEDGEMENT



In the name of Allah SWT, Most Gracious, Most Merciful

Thanks to ALLAH SWT for giving the opportunity, strength and health to complete this dissertation. This dissertation would not have been possible without the guidance and the help of several individuals who, in one way or another, contributed and extended their valuable assistance in the preparation and completion of this study.

First and foremost, my utmost gratitude to both of my supervisors, Dr. Tuan Hairulnizam Tuan Kamauzaman, Emergency Physician / Senior Lecturer Department of Emergency Medicine and Dr Mohd Ismail Ibrahim, Senior Lecturer Department of Community Medicine whose sincerity and encouragement I will never forget. Both have been my inspiration as I hurdle all the obstacles to the completion this research work. Many thanks to Dr. Abu Yazid Md. Noh, Head of Department of Emergency Medicine HUSM, Kubang Kerian, Kelantan for this continued support and encouragement during my studies.

I owe my deepest gratitude to my lovely sister, Miss Shatina Saad for all the ground work she has started in assisting me with this research. She gave me all the learning ropes and I was looking forward to completing this research with her help; despite the distance, she has painstakingly e-mailed the information that I needed.

Furthermore, not to forget my utmost gratitude to the Emergency Medical Services staff in all hospitals in Kelantan, especially to the nine government hospital in

Kelantan that participated in this study for their full co-operation and commitment in obtaining the data needed.

Lastly, to my beloved parent, Haji Saad & Puan Ashah, my siblings, my best friends and my colleagues, who without their fullest support, I would not be able to complete this dissertation.

Thank you very much.

Dr Shahzuwaty Saad

2014

## TABLE OF CONTENTS

	<b>Page</b>
ACKNOWLEDGEMENT .....	ii
TABLE OF CONTENTS .....	iv
LIST OF TABLES .....	viii
LIST OF FIGURES.....	x
LIST OF ABBREVIATIONS .....	xi
ABSTRAK .....	xiii
ABSTRACT .....	xvi
CHAPTER 1 - INTRODUCTION .....	1
1.1 Background of the Study.....	1
CHAPTER 2 - LITERATURE REVIEW.....	5
2.1 Safety Culture in Healthcare Industry.....	5
2.2 Measuring Safety Culture in Healthcare Industry.....	8
CHAPTER 3 - RESEARCH HYPOTHESIS AND OBJECTIVE .....	11
3.1 Hypothesis .....	11
3.2 Research Question.....	11
3.3 Objective .....	12
3.3.1 General objective.....	12
3.3.2 Specific objectives.....	12
3.4 Operational Definitions .....	13
CHAPTER 4 - METHODOLOGY.....	15
4.1 Study Design and Duration .....	15

4.2	Study Population .....	15
4.3	Study Approval .....	15
4.4	Sample Size .....	16
4.5	Research Tools .....	17
4.5.1	Step 1: Forward translation step.....	17
4.5.2	Step 2: Backward translation step .....	18
4.5.3	Step 3: Validation step .....	18
4.6	Data Collection.....	19
4.7	Statistical Analysis .....	20
CHAPTER 5 - RESULTS .....		24
5.1	Socio-demographics Characteristics .....	24
5.2	Reliability and validity .....	27
5.3	The workplace safety culture between university hospital and public tertiary hospital in Kelantan .....	28
5.4	The workplace safety culture among hospitals with and without Emergency physician in Kelantan.....	29
5.5	Result of the relationships between socio demographic factors and level of safety culture practice among Emergency Medical Services in Kelantan .....	30
5.5.1	The effect of gender on safety culture.....	30
5.5.2	The effect of age group on safety culture.....	31
5.5.3	The effect of staff designation on safety culture .....	33
5.5.4	The effect of level of education on safety culture .....	48
5.5.5	The effect of total experiences in EMS on safety culture .....	60

CHAPTER 6 - DISCUSSION .....	63
6.1 General overview .....	63
6.2 Socio-demographic Data .....	63
6.2.1 Gender .....	63
6.2.2 Ethnicity .....	64
6.2.3 Age .....	64
6.2.4 Designation.....	64
6.2.5 Level of education .....	65
6.2.6 Total experiences in Emergency Medical Services.....	65
6.3 Reliability and Validity of Emergency Medical Service-Safety Attitude Questionnaire (EMS-SAQ) in Malay version .....	65
6.4 Workplace safety culture between university hospital and public tertiary hospital in Kelantan.....	66
6.5 Workplace safety culture between hospital with and without Emergency Physician in Kelantan.....	67
6.6 The association between socio demographic factors and level of safety culture practice among Emergency Medical Services in Kelantan.....	68
6.6.1 Age .....	69
6.6.2 Designation.....	70
6.6.3 Gender .....	71
6.6.4 Level of Education .....	72
6.6.5 Total experiences in Emergency Medical Services.....	72
CHAPTER 7 - CONCLUSION .....	74

CHAPTER 8 - LIMITATION .....	76
CHAPTER 9 - RECOMMENDATION AND FUTURE DIRECTION .....	77
CHAPTER 10 - REFERENCES.....	78
APPENDICES.....	87
Appendix A : Consent Form.....	87
Appendix B : Questionnaire EMS-SAQ-Malay version .....	96
Appendix C : Questionnaire EMS-SAQ .....	100
Appendix D : Hospital Ethics Committee Approval .....	103
Appendix E : Medical Research and Ethics Community Ministry of Health Malaysia Approval .....	104

## LIST OF TABLES

<b>List of tables</b>	<b>Page</b>
Table 5.1: Socio-demographic characteristic .....	25
Table 5.2 : Reliability of the Emergency Medical Services – Safety Attitude Questionnaire – Malay version (EMS-SAQ-M).....	27
Table 5.3 : EMS workplace safety culture among university hospital and public tertiary hospital in Kelantan .....	28
Table 5.4 : EMS workplace safety culture among hospital with and without emergency physician (EP) in Kelantan .....	29
Table 5.5 : The effect of gender on safety culture among EMS in Kelantan.....	30
Table 5.6 : The effect of age group on the job satisfaction of EMS in Kelantan.....	31
Table 5.7 : The effect of designation on the safety climate of EMS in Kelantan .....	33
Table 5.8 : The effect of designation on perception of management of EMS in Kelantan .....	36
Table 5.9 : The effect of designation on stress recognition of EMS in Kelantan .....	39
Table 5.10 : The effect of designation on workplace condition of EMS in Kelantan....	42
Table 5.11 : The effect of designation on job satisfaction of EMS in Kelantan .....	45
Table 5.12 : The effect of level of education on safety climate of EMS in Kelantan ....	48



