

AMERICAN UNIVERSITY OF BEIRUT

ORGANIZATIONAL FACTORS AFFECTING WORKER-
RELATED INJURIES IN PRIVATE HOSPITALS IN LEBANON

by
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AN ABSTRACT OF THE THESIS

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Title: Organizational factors affecting worker-related injuries in private Lebanese hospitals

Healthcare employees face many occupational challenges that affect their health and safety. Numerous studies have established that unsafe work environment and inadequate management strategies in hospitals result in high number of work-related injuries, however, such associations are not yet studied in Lebanon.

This study aims to identify the number and type of work-related injuries in various job classifications in Lebanese private hospitals and to examine the association between specific organizational factors and the prevalence of work-related injuries.

A cross-sectional study of 68 private Lebanese hospitals was conducted in February 2011. The Occupational Health and Safety officer in each hospital was interviewed by a trained field staff using a standardized questionnaire. A Poisson regression model was employed to analyze the association between organizational factors and the prevalence of work-related injuries, adjusting for other relevant variables.

Results of the study indicated an average of 14.6 injuries per 100 employees per 12 months within the participating private Lebanese hospitals. Being a small hospital and providing long-term care increased the risk of reported work-related injuries. The availability of an Occupational Health and Safety (OHS) department in the hospital and training staff on OHS matter decreased the risk of reported work-related injuries. The availability of good work organization and safety equipment in the hospital were protective factors against work-related injuries. Accredited hospitals were less likely to have work-related injuries than non-accredited hospitals.

Findings of this study shed light on the prevalence and determinants of work-related injuries in private Lebanese hospitals, which can be used in intervention plans to enhance safety programs and reduce work-related injuries. Further research is needed to explore other organizational factors affecting work-related injuries in both private and public Lebanese hospitals.

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To

*My parents Boutros and Feyrouz,
My brothers Anthony and Bernard,
And to Alex, my soul mate
Thank you for always being there for me*

INTRODUCTION

1.1. The Study Setting

Lebanon is a 10,452 Km² middle-income country with an estimated population of around 4 million (IGSPS-USJ, 2012). The Lebanese healthcare system includes public hospitals, private hospitals, private non-institutional providers, residential nursing care, home care and emergency rescue (Ammar et al., 2000).

Both public and private hospitals in Lebanon are regulated by the Ministry of Public Health through the law No.544 of 1996 for public hospitals and the June 1962 law number 9826 for private hospitals, which was also followed by the legislative decree No. 139 of September 1983 and the amendment No.546 of October 2003 (Republic of Lebanon 1962, 1983, 1996, 2003a).

Lebanon has 164 public and private hospitals distributed over the Lebanese governorates and covering various medical and surgical specializations. Out of these hospitals, there are 28 public hospitals with a total of 1,570 beds and 136 private hospitals with a total of 12,720 beds (Haroun, 2012). Moreover, around 70% of the private hospitals are owned by private individuals or groups of doctors and the remaining 30% are established by nongovernmental organizations (NGOs), mainly religious, charitable or community groups (Kronfol, 2006).

The Lebanese private hospitals are considered as the main component of the healthcare system in Lebanon, since they are highly developed in both number and capacity, especially since they account for 82% of the country's total capacity (IGSPS-

USJ, 2012). These hospitals are mainly general multidisciplinary hospitals with number of beds ranging between 80 to 400 beds per hospital. Furthermore, twelve of the private hospitals are university hospitals (IGSPS-USJ, 2012). Table 1.1 illustrates the distribution of private Lebanese hospitals according to the number of beds and across governorates.

Table 1.1- Distribution of private Lebanese hospitals according to type and number of beds across governorates, 2012 (Adapted from Haroun, 2012)

Governorate	Private hospitals Short and Medium stay*		Private hospitals Long stay**	
	Hospitals	Number of beds	Hospitals	Number of beds
Beirut	17	1857	2	754
Mount Lebanon	46	3408	14	2367
Bekaa	19	1231	0	0
North	19	1397	2	175
South	16	1331	1	200
TOTAL	117	9224	19	3496

* Short and medium stay hospitals: Acute care hospitals that focus on patients who stay for a short-period of time

** Long stay Hospitals: hospitals that focus on patients who, on average, stay more than 25 days.

1.2. Objectives of the Study

This study aims to:

- Identify the number and type of work-related injuries in various job classifications at Lebanese private hospitals.
- Study the association between specific organizational factors and the prevalence of work-related injuries in private Lebanese hospitals.

The study has also a secondary objective: to check the association between hospital accreditation status and the prevalence of work-related injuries in private Lebanese hospitals.

1.3. Significance of the Study

Many studies have established that the unsafe work environment and inadequate management strategies in hospitals result in a high number of work-related injuries (Rosa, 1995; Gimeno et al., 2005; Alamgir et al., 2007; Stone & Gershon, 2009). Gimeno and colleagues (2005) determined the exposure to harmful occupational factors such as chemical and physical hazards, as well as to poor organizational factors such as lack of safety training, bad administrative controls and low levels of safety climate and safety practices are significantly related to higher rates of work-related injuries. Similar results were reported by Stone and Gershon (2009) whose study concluded that negative organizational climates in an Intensive Care Unit were associated with higher rates of work related injuries and exposure to blood and body fluid (Stone & Gershon, 2009). In spite of these findings, the risk of health workers in hospitals remains less visible to the public opinion who is more concerned about patient safety (CDC & NIOSH, 2009).

Furthermore, literature shows that the organizational climate in hospitals is strengthened when hospitals are accredited (Georges et al., 2005; Manzo et al., 2012). Hospital accreditation has been defined as “a process in which an entity, separate and distinct from the health care organization, usually nongovernmental, assesses the health care organization to determine if it meets a set of requirements (standards) designed to

improve the safety and quality of care” (Joint Commission International- JCI, 2011). It is a voluntary process with optimal and achievable standards providing the hospital with a visible commitment to improve quality of care and safety of patients and reduce risks to staff (JCI, 2011).

Studies undertaken in Lebanon focused more on the impact of accreditation on the hospital management and structure, along with patient safety (Ammar, Wakim & Hajj, 2007; El-Jardali et al., 2008c). The effect of accreditation on the workers’ occupational health and safety in Lebanon has not been examined, although studies have shown that higher safety in the work environment among caregivers will eventually lead to a better quality of care provided, as well as improved patient safety (Landrigan et al., 2007; Lockley et al., 2007)

This research contributes to the body of knowledge on specific hospital organizational factors by starting to gauge the effectiveness of OHS programs at occupational health outcomes among healthcare workers. This research also serves a functional purpose in the Lebanese context, as it independently verifies performance on the OHS standards related to these organizational factors and their relationship with lower injury rates. The study provides a rudimentary analysis of organizational factors and may prove foundational for additional research into hospital OHS performance amid the changes brought on by the national push for hospital accreditation.

Furthermore, the findings of this study will shed light on the prevalence and determinants of work-related injuries in private Lebanese hospitals, which can be used in intervention plans to reduce work-related injuries and enhance safety programs. It will also

highlight the importance of occupational safety development and accreditation in promoting health and safety among hospital staff.

Additionally, this study can influence implications on OHS policies and practices in Lebanon and in the region. Consequently, it can influence the review of Lebanese accreditation indicators which in turn will have an impact on improving health and safety in hospitals. It will encourage occupational health professionals and policy makers to improve the work environment in hospitals as it proves the need to expand the OHS standards of the Lebanese accreditation program in order to be more comprehensive, up to date and evidence based, especially that current OHS standards included in the Lebanese accreditation program dates back to the year 2000. This study will encourage Lebanese hospitals to address occupational health in a much more effective way by improving the implementation of safety standards and practices in their facilities, especially that during the 2002 accreditation cycle, 32 Lebanese hospitals were found to operate below accreditation standards (Ammar, 2003).

CHAPTER 2

LITERATURE REVIEW

2.1. Overview of the Chapter

The following chapter presents a review of the literature addressing work related injuries, their causes and the actions taken in healthcare settings to improve the occupational health and safety in hospitals. This chapter also examines findings reported in the literature on the association between specific organizational factor and work-related injuries in healthcare settings.

2.2. Work-Related Hazards in Hospitals

Hospitals are large and complex institutions that employ large numbers of workers from different professional backgrounds. These settings can be unsafe for workers due to the many work-related hazards that are faced on a daily basis. Each hospital worker is exposed to different types of hazards depending on their jobs; for example, those handling direct care such as nurses and nurse aides have different risks of occupational injuries depending on their job tasks and the roles they each fulfill (Alamgir et al., 2007). For instance, nurse aides are considered the most vulnerable group in a hospital since most of their daily tasks involves patient handling activities such as transferring and repositioning patients (Alamgir et al., 2007).

Healthcare workers in hospitals are primarily at risk of exposure to chemical (detergents and disinfectants), physical (radiation, noise and humidity), biological (blood-

borne pathogens and needle stick injuries), as well as ergonomic (lifting, awkward positions) and psychosocial hazards (overexertion, stress and fatigue) (OSHA, 2004; CDC & NIOSH, 2009). Exposure to work-related violence, either verbal or physical, from both patients and colleagues, can also pose significant risk on the health of hospital staff (Adib et al., 2002; AbuAlRub et al., 2007; Alameddine et al., 2011; Smith, 2012). A study conducted by AbuAlRub and her colleagues (2007) showed that 91% of 116 Iraqi nurses experienced physical, verbal, emotional, or sexual workplace violence at least three times in the year prior to the study. Forty-two percent of the Iraqi nurses experienced physical violence and 53% witnessed violent incidents (AbuAlRub et al., 2007). Additionally, a study conducted among Lebanese Emergency Department (ED) employees found that 80.8% of ED employees reported being exposed to at least one incident of verbal abuse and 25.8% reported being exposed to at least one incident of physical assault (Alameddine et al., 2011). Consequently, work-related violence results in lost work-days, restriction of task, job transfer, personnel burnout, psychological distress, medical treatment, loss of consciousness and even death (Adib et al., 2002; Munro, 2002, Nhiwatiwa, 2003).

Furthermore, exposures also include accidents such as falls, slips, trips, cuts, electrical shocks, etc. which can lead to severe health problems among the hospital workforce. In addition to the aforementioned hazards related to the job content, other types of hazards exist in the organization of work itself. The latter includes: demanding work schedules (shift work, long work hours per week, extended work shifts, unpredictable working hours, strict and inflexible work schedules, and inadequate breaks), challenging job design (task complexity, required efforts, lack of participation in decision making and

control over work, heavy workload, conflicting job demands and unclear responsibilities), poor interpersonal relationships with coworkers and supervisors, high career concerns, poor management styles, and poor organizational climate and culture (Caruso & Geiger-Brown, 2009).

2.3. Work-Related Injuries in Hospitals

Many studies have documented injury rates among health care workers in hospitals or health care centers (Dement et al., 2004; Alamgir, 2007; Muralidhar, 2010; Stone, 2010; Boden et al., 2012). Alamgir and his colleagues (2007) stated that most injuries that arise in acute care settings are related to irritation and allergy, burns, cuts, bruises, psychological trauma and puncture injuries.

