

# **Health and Safety in Construction Industry of Lebanon**

**Abdul Rahman Obeid**

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---

Prof. Dr. Serhan Çiftçiođlu  
Acting Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Civil Engineering

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Prof. Dr. Özgür Eren  
Chair, Department of Civil Engineering

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Civil Engineering.

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Asst. Prof. Dr. Mürüde Çelikađ  
Supervisor

---

Examining Committee

1. Assoc. Prof. Dr. İbrahim Yitmen

2. Asst. Prof. Dr. Mürüde Çelikađ

3. Asst. Prof. Dr. Eriş Uygur

## ABSTRACT

A labourer at a construction site is bound to have certain rights, such as, right to return home safe and sound and to be taught how to maintain his and his colleague's safety against potential hazards and risks associated with his position. Thus, enforcement of Occupational Health and Safety (OHS) standards at workplace is essential to prevent the work accidents and harm to labourers. The essence of the requirements and principles of OHS generally involves showing gratitude and respect towards the employee as a human being since he plays a very important role in achieving economical and communal development. The objective of this study is to investigate the status of OHS and its standards in Lebanon. In order to achieve this objective, three different surveys are prepared with the aim of getting sufficient OHS related information from public, employers and labourers. Construction sites, International Labour Organization, engineering union and construction workers union are visited to investigate the matters relating to OHS through meetings with those in charge. In addition, the laws and by-laws related to the OHS are explored and listed. The gathered information is analyzed to interpret the status of OHS in Lebanon. Finally, recommendations towards establishing and enforcing relevant rules to reduce and/or prevent the number of fatalities and injuries among labourers at construction sites, are presented.

**Keyword:** Occupational health and safety in Lebanon, Lebanon Construction Industry, workers rights, standards, accident prevention.

## ÖZ

İnşaat şantiyesinde çalışan bir işçinin, güvenli bir şekilde eve dönme ve kendinin ve arkadaşlarının güvenliğini yaptığı iş ile ilgili potansiyel tehlike ve risklerden nasıl koruyacağını öğrenme hakkı vardır. İş Sağlığı ve Güvenliği (İSG) standartlarının işyerinde uygulanması iş kazalarını ve işçilere zararı önlemek için gereklidir. İSG esas gereksinimi ve prensipleri, ekonomik ve toplumsal gelişimin kazanılmasında önemli rol oynayan, çalışana karşı bir insan olarak saygı ve şükran göstermeyi içerir. Bu çalışmanın amacı Lübnan'da İSG ve standartlarının durumunu uygulamadain araştırmaktır. Bu hedefe ulaşabilmek ve İSG ile ilgili toplum, işveren ve işçilerden yeterli bilgi elde edebilmek için üç farklı anket hazırlanmıştır. İnşaat şantiyeleri, Uluslararası İşçi Örgütü, mühendislik sendikası ve inşaat işçileri sendikasına yapılan ziyaretlerde bu kurum yetkililerinden İSG ile ilgili bilgiler alınmıştır. İlaveten, İSG ile ilgili yasa ve yönetmelikler araştırıldı ve listelendi. Toparlanan bilgiler analiz edilip Lübnan'da İSG'nin uygulamadlali durum irdelendi. Son olarak, inşaat şantiyelerindeki işçi yaralanmaları ve ölümlü kazalarının sayısını azaltmak ve/veya önlemek için ilgili İSG kurallarının belirlenmesi ve uygulanması için öneriler verildi.

**Anahtar Kelime:** Lübnan'da iş sağlığı ve güvenliği, Lübnan inşaat sektörü, işçi hakları, yasa ve yönetmelikler, kaza önleme.

Dedicated to:

My Family

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## **LIST OF ABBREVIATIONS**

OHS	Occupational Health and Safety.
OSH	Occupational Safety and Health.
EASHW	European Agency for Safety and Health at Work.
OHSAS	Occupational Health and Safety Assessment Series.
PDCA	Plan, Do, Check and Act.
ILO	International Labour Organization.
OHSM	Occupational Health and Safety Management.
OSHA	Occupational Safety and Health Act.
OHSMS	Occupational Health and Safety Management System.
HSE	Health and Safety Executive.
EU	European Union.
SMEs	Small Medium Enterprises.
ESWC	European Survey of Working Conditions.
ISSA	International Social Security Association.
PPE	Personal Protective Equipment.

# Chapter 1

## INTRODUCTION

### 1.1 Occupational Health and Safety

Occupational Health and Safety (OHS) or Occupational Safety and Health (OSH) is the science concerned with the health and safety of people involved in any work by providing a safe working environment free of the causes of accidents, injuries or occupational diseases. This can be achieved by securing, protecting and preventing the labourers from being exposed to risks and hazards in any field through the control of the work environment. Thus, it intends to eliminate or reduce all kinds of hazards [1].