Table 5.13 : The effect of level of education on teamwork climate of EMS in Kelantan .....	50
Table 5.14 : The effect of level of education on perception of management of EMS in Kelantan .....	52
Table 5.15 : The effect of level of education on stress recognition of EMS in Kelantan .....	54
Table 5.16 : The effect of level of education on workplace condition of EMS in Kelantan .....	56
Table 5.17 : The effect of level of education on job satisfaction of EMS in Kelantan ..	58
Table 5.18 : The effect of total experiences in EMS on the job satisfaction of EMS in Kelantan .....	60

## LIST OF FIGURES

<b>List of figure</b>	<b>Page</b>
Figure 2.1. Proposed model of safety climate and injury outcomes .....	6
Figure 4.1 Study sample flow chart .....	23
Figure 5.1 Percentage of respondent based on hospitals that provide emergency medical services in Kelantan .....	26

## LIST OF ABBREVIATIONS

EMS	Emergency Medical Service
EMS-SAQ	Emergency Medical Service-Safety Attitude Questionnaire
SAQ	Safety Attitude Questionnaire
EMS-SAQ-M	Emergency Medical Service-Safety Attitude Questionnaire Malay Version
EMT	Emergency Medical Team
KKM	Kementerian Kesihatan Malaysia
HUSM	Hospital University Sains Malaysia
HRPZ II	Hospital Raja Perempuan Zainab II
HPM	Hospital Pasir Mas
HT	Hospital Tumpat
HPP	Hospital Pasir Puteh
HKK	Hospital Kuala Krai
HGM	Hospital Gua Musang
HTM	Hospital Tanah Merah
HJ	Hospital Jeli
HM	Hospital Machang
ANOVA	Analysis of Variance

IQOLA	International Quality of Life
US	United State
UK	United Kingdom
ASEAN	Association Of Southeast Asian Nations
FMAQ	Flight Management Attitude Questionnaire
ICU	Intensive Care Unit
SPSS	Statistical Package for Social Sciences

## **ABSTRAK**

### **Budaya Keselamatan: Persepsi Dan Perbezaan Dalam Kalangan Pengamal Perkhidmatan Kesihatan Kecemasan Di Kelantan**

**Pengenalan:** Kebanyakan industri pekerjaan, pengurusan keselamatan adalah berkaitan dengan mengurangkan kecederaan kepada pekerja, walaupun pada sesetengah sektor pekerjaan seperti sektor pengangkutan, sektor penjanaan kuasa nuklear atau pengeluaran pemakanan, ia juga membahayakan pengguna awam. Walaubagaimanapun, di dalam industri kesihatan, kecederaan bukan sekadar melibatkan pesakit, tetapi ia juga melibatkan pekerja yang memberi khidmat kesihatan kepada pesakit. Petugas khidmat kesihatan setiap masa terdedah kepada bahaya seperti serangan fizikal atau lisan daripada pesakit mahupun daripada rakan sekerja. Risiko kesihatan dan keselamatan di dalam industri kesihatan ini dilihat mempunyai suasana pekerjaan yang tidak kondusif dan selamat, di mana ia boleh memberi impak negatif kepada petugas khidmat kesihatan. Satu kaji selidik yang telah dijalankan oleh Neal dan Graffin (2004) menunjukkan bahawa budaya keselamatan boleh mempengaruhi pengetahuan serta motivasi pekerja, di mana secara tidak langsung ia boleh memberi impak kepada sikap serta budaya terhadap keselamatan sesuatu organisasi sesebuah jabatan. Tujuan kaji selidik ini ialah untuk mengukur sejauh mana budaya keselamatan yang diamalkan oleh staf di Jabatan Kecemasan yang terdapat di Kelantan. Sehingga hari ini, belum lagi terdapat data yang berkaitan dengan budaya keselamatan untuk Jabatan Kecemasan di seluruh Malaysia. Pada masa yang sama, data yang diperolehi boleh dibuat sebagai penanda aras serta perbandingan dengan data antarabangsa yang telah meluas digunapakai seperti di Amerika Syarikat, United

Kingdom dan beberapa negara ASEAN. Hasil daripada kajiselidik ini boleh juga membimbing strategi pengurusan unit asas, bersepadu serta membentuk staf yang berintegriti tinggi.

**Kaedah:** Kami telah menjalankan kajian rentas yang melibatkan 10 hospital di Kelantan yang menawarkan Perkhidmatan Perubatan Kecemasan dan ia mengambil masa selama empat belas bulan. Kami menggunakan soalan kaji selidik “SAQ” versi Melayu (EMS-SAQ), instrumen kajian yang mengukur dimensi budaya keselamatan di tempat kerja. Semua Pasukan Perubatan Kecemasan (EMT) di Jabatan Kecemasan pada masa pengumpulan data termasuk dalam kajian. Mereka adalah Pegawai Perubatan, Paramedik, Jururawat Terlatih, Pembantu Perubatan, Atendan dan Pemandu. Kami menentukan variasi dalam keselamatan skor budaya di semua institusi dan juga kaitan di antara faktor demografi sosial dan tahap amalan budaya keselamatan dalam kalangan EMS di Kelantan.

**Hasil:** Kami menerima 319 soalan kaji selidik yang lengkap diisi dari 10 buah hospital di Kelantan. Majoriti responden ialah lelaki (55.8%) dengan minimum umur responden berusia 35.2 tahun. Majoriti responden ialah Melayu (93.7%) dan kebanyakannya terdiri daripada jururawat terlatih dan pembantu perubatan diikuti oleh doktor. Purata masa perkhidmatan EMS ialah 10.9 tahun. Terdapat variasi dalam skor budaya keselamatan di agensi EMS di Kelantan tetapi tiada yang signifikan secara statistik dari segi skor budaya keselamatan antara hospital universiti dan hospital awam di Kelantan dan keselamatan skor budaya antara hospital dengan dan tanpa pakar perubatan kecemasan di setiap budaya keselamatan domain yang telah diperiksa.