A study by Dement and colleagues (2004) in North Carolina, US, found a rate of 5.5 events/100 full-time equivalent (FTE) of blood and body fluid exposure accidents between 1998 and 2002, with higher rates among nurses, anesthetists, phlebotomists and surgical technicians (Dement et al., 2004). Another study comparing injury rates among different health care professionals in Canada found that care aides had the highest injury rates (37 injuries/100 FTE), while it was 30 injuries/100 FTE for licensed practical nurses, and 21.9 injuries/100 FTE for registered nurses. Reported Injuries included musculoskeletal, punctures, and skin, eye and respiratory irritation injuries (Alamgir, 2007). Similar results were found in a study conducted by Boden and his colleagues (2012) in Boston, USA, where the injury rates per 100 FTE workers were higher among nurse aides than among registered nurses for injuries with days away from work (11.3 vs. 7.2)

and injuries with no days away from work (9.9 vs. 5.7). Back injuries, sprains, strains, exertion, as well as, sharps injuries were the main and most recurrent injuries identified in the study (Boden et al., 2012).

Gimeno and his colleagues (2005) reported that the total number of work-related injuries among 1000 public hospitals employees in Costa Rica was 4,498 for a period of six months with an individual employee rate of 9.5 events every six months. Additionally, a study conducted in New York City among 2,047 registered nurses stated that over one third of nurses reported having a work-related injury in 4 months, with the majority (75%) reported missing at least a workday due to injury (Stone et al., 2010).

Furthermore, a study conducted at a tertiary care center in Beirut, Lebanon, by Musharrafieh and her colleagues in 2008, found that the average rate of exposure related accidents to blood and body fluids, between 1996 and 2001, was 0.57 per 100 admissions per year. Job categories that reported exposure to blood and body fluids related accidents during 2001 included house officers (13%), attending physicians (8%), medical students (9%), nurses (5%), housekeeping (4%), technicians (4%), and auxiliary service employees (2%). The main causes of the above injuries were needle sticks (75%), sharp objects (10%), splash and spill (3%); with reasons attributed to procedural intervention, improper disposal of sharps and recapping (Musharrafieh et al., 2008). The study found that the number of blood and body fluid exposure-related accidents ranged between 39 and 161, per year between the years 1985 and 2001, with an average of 96 incidents per year, (Musharrafieh et al., 2008) which compares to averages of 100 incidents per year in similar sized hospitals (Ferreiro & Sepkowitz, 2001; Doebbelin et al., 2003). Similarly, a study

conducted among 277 Lebanese health care workers in 4 general hospitals in South Lebanon found that 30% of the participants had at least one incident of occupational exposure to blood and body fluids in a year. With needle stick injuries being the most frequently reported incident type (75.9%) and registered nurses being the most exposed group to blood and body fluids incidents (57.8%) (Sabbah et al., 2013).

The impact of work-related injuries and illnesses extend beyond the worker to affect hospital administrative and workflow functions. Increased work absenteeism, work stoppage and employee downtime loss, high personnel turnover rate and extra cost for worker compensation, rehabilitation and medical treatment are all byproducts of work-related health events (CDC & NIOSH, 2009; Stone, 2010).

Work-related Health Complaints

Many studies highlighted the importance of work-related health complaints in predicting psychological disorders and work-related injuries (Eriksen et al., 2002; Aasa et al., 2005).

Aasa and his colleagues (2005) conducted a study in Sweden investigating reported health complaints such as sleeping problems, headache and stomach symptoms among female and male ambulance personnel. They found that 25% of female and 20% of male ambulance personnel reported at least two health complaints during their working hours and that the health complaints were associated with psychological job demands and worrying about work conditions (Aasa et al., 2005). Furthermore, work-related health complaints were found to be associated with high risk of sickness and absences from the job (Eriksen et al., 2002).

Experience and evidence have confirmed that elimination or reduction in injuries and illnesses at the workplace require a progressive approach. Occupational health and safety (OHS) programs are established to intervene on work organization, environmental and individual factors which consequently improve the health and wellbeing of workers (Sadleir, 2002).

2.4. Regulations for reducing injury rates

In order to manage and reduce work-related hazards and resulting injuries, hospitals in developed countries such as those in Europe and the United States started developing regulations such as the European Council Directive 89/391/EEC issued on 12 June, 1989 that stated that “every employer has to ensure the health and safety of workers in every aspect related to the work”, and workers are entitled “to receive adequate and specialized training in matters related to health and safety” (EU-OSHA, 2009). Hence, the implementation of safety practices and procedures aiming to ensure the occupational health and safety of hospitals’ staff, especially the ones promoting a safety culture in healthcare settings, benefits not only workers, but also patients, family members and all who visit these facilities (CDC & NIOSH, 2009).

Moreover, the 6th chapter of the Lebanese Labor Law issued in 1946 stated that organizations under the Lebanese jurisdiction “must be kept in a constant state of cleanliness and meet the requirements of health and comfort necessary for the employees, and these organizations must be prepared to ensure the safety of their staff” (article 61) (Republic of Lebanon, 1946). This article is strengthened by decree number 11802 issued

in December 2003 which included more systems oriented occupational health and safety regulations (Republic of Lebanon, 2003b).

2.5. Organizational factors for reducing Injury Rates

Organizational factors refer to elements within the hospital administration that reflect policies and organizational structure, processes and practices that aim at efficient workflow but may impact the overall safety of staff and patients at the hospital (Keroack et al., 2007; Price et al., 2010).

Many studies have associated certain organizational factors with reporting of work-related injuries (Rosa, 1995; Clarke et al., 2002; Gimeno et al, 2005; Montgomery et al., 2013). The rates of work-related injuries vary with type of hospital, level of administrative control, safety practices and policies, safety climate, as well as the availability of safety training and personal protective equipment (PPE) (Gimeno et al., 2005). Gimeno and his colleagues (2005) found that the interaction of low levels of safety climate and safety practices was associated with the highest rates of work related injuries. The safety climate is defined as the “shared assessments of safety policies, procedures and practices in work organizations and the perceptions and expectations employees have of the safety in their workplace” (Gimeno et al., 2005). This study conducted at public hospitals in Costa Rica, found that hospitals that lacked safety training reported 41% more work-related injuries, hospitals with low levels of safety climate reported 50% more injuries, and those with poor safety practices reported a 27% increase in work-related injuries (Gimeno et al., 2005).

Another study of 2,287 medical-surgical nurses in 22 US hospitals found that good organizational climate and use of PPE were directly related to lower rates of needlestick injury (Clarke et al., 2002). In contrast, extended work shifts and excessive fatigue were associated with increased injury rates among healthcare workers (Rosa, 1995). Montgomery and colleagues (2013) stated that organizational factors play a crucial role in the development of health professionals' job burnout at hospitals. These studies highlight the importance of hospital organizational efforts to minimize workplace injuries and improve occupational health outcomes for staff. Organizational factors include type of hospital, availability of OHS department, work organization, availability of safety equipment, staff training and education, reporting of work-related health complaints, as well as hospital characteristics (location and size).

The following section summarizes the published literature on the association between each of these organizational factors and work-related injuries among hospital staff.

Type of Hospital

Hospitals provide two types of care; short and long-term. Short-term care is provided to patients to improve their health in a short period of time such as treatment of acute illnesses or minor injuries (CMS, 2012). Long-term care is provided to patients who need help with their normal daily activities and may improve with time such as those that need comprehensive rehabilitation, respiratory therapy, head trauma treatment, and pain management (Gurwitz et al., 2005; CMS, 2012). Studies have shown that healthcare workers employed in acute care facilities have higher rates of work-related injuries than

those working in long-term care settings (Alamgir et al., 2007; Alamgir & Yu, 2008), mostly attributed to higher workloads in the former (Vahey et al., 2004). Occupational injuries related to allergies, burns, cuts, bruises and punctures were found to occur mostly in short-term care facilities (Alamgir et al., 2007).

Work Organization

Work organization is a comprehensive concept that includes work schedules, case-load size, job design, interpersonal relationships, career concerns, management styles, and organizational characteristics (Rosa, 1995; Huang et. al, 2002; Sauter et. al, 2002; Hurrell & Kelloway, 2007; Stone et al., 2010). A study on nursing homes in the US showed 35% lower odds of a work-related injury among nursing assistants who reported having sufficient time to complete resident activities of daily living compared to nursing assistants who reported not having sufficient time to complete these activities (D'Arcy, Sasai & Stearns, 2012). Hence, proper staffing levels can provide adequate time for resident care which plays a key role in injury prevention. Moreover, Stone and her colleagues (2010) found that perceived low professional practice, low nurse/physician collaboration, low opportunity of advancement, and low decision-making opportunity among hospital nurses resulted in poor occupational health outcome in terms of lost workdays, musculoskeletal injury, blood and body fluid exposures, and high levels of burnout (Stone, 2010).

Furthermore, Rosta and Aasland (2011), when comparing self-rated health of 1,260 German doctors to 562 Norwegian doctors, reported significantly lower percentage of doctors with good self-rated health in Germany (63.3%) than in Norway (88.1%). The

lower reporting of good self-rated health among German doctors was attributed to a higher amount of work hours on weekdays and on-call duties, in addition to negative aspects of the work organization such as higher workloads, less control over work hours and higher amount of uncompensated overtime (Rosta & Aasland, 2011).

Studies have shown that the risk of nurses making an error that endanger both their health and the patients' safety is significantly increased when nurses work shifts longer than 12 hours, work overtime or work more than 40 hours per week (Rogers et al., 2004). Additionally, working excessively long hours in these settings poses significant threats to the health of workers and eventually leads to increased risk of health complaints such as severe mental and physical fatigue, gastrointestinal problems such as nausea and weight loss, and heart disorders in terms of lumpy throat and chest pain. Moreover, long working hours influences the attitudes of healthcare workers causing fast mood changes, mainly irritability and brooding (Van der Hulst, 2003; Rosta & Gerber, 2007). Therefore, industrialized countries regulated healthcare working hours to ensure safety among healthcare staff. European laws have limited healthcare workers, including nurses and physicians, to a maximum of 13 consecutive hours of work and to a maximum of 56 hours per week (British Medical Association, 2004; Landrigan et al., 2007). Furthermore, New Zealand have limited physicians-in-training to a maximum of 16 consecutive hours and 72 hours per week (Gander et al., 2007).

Similarly, Rosa (1995) concluded that, in order to reduce high rates of occupational injuries, work shifts at hospitals should be designed in such a way that workloads should be distributed to account for critical time periods when fatigue is

assumed high with small breaks distributed throughout the shift for temporary recovery. Additionally, adequate job rotation should be implemented to decrease repetitive work and long monotonous tasks that induce boredom and low level of attention (Rosa, 1995). Furthermore, a study conducted among 837 registered nurses in ICU units across the United States, showed that the more positive organizational climates as well as decision making and available norms in the workplace, the lower the rates of occupational injuries and blood and body fluid exposures (Stone & Gershon, 2006).

Safety Equipment

Many studies have shed light on the importance of the use of safety equipment in hospitals in reducing work related injuries. Alamgir and his colleagues (2007) expressed the need for introducing safety equipment such as floor and ceiling lifts for lifting patients in hospitals to reduce stress on muscles, joints and backs, hence, decrease musculoskeletal disorders. Furthermore, a study conducted in British Columbia to evaluate the efficacy of the use of overhead lifts (ceiling mechanical lifts used for lifting, transferring, or repositioning patients), found that such equipment lead to rapid economic gains, as well as, sustained reduction in the frequency and cost of patient handling injuries (Chhokar et. al, 2005).