The idea of the OHS started when the number of work accidents increased to an alarming rate. In return the employers didn't want to have any responsibility at all for the accidents that occurred in their working area. From the study of these accidents, it emerged that the human is direct and indirect factor for the cause of these accidents. This led the labourers to claim for their right to return home safe. Since the dawn of industrial revolution, labour movements arose in the nineteenth century in Europe to claim their rights as labourers [2].

From that point, the enactment of laws and legislation was established. The owners and employers started to take actions, such as, improving working conditions. The Royal Commission that took place in 1840 in United Kingdom inspected the working

conditions and the environment of mining industry due to the high rate of accidents that occurred then. In 1883, the first social legislation was declared by Otto von Bismarck, as well as the first labourers compensation law that followed in 1884. It was the first in the western world and then other countries established similar acts. The actions taken resulted in the reduction of the number of injuries and fatalities among the labourers in all types of fields. Yet, the number of work accidents continued to increase until now [2].

At present time, the number of injuries and fatalities among field labourers in the world is still high, but the number of work place fatalities has been reduced and occupational injury and illness rates are declined. Considering the rates of injury and fatality the construction sector is in the second place after the industrial sector category. One of the main reasons for the work accidents being still high is the results of globalization. Globalization caused considerable changes in the movement of people among countries, particularly skilled labour. This is particularly true in construction industry. For example, Gulf countries have been through extensive development involving serious construction work. Therefore, these countries recruited many engineers and foreign labour to carry out the required work. Exchange of labour, where the demand is directed towards skilled labourers, became a regular practice in countries where mega projects are underway and they do not have enough work force to do the job [3,4].

Both developed and industrialized countries suffered from a decline of jobs that are secure with lasting contracts, and work related social benefits. In addition, there has been an increase in jobs that were unsecured and unprotected. This change in the work nature resulted in the deterioration of the possibility of achieving the health and



safety requirements. This means that the work services and employments weakened and the possibilities of finding profitable and productive pathways to reduce poverty lessened. For example, the negative impact of globalization on the economic growth and employment may lead to increase in child labour and unfavorable working conditions [5].

The main objective of OHS is to have a safer working environment for labourers and other people such as: family members, clients, employers and the pedestrians that might be affected by the workplace environment [6]. This will reduce the costs resulting from the losses and injuries and increase productivity by providing a safe working environment for employees.

OHS has other significant purposes [6]:

- It encourages awareness regarding the importance of OHS.
- It ensures that health and safety matters are fully implied to when establishing goals and objectives,
- It ensures that objectives are put in place thereby demonstrating commitment to the prevention of workplace accidents and fatalities.

Through the presence and adherence to OHS, a safe secure workplace environment, free from hazards is maintained, where labourers have peace of mind, knowing that they are safe and comfortable in their place of work, which is yet again a very important purpose of OHS [6].

OHS is supported by many key principles that are planned to achieve the main objective. Some of these basic principles can be summarized as follows:

All labourers have the OHS rights in all disciplines. OHS programs and policies that aim to prevent and protect labourers from hazards must be established and enforced. The development and implementation of effective programs and policies should be based on data and information collected from the past accidents and their discovered causes. On the other hand, regarding labourers, employers and OHS related authorities have certain responsibilities, duties and obligations, such as, education and training of labourers and establishing OHS management systems [7].

## **1.2 Aim of the study**

Construction is a high risk sector and is one of the most dangerous occupations in the world; it does not put risks on the physical safety of the labourers only, but also on their health. Every year many construction site labourers are killed or injured as a result of their work; others suffer ill health, such as musculoskeletal disorders, dermatitis or asbestosis. The hazards are not restricted to those working on sites. Children and other members of the public are also killed or injured because of construction activities which have not been adequately controlled.

In Lebanon, labourers are exposed to many health risks in the course of their duties in various sectors, especially in construction sites. The accidents that are common at construction site are: falling from height, struck by falling or moving objects, moving vehicles and being exposed to electrical shock. Furthermore, there is no OHS law to be enforced by the Ministry of Labour and therefore, there is no system and no inspectors to monitor risks at work and protect labourers from health hazards and accidents that may occur at the work place.

There are no OHS experts and no requirement for OHS certification. Engineers Union is the only entity that checks the technical aspects of design but there is no official establishment to observe the construction during execution. Companies operate by themselves, the way they believe it is right and suitable; the statistics on accidents are not accurate and there is a high demand for construction work and thus foreign labour, particularly from countries like Syria and Egypt.