**Kesimpulan:** Keselamatan pesakit ialah masalah kesihatan yang penting di semua negara dan harus menjadi satu proses yang berterusan. Ini harus menjadi keutamaan utama bagi EMS sebagai kakitangan barisan hadapan. Hasil kajian ini telah

menunjukkan bahawa di dalam negara yang sama, terdapat kepelbagaian dalam persepsi terhadap budaya keselamatan dalam kalangan Perkhidmatan Perubatan Kecemasan di Kelantan. Walau bagaimanapun, untuk mendapatkan hasil yang lebih baik, penglibatan pekerja kesihatan yang lain atau kakitangan Jabatan Kecemasan dari hospital lain di seluruh Malaysia diperlukan untuk memastikan data yang lebih komprehensif.

## ABSTRACT

### **Safety Culture: The Perception and Variation among Emergency Medical Services in Kelantan**

**Introduction:** In any industry, most safety management is about minimizing accidents to workers, although some sectors such as transportation, nuclear power generation or food production, the public is also at risk. However, in healthcare industry it is not only patients who are injured, staff can be affected too. The healthcare providers are regularly exposed to hazards such as verbal and physical assaults by both colleagues and patients. These health and safety risks suggest that the health care work environment is a potentially unsafe workplace that negatively impacts health care providers. Neal and Griffin (2004) had explained in their study that safety climate do influence worker's knowledge and motivation, which in turns impacts on their safety behaviors and finally on safety outcomes. The aim of this study was to measure the Emergency Medical Services safety culture. To date, no nationwide safety survey has been conducted in Malaysia on Emergency Medical Services personnel. It also can make a benchmark result against international data which have been widely assessed in United States of America, United Kingdom and some ASEAN countries and at the same time can guide a unit-based, integrated and risk management strategy.

**Method:** We conducted across-sectional study involving 10 hospitals in Kelantan that offer Emergency Medical Services and it took fourteen months period. We administered a Malay version of EMS Safety Attitude Questionnaire (EMS-SAQ), a survey instrument measuring dimension of workplace safety culture. All Emergency Medical Team (EMT) staff in Emergency Department at the time of data collection



were included in the study. Those were doctors, paramedics, staff nurses, medical assistants, attendants and drivers. We determined the variation in safety culture score in all the institutions and also the association between socio demographic factors and level of safety culture practice among EMS in Kelantan.

**Results:** We received 319 completed surveys from 10 hospitals in Kelantan. The majority of respondent were male (55.8%) with mean age of respondent was 35.2 year old. Majority of the respondents were Malays (93.7%) and predominantly staff nurse and medical assistant followed by doctors. Mean years of services in EMS was 10.9 years. There was wide variation in safety culture score across the EMS agencies in Kelantan but not statistically significant in term of safety culture score between university hospital and public tertiary hospital in Kelantan and safety culture score between hospitals with and without Emergency physician in each safety culture domain that have been examined.

**Conclusion:** Patient safety is an important healthcare issue in all countries and should be a continuous process. It should be a top strategic priority for EMS as a frontline staff. The results in this study have shown that within same state, there were variations in perception on safety culture among the Emergency Medical Services in Kelantan. However, for a better result, the involvement of other healthcare workers or emergency department staff from other hospital throughout Malaysia is needed for a larger study to ensure a more comprehensive data.

## CHAPTER 1 - INTRODUCTION

### 1.1 Background of the Study

The development of Emergency Medical Services (EMS) has been based on tradition and, to some extent, on scientific knowledge. Its roots are deep in history which it started 1500 B.C. Later it progress rapidly when it first documented during Romans and Greeks in which they used chariots to remove injured soldiers from the battlefield. In 1890's, civilian ambulance services in the United States began in Cincinnati and New York City. Hospital interns rode in horse drawn carriages designed specifically for transporting the sick and injured patient. As this industry rapidly developed, more sophisticated and well equipped ambulances were created.

As for Malaysia, this services only came a little bit later, and still in an early phase of development, but have improved significantly over the last 10 years since the start of an Emergency Medicine physician training program (Hisamuddin *et al.*, 2007). Increased in demand from the public for a better emergency medical services have alert the Ministry of Health to increase the quality of this services as this services act as a frontline. Emergency medical provider deals with any patient from their homes and street to the hospital door in pre-hospital care, from the non-critical to the most critical cases in the department, and for society from all strata of life. As a frontline medical provider, we have to give as best services as possible. In order to give the best service, we have to have a very good safety culture in the workplace so that we can serve the patient and give the best service to them.

Work activities are hazardous to the safety and health of workers and others, especially if they are not properly monitored and controlled. An injury, disease or

fatality caused by these work hazards does not just affect an individual worker alone. It also involved the economic cost that have to be borne by the employers, insurance firm, and not to forget the human costs that have to be paid by his families, relatives and friends. According to a statistic that have been done by Malaysia Department of Occupational Safety and Health, the frequency rate of occurrence of occupational accidents has steadily been dropping from 11.0 accidents per 1,000 workers in 2000 to 6.1 accidents per 1,000 workers in 2007. While the frequency of occurrence of occupational fatalities appears to have raised from 9.5 deaths per 100,000 workers in 2002 to 12.9 deaths per 100,000 workers in 2004, and has more or less been stagnating around the 12.4 – 12.5 per 100,000 range over the period 2004 through to 2007 ([www.dosh.gov.my](http://www.dosh.gov.my)). Malaysian Trades Union Congress vice-president, A. Balasubramaniam had mentioned in his talk during International Commemoration Day for Dead and Injured Workers, that workplace-related accidents in Malaysia have continued to rise again, with 57,639 cases reported in 2010 compared with 55,186 in 2009 (New Straits Times, April 29 2012).