Additionally, D'Arcy and her colleagues (2012), showed that the odds of having an injury among nursing assistants in nursing homes were 41% lower among those who reported constantly having a lift available. The study concluded that increasing the availability of lifting devices in units where such devices are missing may be able to reduce injury rates substantially (D'Arcy, Sasai & Stearns, 2012). Moreover, a study

among nurses in hospitals adopting a ‘no lift system’ by the installation of safety equipment such as electric beds, slide sheets, draw sheets, monkey bars, standing walkers, etc. reported lower rated physical tiredness, fewer number of work-related injuries especially back injuries, lower rate of pain and symptoms and less absence from work due to musculoskeletal pain than hospitals which did not introduce any safety equipment on their premises (Engvist, 2006).

Staff Training and Education

Evidence shows that availability of adequate training for staff can positively affect the number of work related injuries in a hospital. For instance, D’Arcy and her colleagues (2012) reported that workplace injury prevention training is associated with a decrease in the odds of injury among nursing assistants in nursing homes. The study showed 39% lower odds of injury among those who reported always having available facility training to reduce workplace injuries (D’Arcy, Sasai & Stearns, 2012). Training of new employees on OHS issues in the hospital is also considered one of the effective steps a hospital can take to decrease work-related injuries (Vredenburg, 2002).

However, studies have suggested that staff education and training alone, if unaccompanied with work modifications, do not reduce the frequency or severity of musculoskeletal injuries such as low back-pain (Vredenburg, 2002; Garg et al., 2007).

Occupational Health and Safety Department

The availability of an Occupational Health and Safety (OHS) department improves the overall safety climate in the hospital ensuring better health and safety of staff and patients (Stone & Gershon, 2006). Hospitals known to have well-established OHS

departments have more capital, hence can invest in more up-to-date safety equipment that eventually lead to better occupational health and safety among hospital staff (Gimeno et al., 2005; Stone & Gershon, 2006).

Hospital Characteristics

Hospital characteristics such as hospital location and hospital size can influence the number of work related injuries (Kines & Mikkelsen, 2007; Mark et al., 2007; Rosta & Aasland, 2011). There is not enough data linking work related injuries directly to hospital location and size; however, these are correlated indirectly since location links to other hospital characteristics such as staffing levels. Mark and colleagues (2007) indicate that rural hospitals have lower levels of nursing unit capacity than urban hospitals which lead to greater work complexity (Mark et al., 2007). High levels of work complexity increase the pressure and workload of hospital staff which lead to higher risk of injuries (Rosa, 1995; Rosta & Aasland, 2011).

As for the effect of hospital size on the number of work-related injuries, many studies have found that large organizations report lower number of work-related injuries since they might typically have more managerial levels, higher proportion of support staff and more resources allocated for safety issues (McVittie et al., 1997; Vredenburg, 2002; Kines & Mikkelsen, 2007).

Finally, the implementation of effective safety programs in hospitals, and companies in general, can expect about 20% reductions of injury and illness rates, as well

as a return of \$4 to \$6 for every \$1 invested in improving workplace safety and health (OSHA, 2005). Additionally, lower costs, increased productivity and higher employee morale are all byproducts of an effective safety and health program implementation (OSHA, 2005). Moreover, the importance of motivated healthcare staff in improving quality and safety in healthcare organizations has been well highlighted in the literature (Greenfield et al., 2011; Manzo et al., 2012).

Consequently, although hospitals worldwide have been working to implement safety programs and regulations to improve the health and ensure the safety of their staff; studies have shown that high numbers of occupational injuries, incidence of absences due to work-related disability and sickness in hospitals still exist. These incidences are a result of non-compliance with safety practices, lack of awareness of the importance of safe work and lack of reliable data on the nature and severity of occupational risks (Gimeno et al., 2005; Gimeno et al., 2007).

Hospital organizational factors are strengthened through accreditation programs which ensure the existence of standardized services, optimal standards, effective management, and comprehensive procedures improving the organizational environment (Georges et al., 2005; Touati, 2008; JCI, 2011; Hinchcliff, 2012; Manzo et al., 2012). It has been noted that accreditation provides a safer and more efficient work environment that lead to worker satisfaction (JCI, 2011).

2.6. The Accreditation Program

Accreditation of hospitals and healthcare facilities is a process that assesses the organization of the hospital to determine if it meets a set of requirements and standards designed to improve safety and quality of care (Georges et al., 2005; El-Jardali, 2007; El-Jardali et al., 2008c; Greenfield & Braithwate, 2008; JCI, 2011). It reflects a commitment from the hospital for optimum patient care and safety as well as serves as recognition of services that follow leading international practices and standards (JCI, 2011). From a systems perspective, hospital accreditation has served as a tool adopted by governments and civil society to encourage the widespread adoption of improved OHS and organizational practices in hospitals (Greenfield & Braithwate, 2008; JCI, 2011).

In 1951, the US established the first formal accreditation program to ensure the implementation of structural and managerial standards including occupational health and safety standards in healthcare organizations (Shaw, 2000). This program engaged trained government personnel in the evaluation of hospital compliance compared to pre-established standards. It was considered a tool to improve the working environment, as well as the quality of health care services of hospitals (Shaw, 2000; Alkhenizana & Shaw, 2011). The program entails an assessment of the hospital's resources, objectives, strengths, and limitations with the ultimate purpose of improving the mechanisms and care processes available at healthcare facilities. It ensures hospitals' commitment to implementing evidence-based quality systems of care and allows hospital staff to participate in quality improvement (Hinchcliff, 2012).

However, studies have shown that the proportion of accredited hospitals varies considerably by geographic location; rural hospitals are less likely to be accredited than urban hospitals. Moreover, the proportion of accredited hospitals varies by the degree to which the hospital location is rural -in other words far from main cities- and depending on other available factors such as hospital size, ownership and contract management (Brasure et al., 2000). Additionally, most rural hospitals are not encouraged to participate in the accreditation process due to its related high cost (Brasure et al., 2000).

Accredited hospitals have optimal standards, effective management, comprehensive procedures and policies and standardized services which ensures an effective organizational environment through well-established organizational factors (Georges et al., 2005; Touati, 2008; Manzo et al., 2012).

An international commission promoting continuous improvement of the safety and quality of care through the provision of education and advisory services and international accreditation and certification in the international community – developed the facility management and safety standards section included in the accreditation program. This program was destined to improve the Occupational Health and Safety in hospitals via hazards and risks reduction and control, prevention of accidents and injuries, as well as maintaining safe conditions within the hospital setting (JCI, 2011). However, little research has looked at the impact of accreditation status on hospital staff safety (Georges et al., 2005; Kaminski, 2012), and none in the Middle East region.

2.6.1. Accreditation Impact in Hospitals

The importance of accreditation in improving both the quality and process of care provided by healthcare professionals, as well as clinical outcomes of several clinical conditions has been highlighted by Alkhenizan and his colleague Shaw in 2011. Georges and colleagues (2005) stated that accreditation has many benefits for patients, hospitals and hospital employees (medical and nursing staff as well as administrative staff). Benefits mentioned by Georges et al. (2005) include patient safety, respected and protected patients' rights, and patient involvement in care decisions and care process, as well as enhanced public and community confidence, stimulated continuous improvement, improved professional staff development through training and education on consensus standards, increased staff satisfaction with working conditions, involvement of staff in quality activities, clear lines of authority and accountability, promoted teamwork and improved employee safety and security (Georges et al., 2005).

Hence, besides maximizing quality of care and patient safety and ensuring an effective and efficient use of resources, it has been noted that accreditation would create a safe environment for hospitals' patients and staff, strengthen the information system, assist hospitals in being accountable, transparent and make evidence-based decisions, exhibit a commitment to quality, improve collaboration within organization and promote team building, enhance staff's educational process, increase hospital's credibility, provide recognition for well-done activities, identify areas of quality improvement, and mitigate the risk of adverse events (Beaumont, 2002; ; Georges et al., 2005; Kaminski, 2012; Nicklin, 2012).

Furthermore, involvement of healthcare staff in the accreditation process endorses a better quality and safety culture across organizational boundaries (Greenfield et al., 2011). The majority of hospital employees participating in a study carried out by Greenfields and his colleagues (2011) reported that their participation in the accreditation process offered them opportunities to learn and enabled their development as quality and safety champions. Accreditation was also perceived to promote additional improvement of the staff working conditions through acquiring more safety, providing organizational climate stability as well as establishing a more pleasant and satisfactory environment conducive to strengthening human relationships (Manzo et al., 2012).

2.7. Accreditation Procedure in Lebanese Hospitals

In 2002, aiming to regulate and guarantee the quality of care to its population, the Lebanese Ministry of Public Health developed and implemented the first accreditation policy in the Middle East region with the assistance of an Australian consultant team called ‘Overseas Project Corporation of Victoria’ (Ammar & Wakim, 2005). This project aimed to improve the quality of health care services given by Lebanese hospitals. The accreditation standards were derived from several applied hospital accreditation systems in USA, Canada, Australia, Ireland, New Zealand, France and UK (Ammar, Wakim & Hajj, 2007). Out of 128 hospitals in Lebanon surveyed in 2002, only 47 were accredited and 32 hospitals were found operating below standards not meeting minimum safety standards (Ammar, 2003).

The initial accreditation standards were revised in 2004 to include structures and processes available at hospitals, as well as health care outcomes, both of which require long-term implementation to ensure compliance and effectiveness (Ammar, Wakim, & Hajj, 2007). Subsequent to the revision of the accreditation standards in 2004, 142 hospitals were audited and only 60% were awarded accreditation. Large hospitals (>200 beds) were found to have higher ratings than medium-sized hospitals (101-200 beds) while small-sized hospitals (<100 beds) had the lowest ratings and were found to operate below standards (Ammar, Wakim, and Hajj, 2007).

As of 2010, the Lebanese handbook of accreditation of hospitals included a new chapter on patient safety to (El-Jardali & Jaafar, 2010), and consisted of 535 standards, only 9 of which were categorized as “Occupational Health and Safety”. The nine Occupational Health (OH) standards were as follows: availability of an OHS Officer (OH1), establishment of an OHS committee (OH2), availability of employees health and safety program (OH3), existence of a policy and procedure manual describing the OHS system/service at the hospitals (OH4), exposure of staff to OHS information (OH5), accident/incident reporting and their resolution procedure (OH6), availability of evidence of OHS data (OH7), availability of an OHS hazard identification audit (OH8), and finally, availability of a hazard reporting system (OH9) (MoPH, 2013). Although including OHS standards was a possible development in the accreditation requirements, it is worthy to note that accreditation may still be obtained even if a hospital receives a low score on one or more sections, including OHS, if the overall score is above passing.

Moreover, the Lebanese accreditation scoring was changed since data collection. Initially, accreditation scores were given as follows: 'A' if the hospitals met all the standards, 'B' if at least two thirds of the standards are met, 'C' if less than two thirds of the standards are met, or 'D' if none of the standards are met. Currently the scoring system was changed into accreditation levels where: an accreditation level of '1' is obtained if there is no decisions (recommendation for improvement), '2' if there is at least one recommendation, '3' if there is at least one reservation, or '4' if there is at least one major reservation (MoPH & HAH, 2010). While the scoring system has changed, the standards themselves and the guidelines have not, and are still being adopted. This new scoring system provides the hospital with a more qualitative feedback that reflects both the hospital's culture and environment. This new system will be employed in the next cycle of accreditation to start in the near future.