This research is aimed at investigating the status of occupational health and safety at construction sites in Lebanon, level of knowledge and awareness of people through questionnaire and then to suggest possible approaches to guide the authorities to establish an OHS legislation and management system in Lebanon. It is envisaged that this study will immensely help in identifying the problems, providing methods to establish a system and hence contribute to the reduction of risks on construction sites and therefore minimizing the amount of accidents occurring each year.

### **1.3 Thesis Plan**

- In accordance with the stated objectives the first chapter of the thesis gives the general introduction to history of OHS, globalization and its effect on OHS, purpose and principles of OHS, aim of the study and thesis plan.
- In the second chapter literature review for OHS management and management systems are considered. Also, OHS in UK, Northern Cyprus and Europe and the OHS legislation are studied.
- In the third chapter methodology: it talks about different ways in collecting data.
- In the fourth chapter findings from authorities, construction sites and questionnaire are discussed.

- In the fifth and final chapter conclusion and recommendations are provided.

## **Chapter 2**

### **LITRETURE REVIEW**

#### **2.1 Introduction**

The studies carried out on measuring the degree of dangers exist on construction sites revealed that construction work is immensely dangerous and it is the most hazardous industry compared to other industries, especially in developed countries. For instance, a study done in the United States showed that the construction industry has the highest fatality rate among all the other industries; more than 8993 deaths were reported by the National Safety Council during the period 2003-2011 [8].

One of the main reasons for construction industry being on top of the list of fatality rates is the lack of attention given to OHS, which resulted in irreversible costs [8].

The occupational health and safety is a continual global problem since every day new occupational health and safety risks arise due to new production methods, machinery and construction technology. Therefore, there is continuous research and development in this field too whether it is for introducing the system newly in those countries where OHS do not exist or to advance the OHS management due to changes in work conditions. Since the publication and implementation of OHS 18001 and ILO-OHS 2001, there has been continuous development in OHS related issues in the construction industry [9].

Yet according to the European Agency for Safety and Health at Work (EASHW), construction is and continues to be one of the most dangerous jobs around the world as accidents are still occurring. The percentage of construction labourers getting harmed at work is twice the normal average of labourers injured in other occupations and activities, while the probability of getting a fatal injury is three times as high. This is due to construction labourers being subject to many work hazards, such as climate change, variation of temperature, noises, vibrations, chemical substances and the lack of knowledge in the correct use and control of construction machines [9].

There are two types of factors that lead to the increase in the occurrence of injuries and fatalities in the construction field. The first type is related to the temporal workplace and the dynamics of the work. Construction is always a temporal work that is done in a certain location. The change in location means moving to a different type of project and it may cause the increase in the probability of the labourers subjected to car accidents, brutal weather conditions and the change of soil types. Also, the change in the work place means that there is a change in the mechanism of the work and there may be a change in the members of the staff. While, the second type is correlated to the labourers themselves such as [9]:

- 1) Their attitude and behavior; the construction labourers have the tendency to use drugs and drink alcohol more than the labourers in other industries according to a study in U.S. [9].
- 2) Level of education; most of the labourers have poor education since most of the workers do not continue their studies and got engaged in the field work at a young age [9].
- 3) Language barrier; it is one of the most crucial problems that occur at a construction site with companies that employ many international labourers,

where language becomes a barrier in communication between the labourers on one hand and between the labourers and the management on the other hand [9].

In addition, isolation of the construction sites by using construction barriers, such as, fences, would help to prevent possible accidents involving pedestrian passing by or children playing nearby. This isolation is best to be done before the start of construction. The construction barriers are generally used to [10]:

- Limit the movement of personal vehicle and equipment to only specified areas.
- Reduces the potential for soil erosion and compacting, by minimizing the area of disturbance.
- Prevent unauthorized access especially for people, vehicles and equipments to the construction site area.

## **2.2 Occupational Health and Safety Management in the Construction Industry**

The study of management aims at generating a new and enhanced vision that will be used by professionals in the field of health and safety in the civil construction industry [11].

### **2.2.1 Introduction**

In the area of occupational safety and health management, construction companies faced obstacles while managing human resources. In regards to occupational health and safety, a new form of management is required based on the nature and fundamentality of the civil construction industry [11].

### **2.2.2 Civil Construction Elements for the Management of OSH**

Occupational safety and health management system should form the basis of any safety programs for specific projects in the construction industry. Continuous improvement is achieved through a well revised and improved phases [11].

Programs are created for the satisfaction of the legislation and are not naturally preventative. Therefore, it will result in additional cost [11].