In Canada, nurses and health care aides rank as the two occupation groups with the highest work days lost due to disability or illness, at almost twice that of the national average (Pyper, 2004; Canadian Nurses Association, 2005). Concurrently, in the United States, health care providers in acute care hospitals and long-term care facilities average higher injury and illness incidents than workers in mining, construction, and manufacturing (United States Department of Labor, 2007). Not surprisingly, American and Canadian Nurses Associations continue to identify occupational health and safety as one of the core issues related to nursing workforce well-being (American Nurses Association, 2001; Canadian Nurses Association, 2005). According to statistics of occupational accident prepared by Malaysia Department of

Occupational Safety and Health for 2011, public service was the 3<sup>rd</sup> highest ranking followed by agriculture and manufacturing.

Looking at the statistic, Prime Minister of Malaysia had find a way to overcome the problem by launching an Occupational Safety and Health Master Plan for Malaysia 15 in 2009 in order to build a safe, healthy and productive pool of human capital by creating, cultivating and sustaining a safe and healthy work culture in all organizations throughout Malaysia. It has three stages, in which for the first stage involved spreading out information regarding Occupational Safety and Health ownership that have been started since 2005. For the second stage which started since 2010 and will be end on 2015 comprise of building and sustaining the self regulation which include introducing the concept of safety culture. The final stage is the stage of preventive culture which will be started in 2015 and aim to be achieved in 2020.

The culture of safe and healthy work need to be cultivated and continually strengthened and attitudes toward the development of safe and healthy working conditions need to constantly evolve for the better. The importance of worker safety, health and well-being, in terms of productivity and competition, needs to be better understood and better taken into account.

Workplace safety is becoming a critical problem in many health care organizations as health care providers are regularly exposed to hazards such as verbal and physical assaults by both colleagues and patients (Danna and Griffin, 1999; Gates *et al.*, 2003; McPhaul and Lipscomb, 2004; Walsh and Clarke, 2003; Winstanley and Whittington, 2002). Additionally, in the context of carrying out their job functions, health care providers are also exposed to direct health risks such as inadvertent needle sticks (potential causes of HIV and hepatitis), communicable diseases (e.g. SARS, tuberculosis, and pneumonia), and debilitating back injuries from patient transfers

(American Nurses Association, 2001; Canadian Nurses Association, 2005; Danna and Griffin, 1999; Gates *et al.*, 2003; Walsh and Clarke, 2003; Winstanley and Whittington, 2002). These health and safety risks suggest that the health care work environment is a potentially unsafe workplace that negatively impacts health care providers – a supposition supported by the fact that health care providers are among the occupational groups with the highest injury/illness rates in North America (Hoskins, 2006; Pyper, 2004; Canadian Nurses Association, 2005; United States Department of Labor, 2007). Given the existing workplace risk factors and the high rates of work-derived injury and illness, there is a high likelihood of staff being injured on the job which can negatively influence a health care provider's perceptions about the workplace safety climate and subsequently influence employee outcomes such as job satisfaction and turnover intention (Danna and Griffin, 1999; Pyper, 2004). In another study, they explained that safety climate do influences worker's knowledge and motivation, which in turns impact on their safety behaviors and finally on safety outcomes (Griffin and Neal, 2000). To date, no nationwide safety survey has been conducted in Malaysia on Emergency Medical personnel. The aim of this study was to verify an existing safety culture survey instrument in Malay and to measure Emergency Medical Services safety culture nationwide. It also can serve as a benchmark result against international data which have been widely assess in US, UK and some ASEAN country and at the same time can guide the EMS to initiate a unit-based, integrated and risk management strategy.

## CHAPTER 2 - LITERATURE REVIEW

### 2.1 Safety Culture in Healthcare Industry

In any industry, most safety management is about minimizing accidents to workers, although some sectors such as transportation, nuclear power generation or food production, the public is also at risk. However, in healthcare industry it is not only patients who are injured, staff can be affected too. In other industries, particularly in more hazardous sectors such as energy production, they have taken a very systematic approach to manage safety. They have realized that human factors play a major contributing role in accident causation, but that this encompasses not just the humans operating the system, but also the humans that are managing the organization (Flin, 2003).

Research into safety culture began following a report by the International Atomic Energy Agency that developed the concept in relation to the disaster at the Chernobyl nuclear power plant (IAEA, 1986, 1991). The term safety climate had appeared several years earlier in an investigation of safety attitude in Israel manufacturing (Zohar, 1980). Patterson *et al.* (2010) referred safety culture as a collective beliefs and perception of workers regarding the organizations and safety of their workplace organization. Department of Health (2000) in United Kingdom noted that safety cultures can have a positive and quantifiable impact on the performance of organizations. They also mentioned that culture is crucial component in learning effectively from failure which means cultural consideration are significant in all parts of the learning loop, from initial accident identification and reporting to embedding appropriate changes in practice.

Griffin and Neal (2000) produced and tested one of the first theoretical models illustrating how safety climate relates to safety performance. In their model, the influence of safety climate on safety performance is mediated by worker knowledge, skill and motivation. Subsequently, Neal and Griffin (2004) explained that safety climate influences worker's knowledge and motivation, which in turn impacts on their safety behaviors and finally on safety outcomes. Figure 2.1 presents a simplified version of those models adapted to show that safety climate and motivation do have impact to both patient and health care worker injuries as adverse outcomes (Flin, 2007).