The impact of accreditation on the quality of patient care in Lebanese hospitals was studied by Jardali and his colleagues in 2008. The study conducted among 1,048 Lebanese nurses who perceived improvement of quality results, improved teamwork, and productivity in their hospitals following accreditation (El-Jardali et al., 2008c). Another study conducted by Saleh and his colleagues in 2013 among 110 private short-stay Lebanese hospitals found that 47% of the hospitals perceived that accreditation enhances quality and patient safety cultures in the organization and 33% perceived it improves patient satisfaction (Saleh et al., 2013). The study also indicated that 64% of Lebanese private hospitals considered accreditation to be a worthy investment, although all of them indicated increased expenses related to accreditation. Hospitals revealed that incurred costs

were mainly related to staff training, accreditation consultants' costs, infrastructure maintenance, new equipment purchasing, and property upgrading (Saleh et al., 2013). Therefore, the impact of accreditation has been well proven in relation to improved quality of care provided to patients; however, the impact of accreditation status on the health and safety of staff in private Lebanese hospitals has not been studied yet.

CHAPTER 3

METHODS

3.1. Overview of the Chapter

This chapter describes the methods of the study. The questionnaire development and content, as well as variables used are presented. The process of data collection, data management and analyses is provided.

3.2. Study Population

A list of all private registered Lebanese hospitals (N=138) in all Lebanese governorates was obtained from the Syndicate of Lebanese Private Hospitals in 2011. Private hospitals were selected to participate in the study because they presented 83% of all Lebanese hospitals and their administration was easily accessible. Nursing homes providing care for elderly and orphanages were dropped from the sample. The fieldwork coordinator successfully approached the 127 hospitals that were found eligible to participate in the study; 59 hospitals refused to participate and 68 hospitals successfully completed the questionnaire (refer to figure 3.2 - Data Sampling Diagram). The response rate was 53.5%. Most of the non-response was due to lack of time or non-willingness to participate, often because the hospital was going through the accreditation process at that time. The characteristics of participating and non-participating hospitals are described in table 3.2.

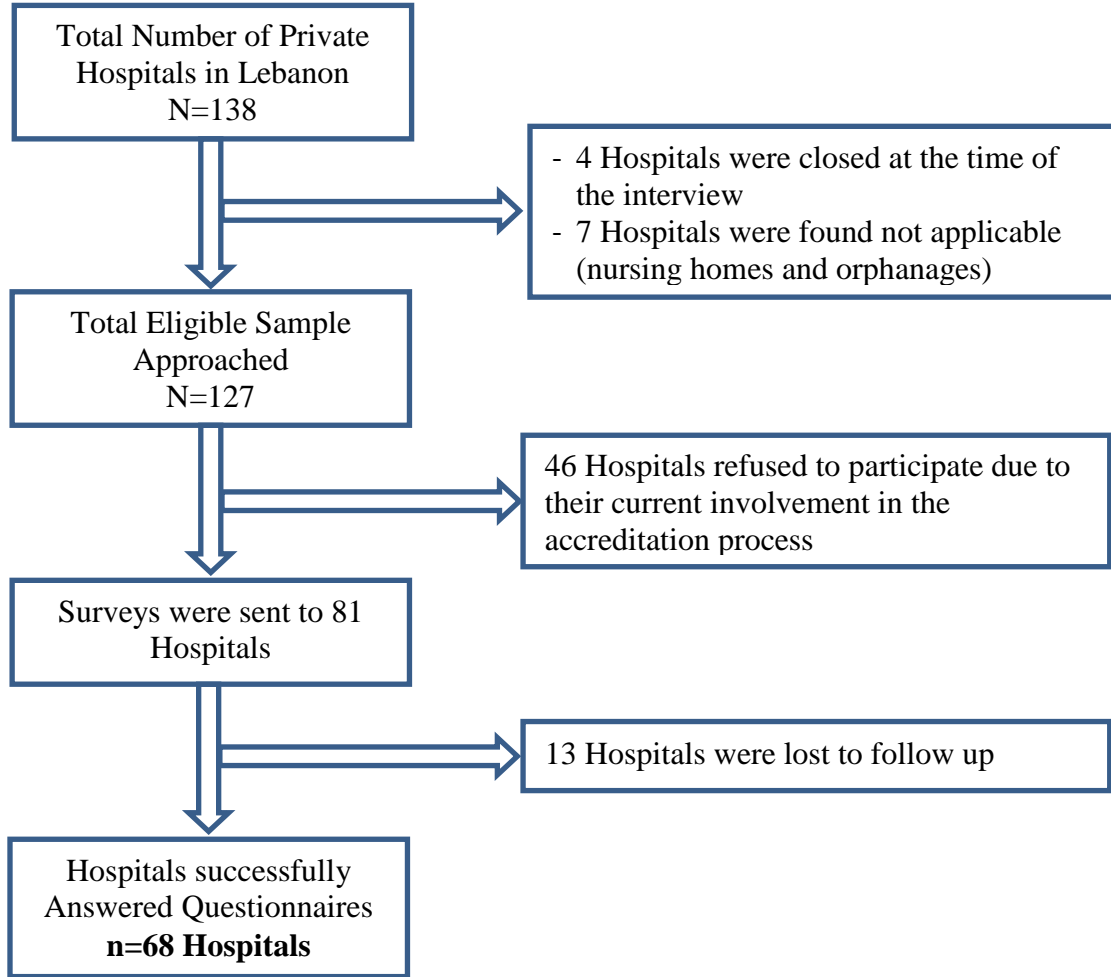


Figure 3.2- Data Sampling Diagram

Table 3.2: Participating vs. Non-participating Hospital characteristics among private Lebanese hospitals

	Participated (n=68)		Refused (n=59)	
	n	%	n	%
Governorate				
Beirut	7	10.3	13	22.0
Mount Lebanon	23	33.8	29	49.2
North	16	23.5	4	6.8
Bekaa	11	16.2	7	11.9
South	11	16.2	6	10.2
Number of beds				
≤100 beds	39	57.4	38	67.9
>100 beds	29	44.6	18	32.1
Type of Care provided				
Short-term care	51	77.3	42	75.0
Long-term care	15	22.7	14	25.0

3.3. Questionnaire Development

A structured questionnaire was developed by a research team at the Faculty of Health Sciences at AUB, based on extensive literature review covering OHS issues in hospitals, policies, regulations and safety practices, types and causes of work-related injuries in hospitals, as well as reporting mechanisms, incidents management and the OHS standards in the Lebanese accreditation program.

The Syndicate of Lebanese Private Hospitals was approached to encourage private hospitals to participate in the study, they distributed a memo to all the private hospitals informing them of the study and its purposes and advising them to participate. In

addition, the questionnaire was checked by a delegate from the syndicate and was shortened and modified upon their suggestions.

The questionnaire was developed originally in English and translated into Arabic, the local language, to ensure that all respondents understand and answer the questions.

The questionnaire was piloted in few selected hospitals in December 2010 and January 2011. Changes were made to the questionnaire based on comments obtained in the pilot study.

3.3.1. Content

The front page of the questionnaire included a consent form that contains an introductory statement explaining the objectives of the study, the questionnaire sections, a statement on the confidentiality of the data and the informed consent from the hospital administration. A second consent form, with similar content, was attached to the questionnaire to be signed by the hospital's OHS officer.

Consent forms were followed by a cover sheet that includes information related to the hospital's address and phone number, the name of the respondent and his/her position at the hospital, and the person responsible for completing the questionnaire (interviewer, supervisor, data editor, data coder and data entry operator). This page also included an identification number unique to each hospital.

The questionnaire included close-ended questions as well as open-ended questions and was divided into sections summarized in table 3.3.1.

Table 3.3.1: Questionnaire Content

Section	Section Title	Description
1	OHS Officer availability	Information on the OHS officer position in the hospital including the OHS program, OHS tasks and responsibilities and job occupancy.
2	OHS Committee availability	Information on the OHSC Committee and the types of OHS trainings attained by the committee members.
3	OHS Policies and Procedures	Information on the available OHS policies and procedures and questions regarding more specific OHS policies and procedures, staff awareness of these policies, and methods of their dissemination across the hospital.
4	OHS Management and Performance	Information on the OHS department, the training of staff, resources allocated for OHS issues, hazard identification audits, practices and safety measures introduced in the hospital, in addition to compliance incentives.
5	Accreditation Status	Information on the hospital's accreditation status, reasons for unsuccessful accreditation and the effectiveness of the accreditation program in promoting the implementation of OHS standards.
6	Accident/Incident Reporting	Questions pertaining to the reporting system of incidents and accidents that occur in the hospital, and the availability of an annual report on the incidents and accidents occurrence in the hospital.
7	Incidents and Accidents	Questions on the incidents and accidents and the number and type of work-related injuries (non-fatal vs. fatal) that occurred in the hospital and their impacts on the hospital in terms of lost workdays, workers compensation cost and new recruitment costs.
8	Work-Related Hazards and Health Problems	Information on the hazards faced by the hospital employees in terms of work-related complaints, nature of non-fatal injuries, and the characteristics of the non-fatal injuries in terms of severity of injuries, frequency of injuries and the most common event that lead to the injury for the following specified health care job categories (registered nurses, orderlies/nurse aides, janitors, phlebotomists, medical technologists, radiologists and physicians).

9	Main Hazards	Questions about the most important and frequent hazards faced in the hospital.
10	Workers Compensation	Information on the workers compensation programs available in the hospital.
11	OHS Officer Characteristics	Personal information relating to the OHS Officer such as sex, date of birth, education, qualifications and training.

3.3.2. Training of Interviewer

A member of the AUB study team was trained on the content of the questionnaire, and data collection techniques.

3.4. Data Collection

The study design is cross-sectional. The fieldwork started in February 2011 after obtaining the list of Hospitals from the syndicate of hospitals in Lebanon. However, the heavy involvement of private Lebanese hospitals in the accreditation process between February 2011 and October 2011, delayed the fieldwork activities which took longer time than expected.

The survey instrument was mailed to all consenting hospitals and was followed by a 30 minute face-to-face interview with the hospital's officer in charge of occupational health and safety issues.

3.5. Ethical Considerations

All information collected by the research team is stored at the Faculty of Health Sciences at AUB, kept confidential, and used only for the purpose of this study. All collected data were de-identified ensuring confidentiality; each questionnaire has a unique identifier that is linked to the hospital and the key that identifies the hospitals is kept in a separate folder.

3.5.1. IRB Approval

The Institutional Review Board at AUB gave the principal investigator Dr. Rima Habib approval for the study on 11 October 2010 (IRB ID: FHS.RH1.04). IRB approval is still applicable until 11 October 2013. Consequently, this thesis was exempted from IRB review and oversight since it involved a study of existing data and the subjects could not be identified directly or through identifiers linked to the subjects. In addition, the principal investigator Dr. Rima Habib served as the advisor on this thesis work.

3.5.2. Informed Consent

Before conducting each interview, informed consent was signed and obtained from both the hospital's administration and the OHS officer that was interviewed. It was explained to all participating hospitals that any acquired information will be treated with confidentiality and published results will be in aggregate form with no reference to hospital names. Respondents had the right to stop the interview at any time and/or not answer questions they feel uncomfortable with.

3.6. Data Management

3.6.1. Review

Questionnaires were reviewed by the staff at AUB. This was done at the same time of data collection in case questionnaires needed to be corrected during the data collection phase.

3.6.2. Coding

Coding was done by an AUB graduate assistant and supervised by an employed research team member. Codes were established for all open-ended questions and close-ended questions with the option “Other, specify”. All answers were listed, grouped and assigned suitable codes, each corresponding to an appropriate answer. This process was done at the Faculty of Health Sciences in AUB.

3.6.3. Data Entry

A database was created on the Census and Survey Processing System (CSPRO) for data entry. Regular quality checks on the data entry were done.

Data cleaning and preliminary analysis were done using the Statistical Package for Social Sciences (SPSS) software version 19.00.

Regression analyses were done using STATA statistical software, version 10.0.

3.7. The Study Variables

The variables used in the study are the number of work-related injuries, hospital accreditation status, hospital governorate, and hospital's organizational factors. Detailed explanation on each is presented below.

3.7.1. Dependent Variable

The main outcome in this study is the number of work-related injuries reported in private Lebanese hospitals in the 12 months prior to the study. To account for the number of staff in different hospitals, the number of work-related injuries was divided by the total number of hospital staff multiplied by 100. Hence, the number of work-related injuries over 12 months per 100 employees became the main outcome for the study. . This variable was computed as.

The total number of staff was missing in 8 hospitals ($8/68 \times 100 = 11.8\%$ of the total number of hospitals). To account for the missing values in the number of hospital staff, single imputation technique was used; the missing values were substituted by the regression estimates computed using the total number of beds.

3.7.2. Independent Variables

Independent variables explored in the analysis were:

3.7.2.1. Organizational Variables

- *Size of the hospital*: The size of hospital was identified by the number of hospital beds. Studies in Lebanese hospitals have categorized hospital size into small

hospitals (≤ 100 beds); medium (101 – 200 beds) and large (> 200 beds) (Ammar, Wakime & Hajj, 2007; El-Jardali et al., 2011). For the purpose of this study, medium and large hospitals were grouped together because of the low number of large hospitals in the sample ($n=5$): small hospitals (≤ 100 beds) and medium and large hospitals (> 100 beds).

- *Type of care provided at the hospital*: This variable was dichotomized into hospitals providing short-term care and hospitals providing long-term care.
- *Availability of OHS department*: Respondents were asked whether or not an OHS department exists in the hospital. Answers were categorized into yes or no.
- *Availability of safe work organization*: work organization that could lead to a better and safer work environment, such as job rotation to minimize hazardous exposure to one particular worker, was categorized into yes or no.
- *Availability of safety equipment*: Safety equipment, for example equipment aiming to minimize ergonomic problems such as ergonomically designed chairs for back pain, was categorized into yes or no.
- *Training of hospital staff*: This variable was obtained by asking the respondent to indicate the percentage of hospital staff that gets trained on OHS matters. This variable was dichotomized into less than 80% of hospital staff trained and more than 80% of hospital staff trained. The cutoff point was taken at the mean.

Additionally, each of the above six organizational variables was recoded into 0 and 1; 1 denotes the category that was found in the literature to increase the number of

work related injuries and 0 denotes the category that was found in the literature to decrease the number of work related injuries. These variables were then added together in one variable named ‘organizational factors index’. This variable is an index that takes a value between 0 and 6; the poorer the ‘organizational factors’, the higher the index value is.

3.7.2.2. Hospital accreditation status

This variable was dichotomized into accredited hospitals and non-accredited hospitals. The category of not accredited hospitals includes hospitals that are still in process of pursuing accreditation, had applied for accreditation but were rejected, and never applied for accreditation.

3.7.2.3. Geographical Location of the hospital

Hospital Governorate: The geographical location of the hospital was categorized into the following five categories: Beirut governorate, Mount Lebanon, North, South and Bekaa. Although the Lebanese territory is divided into 6 governorates, for the purpose of this analysis, the governorate of South Lebanon and the governorate of Nabatieh were grouped together due to the low number of participating hospitals in Nabatieh.

3.7.2.4. Work-related Complaints

The presence of work-related complaints: respondents were asked if the hospital had reports of any of the below work-related complaints in the past 12 months.

- Fatigue

- Weakness
- Headache
- Drowsiness and dizziness
- Sleep deprivation
- Work-related sickness and absenteeism

Hospitals were categorized as either “reporting at least one of the six work-related complaints” or “not reporting any work-related complaints”.

3.8. Data Analysis

Descriptive statistics including frequency distribution, percentages, and medians were calculated to determine the characteristics of the study sample. Since the main outcome was not normally distributed, medians were reported instead of means. Additionally, the total number of injuries was computed separately for each job classification of hospital workers, namely registered nurses, orderlies, janitors, phlebotomists, radiologists, medical technologists and physicians to assess the distribution of the number of injuries among different occupational groups in hospitals setting.

Moreover, given that the outcome is a count, bivariate Poisson regression was carried out to obtain crude associations between the predictors mentioned above and the main outcome, number of work-related injuries per 100 employees. Independent variables known from the literature to be associated with the dependent variable, as well as variables that had a p-value < 0.2 at the bivariate level were included in the multivariable Poisson regression models to determine the adjusted association between the main outcome and the

independent variables. Adjusted relative risks (RR) and a 95% confidence interval were reported. Two multivariable Poisson regression models were used, one including five organizational variables (number of beds was excluded as it had a strong association with the accreditation status, another independent variable in the model) and another including the computed organizational factor index summarizing all six organizational variables. The two models were compared using information criterion to determine which one is the best model. Statistical analyses were performed using STAT 10 and a p-value < 0.05 was considered to be significant.

CHAPTER 4

RESULTS

4.1. Overview of the Chapter

The results of descriptive statistics, bivariate analysis and multivariate Poisson regression are described in this chapter. Hospital characteristics and organizational variables are described, as well as the presence of reported injuries and their types among the different groups of employees in private Lebanese hospitals. Results showing the relationship between the study variables and reported number of injuries per 100 employees are also presented.

4.2. Descriptive Statistics

4.2.1. Hospital Characteristics

Hospital characteristics are summarized in Table 4.2.1. One third of the participating hospitals in the sample are located in Mount Lebanon while the others are distributed among the North (23.5%), Bekaa (16.2%), South (16.2%) and Beirut (10.3%). More than half the hospitals are small (i.e. have 100 beds or less) and 77% of the hospitals provide only short term care.

Table 4.2.1: Hospital characteristics in private Lebanese hospitals, Data collected in 2011 (N=68)

	n	%
HOSPITAL CHARACTERISTICS		
Governorate		
Beirut	7	10.3
Mount Lebanon	23	33.8
North	16	23.5
Bekaa	11	16.2
South	11	16.2
Number of beds		
≤100 beds	39	57.4
>100 beds	29	42.6
Type of Care provided		
Short-term care	51	77.3
Long-term care	15	22.7

4.2.2. Organizational factors

Table 4.2.2 describes the organizational factors in private Lebanese hospitals. Seventy percent of the hospitals have an OHS department. Seventy percent of the hospitals have introduced work organization practices and safety measures such as job rotation, work schedule, case load size and adequate staffing levels. 56% of hospitals have available safety equipment such as lifting aides, personal protective equipment and medical chairs. All hospitals reported training their staff on OHS issues, however many hospitals do not train all the staff. An average of 79.3% of staff are being trained with only 56% providing OHS training sessions for more than 80% of their staff.

Additionally, only 3% of the hospitals do not have an OHS program and 7% do not have a written manual for OHS policies. All hospitals (100%) have written OHS policies and procedures.

Table 4.2.2: Organizational factors in private Lebanese hospitals, Data collected in 2011 (N=68)

	N	%
OHS DEPARTMENT		
Availability of OHS department		
No	20	29.4
Yes	48	70.6
OHS POLICIES AND PROCEDURES		
Availability of an OHS Program		
No	2	2.9
Yes	66	97.1
Availability of a written manual for OHS policies		
No	5	7.4
Yes	63	92.6
Availability of written OHS policies and procedures		
No	0	0.0
Yes	68	100.0
PRACTICES AND SAFETY MEASURES INTRODUCED IN THE HOSPITAL		
Work organization practices and safety measures introduced		
No	21	30.9
Yes	47	69.1
Availability of safety equipment		
No	30	44.1
Yes	38	55.9
Staff trained on OHS matter		
No	0	0.0
Yes	68	100.0

Percent of staff trained on OHS matter

≤ 80% trained	30	44.1
> 80 % trained	38	55.9
Mean ± SE (Min-Max)	79.3±3.3 (0 -100)	

4.2.3. Accreditation Status

More than half of the hospitals are accredited by the Lebanese Ministry of Public Health. Out of the non-accredited hospitals 86.2% are still in the process of seeking accreditation, 10.3% hospitals applied for accreditation and were rejected and only 3.4% have never applied for the accreditation. Table 4.2.3 shows frequencies of accreditation status and reasons of non-accreditation.

Table 4.2.3: Accreditation Status in private Lebanese hospitals, data collected in 2011 (N=68)

	N	%
ACCREDITATION STATUS		
Accreditation status of the hospital		
Not Accredited	30	44.1
Accredited	38	55.9
Distribution of not accredited hospitals		
In the process of accreditation	25	86.2
Unsuccessful at accreditation	3	10.3
Never applied for accreditation	1	3.4

4.2.4. Injuries and accident/incident reporting

Table 4.2.4 indicates the number of injuries per hospitals, the injury rate as well as accident/incident reporting and complaints. The median number of injuries reported by participating hospitals was 14.5 injuries per hospital with the number of work-related injuries ranging between 0 and 313 injuries per hospital. Additionally, a median of 10 injuries per 100 employees with a range between 0 – 155 injuries per 100 employees, was reported within hospitals in the study sample. Eight hospitals reported having 0 injuries per 100 employees the year prior to the study. Out of these 75% are small hospitals, 87.5% are non-teaching hospitals, 87.5% are hospitals providing short-term care, 37.5% are located in the Mount Lebanon governorate and 62.5% located in the other governorates [north (1 hospital), Bekaa (2 hospitals) and South (2 hospitals)]. The hospital that reported the highest number of injuries per 100 employees (155 injuries) is a small non-teaching hospital from the Bekaa that provides short-term care.

Additionally, almost two third of the hospitals reported receiving at least one work-related complaint the year prior to the study. Half of the hospitals (53.7%) reported receiving fatigue complaints, 31.3% reported headache complaints, 22.4% reported sleep deprivation complaints, 20.9% reported dizziness and drowsiness complaints, 16.4% reported work-related sickness and absenteeism complaints, and 13.4% reported weakness complaints.

Almost all hospitals (97.1%) have written policies on how to report incidents and accidents, 98.5% have incident/accident reporting forms, and 95.6% train their staff to fill

in these incident/accident reports. Moreover, 91.2% produce an annual report on incident/accident occurrences and disseminate it among their staff.