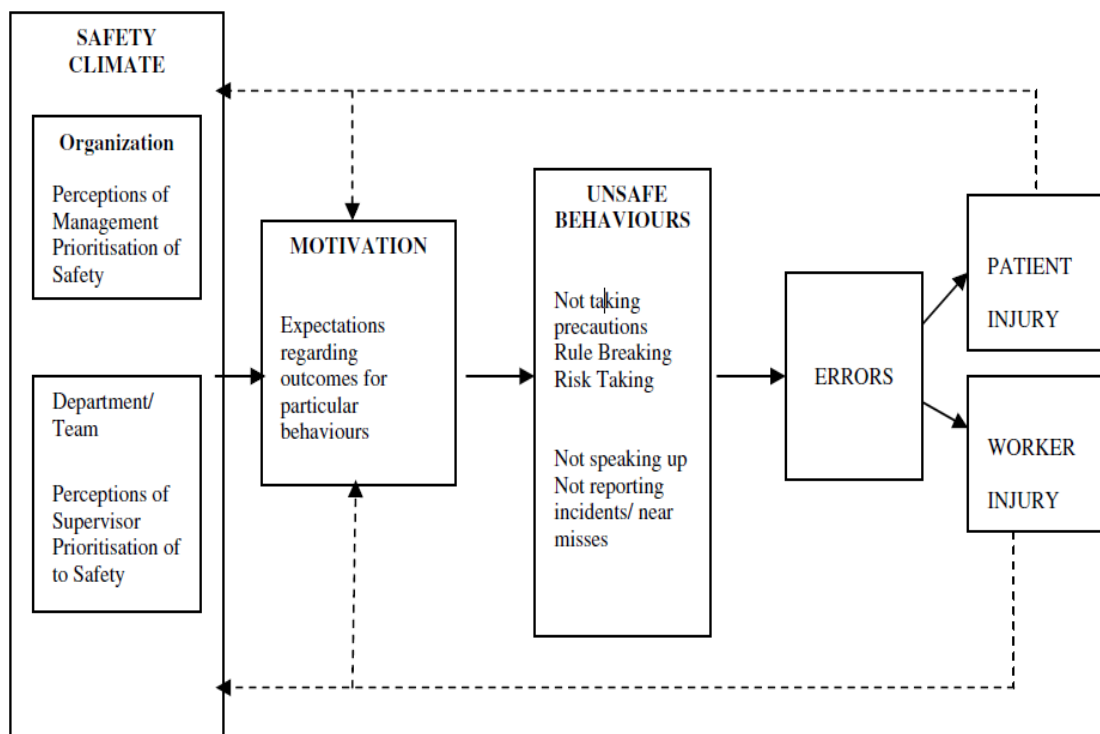


Figure 2.1. Proposed model of safety climate and injury outcomes

(Adapted from Flin, R. (2007). Measuring safety culture in healthcare: A case for accurate diagnosis. *Safety Science*)

This model suggests that the safety climate is similar for both patient and worker adverse events – in both cases being defined as perception of priority of safety in both the work unit and in the organization. The intervening mechanism is taken as some kind of motivational component relating to expectation of consequences for particular behaviors. The behavior stage of the model only include deliberate actions (such as risk taking or rules violation), as these are most likely to be motivated by expectations of consequences. On the other hand, Zohar (2003) in his study mentioned that whenever safety issue are ignored or made contingent on production pressure, workers will infer low safety priority. They tend to choose behaviors that will maximize reward and reduce the risk of punishment. In the workplace, expectations of how supervisors or manager will respond to particular action (e.g. prioritizing safety over production targets) will to a significant extend determine which behavior to be executed.

Wide variation in workplace safety culture is not surprising given that the EMS work environment contains many threats to patient and provider safety (Patterson *et al*, 2010). Suyama *et al.*, (2009) showed that in one urban environment, injury rates associated with lost time at work were higher among paramedics and EMTs than fire and police. In a study of two urban EMS agencies, Maguire *et al.* (2002) determined that the risk of injury among EMS personnel was 1.5 times higher than that for firefighters, 5.8 times higher than that for health services personnel, and 7 times higher than the national average reported by the U.S. Department of Labor. Other studies showed that many EMS personnel often deviate from written protocols, fail to properly secure patient airways, experience high levels of stress and burnout, suffer from poor sleep quality and high fatigue, and have a questionable commitment to the profession.



When combined, these factors may surface as non-positive perceptions of worker safety culture (Patterson *et al.* 2010).

The levels of workers wellbeing (in terms of physical or mental health) do affect the rate of adverse events for patients. Yassi and Hancock (2005) described a number of studies showing that interventions designed to reduce health care worker's injuries and illness also have positive effect on patient safety. Concern over the levels of patient safety within western hospital systems was raised following a series of studies done in US, UK and other countries showing unacceptable rates (3-17% of admission) of adverse events (iatrogenic injury to patient) (Flin, 2007). The reports (usually based on retrospective case note review) indicated that many of these adverse events were avoidable and that they were extremely costly both for patients and for the healthcare system.

## **2.2 Measuring Safety Culture in Healthcare Industry**

Safety climate surveys are now being used to measure the safety culture of healthcare organizations and a number of research studies have been published. According to Patterson (2010), safety culture can be assessed using psychometric questionnaire that measure collective attitude of personnel within the organization. High risk business, e.g. aviation industry has regularly evaluated employee's safety attitude and their organizational safety culture. Healthcare organizations are now becoming increasingly aware of the importance of measuring and transforming organizational culture to ensure patient safety. Lee *et al.* (2010) mentioned in his study that there were strong association between safety culture and healthcare worker's safety behaviors (collaboration, safety training, and adverse event reporting), which are

closely linked to patient safety. Measuring the safety culture is inexpensive, sustainable and has the inherent value of being a 'leading' rather than a 'lagging' indicator of safety.

McCaughey *et al.* (2013) in his study mentioned that workplace-derived injury and illness are associated with poor perceptions of safety climate, and that perceptions of safety climate mediate the relationship between workplace-derived injuries and sick days and three outcomes variables (job stress, turnover intention and job satisfaction).

The most commonly used and rigorously validated tool to measure safety culture is Safety Attitude Questionnaire (SAQ) (Pronovost *et al.*, 2005). Sexton *et al.* (2006) mentioned that SAQ is a psychometrically sound instrument for assessing six safety-related climate domains by systematically eliciting input from front-liner caregivers. The six domains which included in SAQ are safety climate, job satisfaction, perception of management, teamwork climate, working conditions and stress recognitions.

Historically, the SAQ is a refinement of the Intensive Care Unit Management Attitudes Questionnaire which was derived from a questionnaire widely used in aviation, the Flight Management Attitude (FMAQ). The FMAQ was created after researchers found that most airlines accidents were due to breakdown in interpersonal aspects of crew performance such as teamwork, speaking up, leadership, communication and collaborative decision making. The FMAQ later have been adapted for and validated in a range of medical setting such as ambulatory care, the operating room, the ICU and skilled nursing facilities.

The SAQ differs from other medical safety climate or "culture" surveys in a few aspect. The SAQ has been more widely used for a longer period of time, so there was benchmarking data available and many of the challenges of longitudinal assessment

have been encountered and addressed. Furthermore, a larger amount of psychometric data is available to analyze for the SAQ and it also maintains continuity with its predecessor (the FMAQ), a traditional human factors survey with a 20 year history in aviation. The availability of benchmarking data in the public domain enables organizations to evaluate their own climate data. Besides, SAQ also preserved item continuity with other high-reliability industries that allows for comparisons between professions, and assists with the search for universal human factors issues across professions (Sexton *et al.*, 2006).

## **CHAPTER 3 - RESEARCH HYPOTHESIS AND OBJECTIVE**

### **3.1 Hypothesis**

1. There is a variation of safety culture in Emergency Medical Services (EMS) agency in Kelantan.
2. There is a difference of workplace safety culture in Emergency Medical Services among university hospital and public tertiary hospital in Kelantan.
3. There is a difference of workplace safety culture in Emergency Medical Services among hospitals with and without Emergency physician in Kelantan.

### **3.2 Research Question**

There were three main questions that being investigated in this study:

1. What is the variation of safety culture in Emergency Medical Services (EMS) agency in Kelantan?
2. What are the differences of workplace safety cultures in Emergency Medical Services between university hospital and public tertiary hospital in Kelantan?
3. What are the differences of workplace safety cultures in Emergency Medical Services between hospitals with and without Emergency physician in Kelantan?

### **3.3 Objective**

#### **3.3.1 General objective**

The general objective is to determine the variation of safety culture in Emergency Medical Services (EMS) agency in Kelantan.

#### **3.3.2 Specific objectives**

1. To translate and validate the Emergency Medical Service-Safety Attitude Questionnaire (EMS-SAQ) in Bahasa Malaysia.
2. To compare the Emergency Medical Service workplace safety culture among university hospital and public tertiary hospital in Kelantan.
3. To compare the Emergency Medical Service workplace safety culture among hospitals with and without Emergency physician in Kelantan.
4. To define the association between socio demographic factors and level of safety culture practice among Emergency Medical Services in Kelantan.

### 3.4 Operational Definitions

1. **Safety culture** of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of an organization's health and safety management (Patterson *et al.*, 2010).
2. **Emergency Medical Service (EMS)** is defined as a network of services coordinated to provide aid and medical assistance from primary response to definitive care, involving personnel trained in the rescue, stabilization, transportation, and advanced treatment of traumatic or medical emergencies (Hisamuddin *et al.*, 2007).
3. **Emergency Medical Team (EMT)** defined as a person trained and certified to appraise and initiate the administration of emergency care for victims of trauma or acute illness before or during transportation of victims to a health care facility (Hisamuddin *et al.*, 2007).
4. **Tertiary hospital** defined as specialized consultative care, usually on referral from primary or secondary medical care personnel, by specialists working in a center that has personnel and facilities for special investigation and treatment. (Hamdan and Saleem, 2013)
5. **Teaching hospital** is generally understood as a centre of secondary or tertiary care in a major city that is affiliated with a medical school, often with a large academic department and a reputation for excellence in research. (El-Jardali *et al.*, 2014)
6. **Safety climate** defined as a perception of strong and proactive organizational commitment to safety (Patterson *et al.*, 2010).

7. **Teamwork climate** is a perceived quality of collaboration between personnel (Patterson *et al.*, 2010).
8. **Job satisfaction** defined as positivity about the work experience (Patterson *et al.*, 2010).
9. **Perception of management** is an approval of managerial action (Patterson *et al.*, 2010).
10. **Working condition** defined as perceived quality of work environment and logistical support (staffing, equipment) (Patterson *et al.*, 2010).
11. **Stress recognition** is an acknowledgment of how performance is influenced by stressors (Patterson *et al.*, 2010).

## **CHAPTER 4 - METHODOLOGY**

### **4.1 Study Design and Duration**

This was a cross-sectional anonymous questionnaire survey study to achieve all specific objectives and it took fourteen months period from October 2013 till November 2014 to complete it.

### **4.2 Study Population**

All Emergency Medical Team (EMT) staffs in Emergency Department at the time of data collection were included in the study. Those were doctors, paramedics, staff nurses, medical assistants, attendants and drivers. There were no sampling method that have been used as all healthcare staff working in the Emergency Department at the time of data collection were included in the study.

### **4.3 Study Approval**

This study was undertaken as a dissertation study for the of Master of Medicine (Emergency Medicine) under the Hospital Universiti Sains Malaysia and approved by the department board review and Human Research Ethics Committee, Universiti Sains Malaysia on the 29<sup>th</sup> September 2013 (FWA Reg. No:00007718; IRB Reg. No:00004494). This study also has been approved by the Medical Research and Ethics Community Ministry of Health Malaysia on 3<sup>rd</sup> October 2013 (NMRR-13-756-14739).



#### 4.4 Sample Size

The sample size was calculated using Power and Sample Size Calculations Version 3.0.2 programme licensed to USM software Copyright 1997 by William D. Dupont and Walton D. Plummer.

For objective 1 which was to validate the Malay version EMS-SAQ, 150 samples were needed (number of question X 5 = 30 X 5 = 150).

For objective 2, a study of independent exposed and controls groups using two means formula calculated using PS software were used. The exposed group was Hospital University Science Malaysia and the control group was the Hospital Raja Perempuan Zainab II. Previous study using job satisfaction domain indicates that the standard deviation ( $\sigma$ ) was 0.9 (Patterson et al, 2010). For independent tests ( $m$ ) was the ratio of control to experimental patients which was 1. The  $\alpha$  which was the Type I error probability for a two sided test was 0.05. This is the probability that we will falsely reject the null hypothesis. The power for this study was 0.8 and the difference in population means ( $\delta$ ) was 0.05. For independent t-tests,  $n$  is the number of experimental subjects. For pair test,  $n$  is the number of pairs. ( $n = 58 \times 2 = 116$ ). After considering 10% drop out rate, minimum number of sample required were 128 samples  $[(58 \times 2) + 10\%]$ .