Table 4.2.4: Number of injuries and status of incident/accident reporting in private Lebanese hospitals, Data collected in 2011 (N=68)

	n	%
NUMBER OF WORK-RELATED INJURIES		
Number of Injuries among Hospitals		
Median [IQR=Q1-Q3]	14.5	[7.5-39.5]
Number of Injuries per 100 employees		
Median [IQR=Q1-Q3]	10	[4-18]
WORK-RELATED COMPLAINTS		
Work related complaints during 2010-2011		
Zero complaints	25	36.8
At least one complaint	43	63.2
Types of work related complaints during 2010-2011*		
Fatigue (% yes)	36	53.7
Weakness (% yes)	9	13.4
Headache (% yes)	21	31.3
Drowsiness and Dizziness (% yes)	14	20.9
Sleep deprivation (% yes)	15	22.4
Sickness and wok-related absenteeism (% yes)	11	16.4
ACCIDENTS AND INCIDENTS REPORTING		
Availability of clearly written policies on how to report incidents and accidents		
No	2	2.9
Yes	66	97.1
Availability of a form for reporting incident/accident		
No	1	1.5
Yes	67	98.5
Staff are trained to fill the Incident/accident report		
No	3	4.4
Yes	65	95.6
Production of an annual report on incidents/accidents occurrences		
No	6	8.8
Yes	62	91.2

*Percent displayed is that of hospitals reporting the complaint

4.2.5. *Distribution of work related injuries*

Results showed that in the year preceding the study, the total number of injuries reported in participating hospitals was 1157 distributed into 354 (30.6%) injuries among registered nurses, 340 (29.3%) injuries among orderlies, 234 (20.2%) among physicians, 166 (14.3%) injuries among janitors, 27 (2.3%) injuries among medical technologists, 23 (2.0%) injuries among phlebotomists, and 15 (1.3%) injuries among radiologists (table 4.2.5).

Needle stick injuries were the most reported in all job classifications (n=603, 52.1%). Followed by struck against or by an object (n=110, 9.5%), falling accidents (n=90, 7.8%), slipping and tripping (n=90, 7.8%), injuries related to lifting (n=56, 4.8%), Injuries due to exposure to hazardous substances (n=52, 4.5%) and finally, job stress (n=27, 2.3%).

Table 4.2.5: Distribution of the total number of work-related injuries in Lebanese private hospitals, 2011 (N=1,157)

	Total Number of injuries	
	n	%
Job Classifications		
Registered Nurses	354	30.6
Orderlies	340	29.3
Physicians	234	20
Janitors	166	14.3
Medical Technologists	24	2.3
Phlebotomists	23	2
Radiologists	15	1.3
Types of Injuries		
Sharps Injuries		
Needle Stick Injuries	603	52.1
Others*	21	1.8
Falls Related-Injuries	90	7.8

Accidents Related-Injuries		
Burns	4	0.3
Bruises	1	0.1
Eye Injuries	2	0.2
Slip, trip and loss of balance without falls	90	7.8
Hit by vehicle	5	0.4
Collision between vehicles	6	0.5
Struck against or by an object	110	9.5
Hazardous Exposures		
Blood Borne Pathogens	8	0.7
Bodily Reactions [†]	18	1.5
Hazardous Substances ^{††}	52	4.5
Lifting Related-Injuries	56	4.8
Awkward Posture Related-Injuries^{**}	11	0.9
Electrical Shocks	5	0.4
Psychosocial Injuries		
Assaults and Violence Acts	23	2
Job Stress	27	2.3
Overexertion	7	0.6
Others	18	1.5

* Other sharp injuries include knife related-injuries and cuts

† Bodily reactions such as allergies

†† Substances that are caustic, noxious, and cause allergenic reactions

** Injuries related to bending, climbing, crawling, reaching, twisting, etc...

4.3. Bivariate Analysis

Unadjusted Relative Risk (RR) for the number of work-related injuries per 100 employees in private Lebanese hospitals is presented in Table 4.3.1.

The number of work-related injuries per 100 employees was significantly associated with availability of OHS department, percentage of staff trained on OHS matter, accreditation status, hospital location, and work related complaints.

Of the organizational factors that were studied, the number of beds, the type of care provided at the hospital, the availability of an OHS department and the number of

staff trained on OHS matter were significantly associated with the number of work-related injuries per 100 employees. Compared to small size hospitals, larger hospitals (hospitals with more than 100 beds) have a lower rate of injury (RR = 0.54, 95% CI = 0.48 – 0.63), and hospitals that provide long-term care were found to have a higher rate of injury per 100 employees (RR = 1.20; 95% CI = 1.04 – 1.38). Moreover, hospitals who had an OHS department had 42% less work-related injuries than those that did not (RR = 0.58; 95% CI = 0.51 – 0.65). In addition, hospitals that train more than 80% of their staff on OHS issues had 39% lower work-related injuries than those that train a lower number of staff (RR = 0.61; 95% CI = 0.54 – 0.69). Work organizational practices and safety measures as well as the availability of safety equipment were not significantly associated with the number of work-related injuries in hospitals.

The rate of injuries per 100 employees was 41% lower in accredited hospitals compared to those that are not accredited (RR = 0.59, 95% CI = 0.52 – 0.67).

Hospitals located in the Bekaa governorate showed a higher risk of reporting injuries compared to hospitals located in the city, Beirut (RR = 1.68, 95% CI = 1.35 – 2.11), while hospitals located in other locations (North and South) had a lower risk of work-related injuries per 100 employees compared to Beirut (RR = 0.69, 95% CI = 0.54 – 0.88; RR = 0.64, 95% CI = 0.49 – 0.83 respectively). The rate of injuries in hospitals located in Mount Lebanon was not significantly different from that reported in hospitals located in Beirut.

Work-related complaints were positively correlated to the number of injuries per 100 employees. Hospitals that have had at least one work-related complaint per year had twice the number of injuries per 100 employees (RR = 2.11, 95% CI = 1.81 – 2.45).

Table 4.3.2. shows the unadjusted Relative Risk (RR) for the number of work-related injuries per 100 employees using an index for organizational factors. As the index of organizational factors increases, the higher the rate of work-related injuries per 100 employees (RR = 1.28; 95% CI = 1.22 – 1.34)

Table 4.3.1: Bivariate Poisson Regression: Unadjusted association between hospital organizational factors and the accreditation status with the number of work-related injuries per 100 employees in private Lebanese hospitals (N=68). Data collected in 2011.

	Number of Work-related injuries per 100 employees	
	Unadjusted RR (95% CI)	P-value
ORGANIZATIONAL FACTORS		
Number of beds		
≤100 beds	1	
>100 beds	0.54 (0.48-0.63)	<0.001
Type of care provided		
Short-term care	1	
Long-term care	1.20 (1.04-1.38)	0.011
Availability of OHS department		
No	1	
Yes	0.58 (0.51-0.65)	<0.001
Work organization practices and safety measures		
No	1	
Yes	0.90 (0.79-1.03)	0.119
Availability of Safety equipment		
No	1	
Yes	0.94 (0.83-1.07)	0.370

Percent of staff trained on OHS matter		
≤ 80% trained	1	
> 80 % trained	0.61 (0.54-0.69)	<0.001
ACCREDITATION STATUS OF THE HOSPITAL		
Accreditation Status of the hospital*		
Not Accredited	1	
Accredited	0.59 (0.52-0.67)	<0.001
HOSPITAL LOCATION		
Governorate		
Beirut	1	
Mount Lebanon	0.99 (0.79-1.23)	0.917
North	0.69 (0.54-0.88)	0.003
Bekaa	1.68 (1.35-2.11)	<0.001
South	0.64 (0.49-0.83)	0.001
WORK-RELATED COMPLAINTS		
At least one work related complaint during 2010-2011		
No	1	
Yes	2.11 (1.81-2.45)	<0.001

*Categories of Not accredited include Hospitals that are in process of pursuing accreditation, applied for accreditation and was rejected, and never applied for accreditation

Table 4.3.2: Bivariate Poisson Regression: Unadjusted association between the index of organizational factors and the number of work-related injuries per 100 employees in private Lebanese hospitals (N=68). Data collected in 2011.

	Number of Work-related injuries per 100 employees	
	Unadjusted RR (95% CI)	P-value
HOSPITAL ORGANIZATIONAL FACTORS*	1.28 (1.22-1.34)	<0.001

* Variable 'Hospital Organizational Factors' includes the following variables: availability of work organization, availability of Safety equipment, Percent of staff trained, size of the hospital, and type of care provided by the hospital.

4.4. Multivariable Poisson Regression

Two multivariable Poisson Regression models were done to investigate which of the hospital parameters was significantly associated with the number of work-related injuries per 100 employees (Tables 4.3.3, 4.3.4). Although work organization and availability of safety equipment were not significant at the bivariate levels, they were included in the final models based on literature showing their association with the dependent variable. The first model includes five of the organizational factors, the geographical location of the hospital or governorates, work-related complaints, and the accreditation status of the hospital. The number of beds was dropped from the first model because it was strongly associated with another independent variable (accreditation status). In the second model the organizational factors were grouped in an index as previously explained in the Methods section; this model also includes governorates, work-related complaints, and accreditation status.

Model 1

Results in model 1 showed that organizational factors including the availability of OHS department, work organization, availability of safety equipment and the number of staff trained, the hospital accreditation status, the geographical location of the hospital, as well as the number of complaints were all significantly associated with the number of work-related injuries per 100 employees.

All organizational factors were shown to have a significant association with the number of work-related injuries per 100 employees in the regression model. Hospitals that

provided long-term care had 28% higher risk of injuries per 100 employees compared to hospitals with short-term care (RR = 1.28; 95% CI = 1.10 – 1.50). Furthermore, hospitals who had an OHS department have 32% lower risk of work-related injuries (RR = 0.68, 95% CI = 0.58 – 0.79), and those who provide OHS training to more than 80% of their staff have 26% lower risk of work-related injuries (RR = 0.74, 95% CI = 0.64 – 0.86). While the variables, work organization practices and safety measures and availability of safety equipment, were not significant at the bivariate level, they were shown to be significant in the final model (p-value<0.001 and p-value=0.017, respectively). Hospitals that introduced work organization practices and safety measures have 24% lower risk of work-related injuries (RR = 0.76, 95% CI = 0.66 – 0.89). Furthermore, hospitals with available safety equipment have a rate of 16% lower risk of work-related injuries (RR = 0.84, 95% CI = 0.74 – 0.97).

Accredited hospitals show a lower number of reported injuries (RR = 0.76, 95% CI = 0.66 – 0.88) than hospitals that have not been accredited.

Net of the effect of the other variables in the model, hospitals in the North and the South had a lower rate of work-related injuries per 100 employees (RR = 0.74, 95% CI = 0.56 – 0.97, RR = 0.70, 95% CI = 0.52 – 0.94 respectively), compared to hospitals in the governorate of Beirut (that includes the capital city Beirut). Whereas hospitals in the Bekaa were nearly twice as likely to report work-related injuries compared to hospitals in Beirut (RR = 1.94, 95% CI = 1.52 – 2.47). The number of injuries in hospitals located in Mount Lebanon was not significantly different from that reported in hospitals located in Beirut.

Moreover, hospitals that have had at least one work-related complaint per year had twice the number of injuries per 100 employees (RR = 2.25, 95% CI = 1.91 – 2.66).

Table 4.3.3: Poisson Regression Model 1: Adjusted association between hospital organizational factors and the number of work-related injuries per 100 employees in private Lebanese hospitals (N=68). Data collected in 2011.