In objective 3, a study of independent exposed and controls groups using two means formula also used and calculated using PS software. The exposed groups were hospital without Emergency Physician and the control groups were the hospital with Emergency Physician. Previous study using job satisfaction domain indicates that the standard deviation ( $\sigma$ ) was 0.7 (Patterson et al, 2010). For independent tests ( $m$ ) was the ratio of control to experimental patients which was 1. The Type I error probability for a

two sided test ( $\alpha$ ) was 0.05. This is the probability that we will falsely reject the null hypothesis. The power for this study was 0.8 and the difference in population means ( $\delta$ ) was 0.4. For independent t-tests,  $n$  is the number of experimental subjects. For pair test,  $n$  is the number of pairs. ( $n = 49 \times 2 = 98$ ). After considering 10% drop out rate, minimum number of sample required were 108 samples  $[(49 \times 2) + 10\%]$ .

## **4.5 Research Tools**

The methods of translation to Malay version was adapted from International Quality of Life (IQOLA) which comprise of forward and backward translation processes (Bullinger *et al*, 1998)

### **4.5.1 Step 1: Forward translation step**

It is the translation of a questionnaire into a foreign language (Bahasa Malaysia). This was carried out by a group of expert that was identified by the researcher (English teacher in USM and Master Student). The expert groups were proficient in both Bahasa Malaysia and English language. The aim was to produce a conceptually equivalent translation of the original questionnaire and the language used is colloquial and easy to understand. This process permits changes to be made with respect to the US English version where words or concepts were untranslatable or where words or terms have a specific meaning in one language but a semantically different or secondary meaning in the other language. This process produced a preliminary common forward-translation questionnaire.

#### **4.5.2 Step 2: Backward translation step**

The translated version in step 1 was then translated back to the source language (English). It requires the recruitment of a local professional translator, native speaker of English and bilingual in the target language. The translator translated the first version of the questionnaire produced in phase 1 back into English and the translator have no access to the original US English version of the questionnaire. In this phase, it produced a backward translation version of questionnaire. Backward translation and report with comments were sent back to researcher for review and comment. Comparison of the backward version with the original source version done by researcher team during a meeting with the backward translator in order to detect any misunderstandings, mistranslations or inaccuracies in the intermediary forward version of the questionnaire. If there was a discrepancy between forward and backward translation, the researcher discussed with the backward translator in order to come out with the best phrase. At the end of the discussion, a final version were produced which called Safety Attitude Questionnaire-Malay (SAQ-M).

#### **4.5.3 Step 3: Validation step**

The Safety Attitude Questionnaire-Malay underwent pilot study which has been conducted in every hospital in Kelantan. Personnel that have been involved in the pilot study will not be included in the study. They will be identified by the head of department in each respective hospitals. The purpose of the pilot study was to pre-test the questionnaire in order to see the reliability and validity of the questionnaire. The internal consistency reliabilities of SAQ-M dimensions were assessed using Cronbach's alpha.

A set of validated Malay version questionnaire were used in this study. It was divided into two parts. Part one described on socio-demographic, followed by safety culture domains in part two which consist of safety climate (seven items), job satisfaction (five items), perceptions of management (four items), teamwork climate (six items), working conditions (four items) and stress recognition (four items). All responses were recorded on a 5-point Likert-type scale (*Strongly agree to strongly disagree*). The score for each domain were calculated using the methods described by Sexton *et al.* First, the Likert ratings were converted to a point scale ranging from 0 to 100: disagree strongly = 0, disagree slightly =25, neutral = 50, agree slightly = 75, and agree strongly = 100. The domain score were calculated by adding the individual response scores and divided by total number of items. For example, if respondent answered disagree strongly, neutral, neutral, and agree slightly on the four items of Stress Recognition, the domain score would be 43.75. If a respondent's mean score was 75 or higher, he or she was reported to hold a positive attitude to a given dimension.

#### **4.6 Data Collection**

There are currently 13 hospitals in Kelantan, in which 9 are under Kementerian Kesihatan Malaysia (KKM), 1 university hospital – Hospital Universiti Sains Malaysia (HUSM). The other 3 are privately-run medical centers. This study was done on HUSM and 9 KKM hospitals only. Out of these 10 hospitals, 4 are manned with in-house Emergency Physician, namely Hospital Universiti Sains Malaysia (HUSM), Hospital Raja Perempuan Zainab II (HRPZ II), Hospital Tanah Merah (HTM) and Hospital Kuala Krai

(HKK). The rest of the KKM hospitals are district hospitals, which are run by medical officers.

To conduct the study, the researcher called up each Head of Emergency Department for tertiary hospitals as well as the Director of each district hospitals in Kelantan to explain the purpose of the study and the intention to include his/her pre-hospital care providers as the study subject. Subsequently, a date was set up so that the respective head of department can make an arrangement for the researcher to distribute the questionnaires to the study subjects. On the date agreed, the researcher traveled to the hospital concerned and met with the study subjects in a group. The objectives of the study explained and a written consent obtained from each study subjects. Once consent was obtained, the questionnaire SAQ-M was distributed to each of the study subjects and the subjects were required to complete the questionnaire on the same sessions. . It was a self administered questionnaire. There were no time limit to answer the questionnaire. While the subjects answering the questionnaire, the researcher was in the same room to clarify any queries on terms or clauses in the questionnaire. Once completed, the questionnaires were collected and the researcher thanked the subjects for their participation.

#### **4.7 Statistical Analysis**

All the data were analysed with Statistical Package for Social Sciences (SPSS) version 21.0 licenced to Hospital Universiti Sains Malaysia. Numerical data were expressed as mean and standard deviation. The numerical variables in this study were:

1. Age
2. Total experience in EMS

Categorical data were expressed as frequency and percentages. The categorical variables in this study were:

1. Gender
2. Race
3. Respondent job type
4. Educational level
5. Total respondent based on hospital that provides emergency medical services in Kelantan
6. Safety climate
7. Teamwork climate
8. Perception of management
9. Job satisfaction
10. Working condition
11. Stress recognition

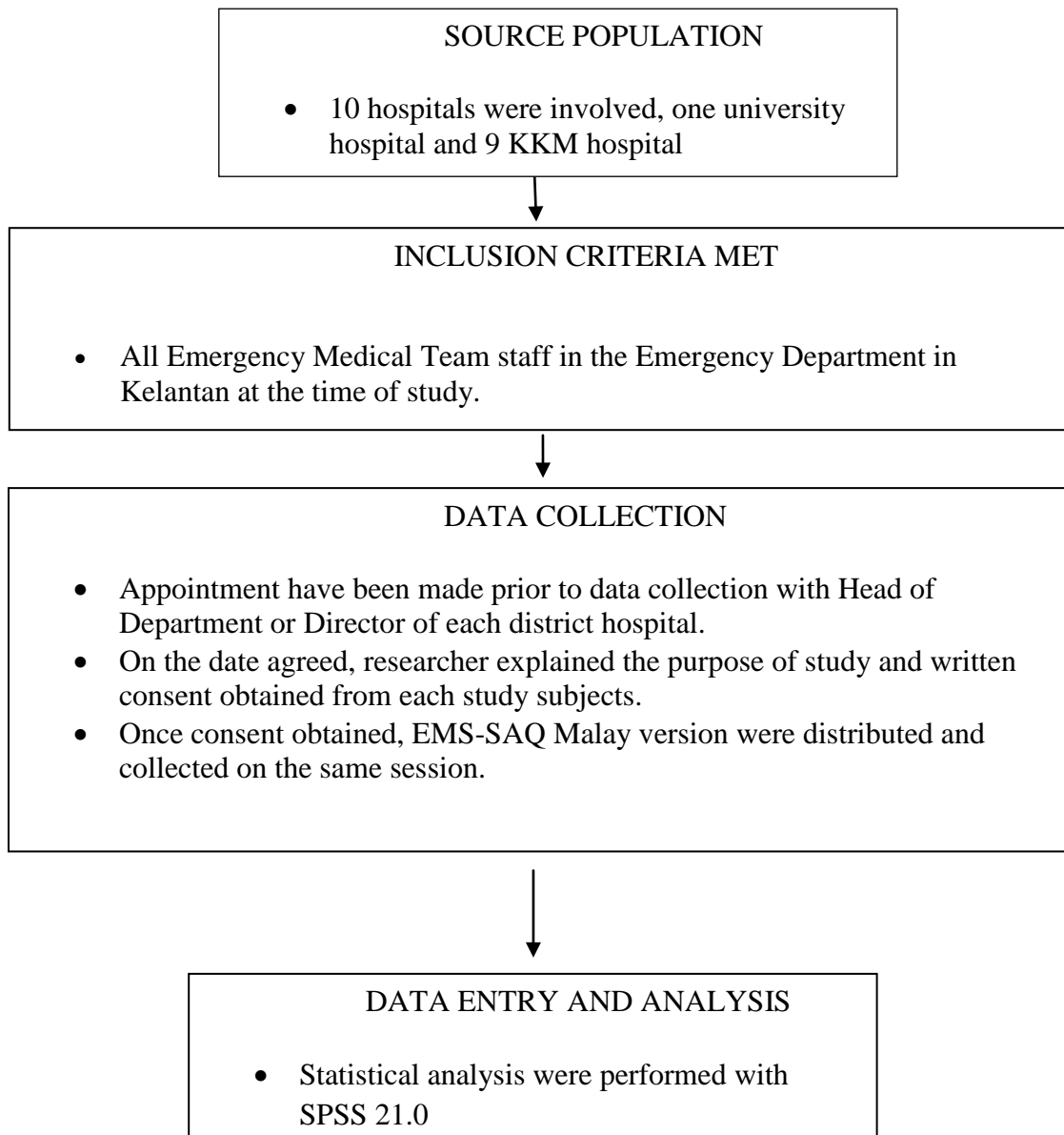
An independent t-test was used to compare the mean score of continuous variable, for two different groups of participants. A probability level of less than 0.05 was considered statistical significant. This statistical analysis was used to examine:

1. Mean score of EMS workplace safety culture between university hospital and public tertiary hospital in Kelantan
2. Mean score of EMS workplace safety culture among hospital with and without emergency physician (EP) in Kelantan
3. The effect of gender on safety culture among EMS in Kelantan.

One-way analysis of variance (ANOVA) was used to compare the independent variable with more than two groups and one dependent continuous variable. Post-hoc comparisons using Bonferroni Alpha test was conducted to explore the differences between each of the groups, however it only conducted once the overall F ratio showed significant differences among the groups. This statistical analysis was used to examine:

1. The effect of age group on the safety culture of EMS in Kelantan
2. The effect of staff designation on the safety culture of EMS in Kelantan
3. The effect of level education on the safety culture of EMS in Kelantan
4. The effect of total experiences in EMS on the safety culture of EMS in Kelantan

Figure 4.1 Study flow chart





## CHAPTER 5 - RESULTS

### 5.1 Socio-demographics Characteristics

Table 5.1 shows the socio-demographic characteristics of the respondents involved in this study. A total of 37 questions were completed by 319 respondents. The majority of respondent were male compared to female that was 55.8% and 44.2% respectively with mean age of respondent was 35.2 years old. Majority of the respondents were Malays (93.7%) and the remaining respondents were Chinese (4.1%), Indian (1.9%) and other (0.3%). Mean years of services of all the respondents in EMS was 10.9 years.

In regards to the position in the Emergency Department that involved in EMS, 27.3% registered staff nurse, 23.5% medical assistants, 18.2% doctors, 13.5% health attendants and 11.3% drivers were involved in the study. Specialist and paramedics were the least that were 2.5% and 3.8% each.

The highest percentage of the level of education among the respondents were Diploma (40.4%) followed by SPM (27.6%) and Degree (22.9%).