	Number of Work-related injuries per 100 employees	
	Adjusted RR (95% CI)	P-value
ORGANIZATIONAL FACTORS		
Type of care provided		
Short-term care	1	
Long-term care	1.28 (1.10-1.50)	0.002
Availability of OHS department		
No	1	
Yes	0.68 (0.58-0.79)	<0.001
Work organization practices and safety measures		
No	1	
Yes	0.76 (0.66-0.89)	<0.001
Availability of Safety equipment		
No	1	
Yes	0.84 (0.74-0.97)	0.014
Percent of staff trained on OHS matter		
≤ 80% trained	1	
> 80 % trained	0.72 (0.62-0.84)	<0.001
ACCREDITATION STATUS OF THE HOSPITAL		
Accreditation Status of the hospital*		
Not Accredited	1	
Accredited	0.76 (0.66-0.88)	<0.001
HOSPITAL LOCATION		
Governorate		
Beirut	1	
Mount Lebanon	1.15 (0.89-1.47)	0.286
North	0.74 (0.56-0.97)	0.029
Bekaa	1.94 (1.52-2.47)	<0.001
South	0.70 (0.52-0.94)	0.016

WORK-RELATED COMPLAINTS

At least one work related complaint/yr

No	1	
Yes	2.25 (1.91-2.66)	<0.001

*Categories of not accredited include Hospitals that are in process of pursuing accreditation, applied for accreditation and was rejected, and never applied for accreditation

Model 2

Table 4.3.4. shows the findings of the second model that correlates organizational factors index and the number of work-related injuries per 100 employees. The index of hospital organizational factors was found to be significantly associated with the number of work-related injuries per 100 employees. With each one unit increase of organizational factors, the risk of work-related injuries per 100 employees increases by 32% (RR = 1.32, 95% CI = 1.25 – 1.39). Hospital location, accreditation status, and work-related complaints showed the same trends as in the first model shown in Table 4.3.1.

Table 4.3.4: Poisson Regression Model 2: Adjusted association between organizational factors index and the number of work-related injuries per 100 employees in private Lebanese hospitals (N=68). Data collected in 2011.

	Number of Work-related injuries per 100 employees	
	Adjusted RR (95% CI)	P-value
HOSPITAL ORGANIZATIONAL FACTORS INDEX*	1.32 (1.25-1.39)	<0.001
ACCREDITATION STATUS OF THE HOSPITAL		
Accreditation Status of the hospital**		
Not Accredited	1	
Accredited	0.81 (0.70-0.93)	0.003

HOSPITAL LOCATION		
Governorate		
Beirut	1	
Mount Lebanon	1.04 (0.83-1.30)	0.727
North	0.62 (0.48-0.80)	<0.001
Bekaa	1.72 (1.37-2.16)	<0.001
South	0.57 (0.43-0.75)	<0.001
WORK-RELATED COMPLAINTS		
At least one work related complaint/yr		
No	1	
Yes	2.17 (1.87-2.53)	<0.001

* Variable 'Hospital Organizational Factors' includes the following variables: availability of work organization, availability of Safety equipment, Percent of staff trained, size of the hospital, and type of care provided by the hospital

** Categories of not accredited include Hospitals that are in process of pursuing accreditation, applied for accreditation and was rejected, and never applied for accreditation

To compare Model 1 and Model 2, Information Criterion tests were carried out.

Table 4.3.5 shows the results of the Information Criterion: AIC, the Akaike Information Criterion, is a measure of the relative quality of a statistical model, for a given set of data; while BIC, the Bayesian Information Criterion, is a criterion for model selection among a finite set of models. When comparing fitted objects, the smaller the AIC or BIC, the better the fit (Sakamoto, Ishiguro, & Kitagawa, 1986).

Both models showed goodness of fit; however the model with the organizational factor index (model 2) has the lowest AIC and BIC, and therefore it presents a better fit for the data (Table 4.3.5).

Table 4.3.5: Information Criterion for Model 1 and Model 2.

	AIC	BIC
Model 1	1156.14	1182.775
Model 2	1135.47	1153.226

CHAPTER 5

DISCUSSION

5.1. Overview of the Chapter

The findings of the study conducted in private Lebanese hospitals in 2011 will be discussed in this chapter and will be compared to existing relevant literature. The chapter addresses the prevalence of work-related injuries and their association with existing organizational factors in private Lebanese hospitals. The association between hospital location, work-related complaints reported in the hospitals, as well as hospital accreditation status on one hand and the number of work-related injuries on the other hand is also discussed.

5.2. Effect of Organizational Factors on Number of Work-Related Injuries

Consistent with the literature, the findings also showed a significant association between organizational factors and the number of work-related injuries in Lebanese hospitals.

When organizational factors were grouped into an index, the analysis showed a significant positive association between the index of organizational factors and work related injuries: the higher the index for organizational factors was (indicating poor factors), the higher the work-related injuries were. The association between each of the

organizational factors and work-related injuries is discussed in the following sections based on the results of Model 1.

Type of care provided

The type of care provided in the hospital was significantly associated with the number of work-related injuries. The results showed that hospitals providing long-term care are at a higher risk of work-related injuries than hospitals providing short-term care. A possible explanation is that long-term care could be overwhelming to hospital employees resulting in repetitive work, longer working hours, long monotonous tasks (Lockley et al., 2007), and closer patient-staff relationship which may result in higher emotional stress if patients pass away.

However, this result contradicts finding of other studies showing that healthcare workers in short-term care have higher rates of injuries than those in long-term care (Alamgir et al., 2007; Alamgir & Yu, 2008). Shorter stays in hospitals providing short-term care result in greater workloads among nurses and higher job burnout with consequently higher rates of occupational injury (Rosa, 1995; Vahey et al., 2004).

Availability of OHS Department

Findings show that hospitals where an OHS department is available have lower risks of work-related injuries than those with no OHS department. Availability of an OHS department entails closer follow up on OHS issues due to the presence of dedicated personnel with an OHS background hence ensuring the implementation of safety policies and practices in the hospital. Additionally, resources will be allocated to OHS matters such as awareness sessions, dissemination of safety and health information, and training of

hospital staff on various OHS topics; all of which may decrease work-related injuries (Gimeno et al., 2005; Stone & Gershon, 2006).

Work Organization

Work organization was found significantly associated with the number of work related injuries. The availability of proper work organization in the hospital such as job rotation, job design and good interpersonal relationships decreases the risk of work-related injuries in the hospital. These results can be explained by the fact that a better and supportive work organization can simplify and improve the jobs of hospital staff through proper staffing, workload distribution, and lesser working hours. Hence, decreasing work pressure, stress and burnout among staff leads to lower number of work-related injuries. These results were concurrent with findings of other studies in the literature (Rogers et al., 2004; Stone & Gershon, 2006; Rosta & Aasland, 2011; D'Arcy, Sasai & Stearns, 2012). In Lebanon, a study by El-Jardali and colleagues (2011) stated that physical, emotional and professional well-being of nurses is influenced by their work-environment (work-organization); Lebanese nurses complain about their long-working hours, heavy workload, administrative overload, inflexibility of schedules and lack of breaks (El-Jardali et al., 2011), which eventually might lead to injuries.

Availability of Safety Equipment

The availability of safety equipment was found significantly associated with the number of work-related injuries which is consistent with literature findings that staff in hospitals with safety equipment installations such as electric beds, slide sheets, standup

lifts and safer chairs reported fewer back injuries and fewer injuries in any body part (Evanoff et al., 2003; Engkvist, 2006).

The results are also consistent with literature suggesting that the likelihood of having a work absence due to work-related injuries is significantly increased when employees are exposed to low levels of safety practices, as well as having job tasks that prohibit the compliance with the available safety practices in a hospital (Gimeno et al., 2007).

However, other studies have shown that the availability of safety equipment alone is not enough and sufficient to decrease the number of work-related injuries (Khatutsky et al., 2012; Stanev et al., 2012). Therefore, it should be accompanied with proper training on using these equipment and a management cooperation with a proper incentive system to ensure the usage of safety equipment (Evanoff et al., 2003).

Staff Training

The study results revealed that all participating hospitals provide OHS training to their staff with 55% providing the training to the majority of their staff (>80%). The number of staff trained was found significantly associated with the number of work-related injuries, with hospitals training more than 80% of their staff reporting lower risks of work related injury per 100 employees. This result was in-line with findings of previous studies where the availability of facility training was found to reduce workplace injuries (Garg et al., 2007; Vredenburgh et al., 2007; D'Arcy, Sasai & Stearns, 2012).

Hospital Size

Although hospital size was not included in Model 1, it was part of the organizational factors index. The bivariate analysis showed a significant inverse association between the number of beds and the number of work-related injuries; the higher the number of beds, the lower the number of work-related injuries per 100 employees in Lebanese private hospitals. This result is explained by the fact that large organizations are likely to have higher levels of planning and better organization, a more comprehensive safety program involving a greater in-house health and safety expertise, better employee training and more allocated resources for prevention of occupational injuries (McVittie et al., 1997; Vredenburg, 2002; Alamgir & Yu, 2008). These results which indicated the direct relationship between hospital size and work-related injuries were consistent with other studies comparing other occupational settings (for example construction firms) to number of occupational injuries (McVittie et al., 1997; Vredenburg, 2002; Kines & Mikkelsen, 2003; Stone & Gershon, 2006). Furthermore, in small-sized Lebanese hospitals, the person in charge of coordinating OHS issues is also tasked with other hospital roles. The study found that only 13% of the small sized hospitals hired an OHS officer specifically for the OHS position. This substantiates the fact that small-sized hospitals do not invest much in OHS which may result in increased risk of work-related injuries.

5.3. Accreditation Status and the Number of Work-Related Injuries

Findings show that hospitals' accreditation status is significantly associated with the number of work-related injuries; accredited hospitals have lower risk of reported work-related injuries. Although this specific association was not fully examined in previous literature, the importance of accreditation in increasing the level of safety in hospitals was discussed in the literature. Manzo et al. (2012) stated that healthcare professionals reported that the accreditation process promoted safety at the hospital in terms of available technical resources and support, standardizing routines, greater organization and being prepared to meet client needs. Accreditation stabilizes the organizational climate and promotes the implementation and enforcement of policies and practices in hospital settings, including safety policies and practices (Touati & Pomey, 2009; Manzo et al., 2012; Nicklin, 2012), and this in turn strengthen the safety culture in the hospital and disseminate the safety awareness among employees (Kaminski, 2012), thus decreasing the number of work-related injuries. Additionally, literature stated that accreditation can improve employee safety and security (Georges et al., 2005), as well as mitigate the risk of adverse events in hospitals (Kaminski, 2012). These statements support the study findings of the low number of work related injuries in accredited hospitals.

5.4. Effect of Hospital Location on Number of Work-Related Injuries

The results revealed that hospitals in the Bekaa region consisting predominantly of rural areas had significantly higher numbers of work related injuries compared to hospitals located in the governorate of Beirut, including the capital city and its surrounding

neighborhoods. Hospitals in the other governorates have significantly lower number of work-related injuries than hospitals in Beirut.

Studies looking at the geographic mal-distribution of the Lebanese healthcare workforce documented the lowest density of both physicians and nurses in the Bekaa governorate as compared to the others (El-Jardali et al., 2008a & 2008b; Mohammad-Ali et al. 2005). The Bekaa governorate has 8% of the total physicians' population in Lebanon, with a density of 2 physicians per 1000 population (Mohammad-Ali et al. 2005) and has only 6.1% of the total nursing population in Lebanon (El-Jardali et al., 2008a & 2008b). These findings suggest a low level of healthcare workers in Bekaa governorate that may increase the workload on the available staff leading to higher numbers of work-related injuries.

Results of the Bekaa area are consistent with the findings of Marc and colleagues (2012) who suggest that greater work complexity among staff in rural hospitals contributed to lower unit capacities in those geographical areas, hence higher job burnout and number of work-related injuries (Aiken et al., 2002; Marc et al., 2012).

Moreover, a study among 857 nurses in Lebanese underserved areas from the Bekaa, North and South governorates, reported that 64.9% of the nurses intend to leave their job within 3 years (El-Jardali et al., 2013), which indicate a possible high turnover rate. This will increase the workload and pressure on the staying nurses and might drive hospital administration to fill the vacancies by employing nurses that may be less experienced; this may lead to an in work-related injuries.

5.5. Work-Related Complaints and the Number of Work-Related Injuries

The analysis showed a significant positive association between the reporting of work-related complaints such as fatigue, weakness, headache, drowsiness and dizziness, sleep deprivation, work-related sickness and absenteeism, and the number of work-related injuries in Lebanese hospitals. Work-related complaints have been associated with emotional exhaustion, lack of motivation, poor psychological health and dissatisfaction with working conditions (Vahey et al., 2004; Aasa et al., 2005), consequently leading to health problems including sleeping disorders, headache and stomach symptoms (Aasa et al., 2005). As a result, distractions on the job may occur, increasing the number of work-related injuries among hospital staff. Similar findings were shown in a study conducted by Eriksen and his colleagues (2002) where health complaints were associated with higher risks of work-related sickness absence. While there are no studies in Lebanon that relate work-related complaints to work-related injuries, one study by Jardali and colleagues (2011) looked at nurse work environment and intent to leave their occupation in Lebanese hospitals. The study stated that nurses are concerned over their physical (including fatigue and exhaustion) and psychological well-being (including stress and burnout) aggravated by their working conditions (El-Jardali et al., 2011). These concerns can be translated into work-related complaints that eventually lead to high number of injuries.

5.6. Strengths of the Study

There is a dearth in the literature assessing the association between organizational factors and the number of work-related injuries in hospitals. This is the first study in

Lebanon to assess such association, and maybe the first worldwide to test the association between hospitals' accreditation status and the work-related injuries among healthcare workers. Available studies in the literature reported occupational injuries in hospitals in relation to specific organizational parameters such as working hours or safety equipment; this study attempted to group a number of organizational factors in an index and examine its association with work-related injuries in hospitals.

Findings of this study are valuable for leading intervention efforts to improve occupational health and safety conditions in all Lebanese hospitals, and not specific to private hospitals by developing national guidelines, standards and policies to be implemented within all hospitals, as well as providing hospitals with guides, manuals and training programs to increase awareness among healthcare workers.

This is a national study and its findings come at a critical time: it can influence the review of accreditation indicators by guiding policy makers to improve the OHS standards section of the program which in turn will have an impact on improving health and safety in hospitals. The existing OHS standards have not changed or been updated since the development of the accreditation program in 2000, hence results of this study could be used to expand the OHS standard section and include standards that improve occupational health and safety in the healthcare setting.

5.7. Limitations of the Study

This study has several limitations; first its cross sectional design limits the ability to determine causality since the relationship between the variables is not examined over time.

Another limitation is related to the small sample size; the response rate was 53.5% and only 68 private hospitals participated in the study. The small sample size may have decreased the detection of sensitive associations. Potential selection bias could have resulted from the high non-response rate among hospitals; for example, a high number of hospitals from Beirut and Mount Lebanon were not involved in this study (table 3.2).

Additionally, due to the small sample size, some organizational variables such as the availability of hazard identification audits and specific safety policies and practices had to be excluded from the multivariate Poisson regression due to their small numbers. For the purpose of having a good model and avoid problematic results, the assumption of at least 10 numbers of events per variable should be followed while constructing the model (Peduzzi, 1996). Furthermore, some organizational factors could not be used in the model due to the low variability among categories (for example 100% of hospitals have available written OHS policies and procedures – Table 4.2.2.).

Another limitation related to the study design was encountered in relation to the gap in information acquired from hospitals. The investigators had to restrict the number of questions and keep the questionnaire to a reasonable length. It would have been more appropriate to use the number of injuries per Full-Time Equivalent (FTEs) as an outcome in the analysis. Researches were not able to inquire about the number of hours worked at

the hospitals; hence FTEs could not be calculated. This has limited the ability to compare the results of this study with findings of international studies. It should be noted that there is a lack of national data regarding FTEs in Lebanon since there is a disagreement on how to calculate the FTE indicator.

Likewise, injury rates within each job classification could not be generated because the total number of staff in each job category was not reported by many participating hospitals; consequently, it was not possible to compare types and injury rates between the different job classifications.

Another important limitation is the exclusion of the 28 public hospitals in Lebanon; only private hospitals were included in the study. Hence, findings cannot be generalized to all hospitals in Lebanon.

Moreover, the study was conducted during the years 2010-2011 when hospitals were preparing for the upcoming accreditation cycle; therefore, some responses could have been socially desirable ones, specifically in reference to questions of work-related injuries, the availability of some safety policies and practices and safety training. This could also be one reason for the low response rate, as hospitals were in the process of getting accredited and refused to participate in a survey before getting accredited.

Additionally, the number of injuries reported by the OHS officer might be an underestimate, since underreporting of injuries may have occurred at the hospital due to lack of reporting of minor injuries by orderlies and janitors (Scherzer et al., 2005; CDC & NIOSH, 2009; Boden et al., 2012). Reasons for underreporting include fear of job loss,

peer pressure (Azaroff et al., 2002), as well as other socio-economic factors such as loosing work time or the belief that the injury/pain is age-related (Scherzer et al., 2005).

Finally, the data collected from the hospitals lack detailed questions regarding injured employees, details of their injuries, as well as some individual behavioral data such as smoking habits, physical activity or drinking habits that have been linked to health problems in the literature (Dragano et al., 2007; Chaix et al., 2008). In addition, there was lack of data related to the hospitals characteristic including teaching status of the hospital and the hospital's status regarding other accreditation programs such as the nursing 'Magnet recognition - the "gold standard" for nursing excellence' which have been strongly linked to work related injuries (Drenkard, 2010).

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

This thesis studied the association between specific organizational factors, including accreditation status, and the prevalence of work-related injuries in private Lebanese hospitals. Its findings serve to shed light on the occupational health and safety conditions in Lebanese private hospitals. Findings are important to health care providers and policy makers, especially the Lebanese government and the National Committee of Hospital Accreditation as they present evidence of the importance of safety practices and the implementation of strong organizational factors such as the availability of safety equipment and safer working conditions, as well as the accreditation program, in promoting health and safety among hospital employees.

Further research:

- An extension of the work done in this study is recommended, especially that this study is the first to link organizational factors and accreditation to the prevalence of work-related injuries in hospitals in Lebanon.
- An in-depth and qualitative study to assess the occupational health and safety in all types of Lebanese hospitals, private and public, with both hospital administration, as well as hospital employees and through asking specific

questions related to each organizational factor (types of safety equipment available, specific work organization aspects implemented such as staffing levels and working hours limits and others). In addition to questions related to structural factors implemented in the hospital including the engineering and administrative controls introduced, the allocation of sufficient resources for dealing with OHS issues as they arise.

Accreditation program

- This study can benefit the Lebanese accreditation program since there is a need for policy makers to improve the OHS standards section of the program which contains only 9 standards.
- The study's findings provide policy makers with the evidence for the need of more comprehensive, up-to-date and evidence-based OHS standards. This can be done through expanding the accreditation guidelines and adding new standards. Standards related to:
 - Reporting and documentation of work-related complaints and near-miss incidents
 - Availability of safety equipment in the hospitals
 - Implementation of good work organization factors including limited working hours and proper staffing level per unit for workload distribution need to be added to the Lebanese accreditation program;

Specifically since these factors were found to be associated with the decrease in the number of work related injuries in Lebanese private hospitals.

- An OHS department with a qualified and experienced OHS Officer should be enforced in all Lebanese hospitals. While the study indicated the importance of the availability of an OHS department in the hospital in decreasing work-related injuries, the MoPH Lebanese guidelines for hospital accreditation still do not enforce the establishment of an OHS department. They instead offer the choice whether to have a person or a department dedicated to handle these issues.
- Although accreditation details are shared with the hospital's administration for implementation of corrective measures, the Ministry of Public health does not share these details with the public. To understand and establish the effectiveness of accreditation at reducing work-related injury rates, these accreditation details must be shared with the scientific community to enable more evidence-based research and effective interventions towards a safer work environment.

National registry of work-related injuries

- There is a need for the Ministry of Public Health to develop a reliable and valid national registry of work-related injuries or illnesses that require medical treatment or result in lost time or restricted duty, and their causes, in Lebanese hospitals.

- This registry could provide a comprehensive record of injuries and could help policy makers to establish more country-specific OHS standards and regulations and enforce their implementation in Lebanese hospitals.

Improving organizational factors

- Lebanon has the 8th lowest nurse density in the Middle East and North Africa region with a density of 1.18 nurses per 1000 population, compared to a density of 4.94 nurses per 1000 in Qatar, 9.37 nurses per 1000 in the USA and 12.12 nurses per 1000 in the UK (WHO, 2006). Moreover, The ratio of nurses to hospital beds in Lebanon is 1 nurse per 4.5 beds which is much lower than the ratios in European countries of 1 nurse per 2.5 beds (El-Jardali et al., 2008c), implying improper staffing and high workload level among Lebanese nurses.
- Hospitals need to ameliorate the work environment of health-care staff through better policies limiting working hours, better shift scheduling, overtime compensation and through implementation of safety procedures in the hospitals.
- A strategy to re-distribute the healthcare workforce among all Lebanese governorates is needed; as studies have shown that having adequate staffing levels at a hospital can improve the work environment and consequently decrease work-related injuries (Stone & Gershon, 2006; D'Arcy, Sasai & Stearns, 2012).

Improving occupational health and Safety

- Occupational health and safety principles should be integrated in the academic curricula and educational programs of healthcare students (nursing and medicine students). This will guarantee the dissemination of these principles and raise awareness regarding job hazards and their prevention among the healthcare workforce.
- Finally, coordination between the Lebanese Ministry of Public Health and the Lebanese Ministry of Labor is needed to develop a national OHS policy and program that should be implemented in all types of Lebanese organizations, not just the ones related to healthcare. This national policy might ensure the health and safety of all the Lebanese working population by improving their working environment.

In Conclusion, employees in private Lebanese hospitals are exposed to chemical, biological, physical and ergonomic hazards. The control of these hazards is an organizational priority. The study investigated the association between organizational factors and the number of work-related injuries in private Lebanese hospitals. Findings indicated an association between the two variables.

Positive organizational factors and having accreditation are significantly associated with the reduction of the number of work-related injuries in private Lebanese hospitals. Hospitals that have available safety equipment, implement safety practices, train

their staff on occupational health issues and have an OHS department are less likely to have reported work-related injuries. Large hospitals providing short-term care with an available OHS department with a positive work environment, installed safety equipment and trained staff on OHS matter are expected to have the lowest number of work-related injuries.

This study has provided important insights into the role of organizational factors and accreditation programs on the prevalence of work-related injuries in Lebanese private hospitals. If properly used, this evidence can assist in planning effective interventions aiming to improve occupational health and safety conditions in all Lebanese hospitals. Policy makers may be lobbied to strengthen the Lebanese accreditation program through the addition of accreditation guidelines and standards.

Further research is needed to determine the association of other organizational factors with work-related injuries. Additionally, the importance of the presence of an OHS officer and an OHS committee in the hospital and their role in implementing a sound OHS program need to be studied.

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