### **2.2.3 Establishment of OSH Commitments and Principles**

The organization's commitments and principles must express a guarantee for employee's physical and mental health [11].

### **2.2.4 Critical Analysis of the Initial Situation**

It is a stage where a detailed study of organizations, its functioning manner, and its unique characteristics have to be taken under consideration. There is a high importance to economic analysis of the production system. Its efficiency is measured through the comparison of the before and after of financial date with the implementation of the safety policies [11].

### **2.2.5 OSH Policy**

The adopted policy should be well defined and published widely for all organization levels to receive benefit. It must state the paths to be taken so that all activities are executed safely [11].

The policy definition basis is the obligation towards OSH continuous improvement, in order to attain OSH at each level of the organization. Strategic safety, health and motivation goals, as well as the manner used to reach them must be included [11].



### **2.2.6 Planning**

The planning of the OSH management system needs an approach of a varied range, especially highlighting prevention. Hence, planning should be pro-active not reactive [11].

### **2.2.7 Implementation and Operation**

This is the stage where the strategic goals established are obtained through executing controlled actions by approved policies. The implemented system must be agreed upon with defined goals. For the success of the OSH management system and its implementation, it must be confirmed that people of all levels carry the responsibility and have the competence to perform their duties and responsibilities. For this to be done, qualification requirements must be identified clearly at all levels, as well as establishing the essential training. Since training is the core of all safety programs, it is important to define the method clearly and to whom training must be provided [11].

### **2.2.8 Verification and Corrective Action**

The system control has many definitions. The most important ones in the management system are records, monitoring and measuring and corrective actions. In management systems, there are mechanisms that evaluate performance over a specific parameter, like a certain period of time. The parts of management systems, such as, results of activities, records, procedures, resources and processes can be compared to pre-established patterns on which the evaluation is based. In order to evaluate the OHS management system's efficacy and efficiency, a managerial tool must be formed by the OHS management system by which evaluation is achieved [11].

### **2.2.9 High Level Management Critical Analysis**

The last step of the management improvement process is the critical analysis. The periodic critical analysis must be defined by the organization through its frequency and scope. The analysis must take into consideration the following: global system performance, individual elements system performance, observation through auditing internal and external factors like organizational structural changes, legal disputes, introduction of modern technology, new legislation and others [11].

This analysis must also state what actions are required to correct any deficiencies. It is formed to obtain effective results of a certain management system plan and improve the quality of the organization's decision. In order to guarantee better OHS results after the analysis, the high level management should define the modifications and the right adjustments that must be applied to the system [11].

### **2.3 Occupational Health and Safety Management Systems**

Occupational health and safety is a serious global issue due to its distinct nature. Some countries, such as, The United States and Australia, legislate safety regulations on construction sites in order to enhance it. However, the implementation of new worldwide standard on occupational health and safety assessment series (OHSAS) 18001, which is a part of OHSAS 18000, provided a good system for safety during the construction performance [12].

OHSAS 18000 is a global OHS management system specification. It consists of two parts OHSAS 18001 and OHSAS 18002. Also it adopts other reports and announcements [13].

### **2.3.1 OHSAS 18001:2007 Standard**

There are worldwide worries by all kinds of organizations to attain and show OHS performance by controlling their own OHS risks. Many of these organizations create their own OHS review and check systems to evaluate their OHS performance which is not sufficient enough. They need to be managed and controlled within a structured management system that is adjusted within the organization. The OHSAS standard provides the organization with an effective management system that can be mixed with other management requirements to help the organization attain its economical requirement. This OHSAS standard specifies the requirements to enable the organization to improve and apply a strategy and reach purposes that take into account legal requirements and information about OHS risks [14].

OHSAS 18001 uses Plan, Do, Check and Act (PDCA) methodology. It uses them to organize the standard [14].

- 1) Plan: by preparing objectives and process necessary to make better results in accordance with the organization's OHS policy [14].
- 2) Do: by applying the process [14].
- 3) Check: by noting and evaluating processes against OHS policy, objectives, legal and other requirements and report the results [14].
- 4) Act: by improving OHS performance in taking a continual action towards hazards [14].

OHSAS 18001:2007 is an Occupational Health and Safety Assessment Series for Health and safety management systems, which specifies a set of OHS requirements in order to allow an organization to govern its OHS risks and enhance its OHS performance. All of these requirements in the OHSAS 18001 standard are planned to

be included in any OHS management system, Also it is planned to address OHS in general and not the OHS areas, such as, employee or environmental impacts [14].

This OHSAS 18001:2007 standard is based on the similar ISO 14001:2004 and ISO 9001:2000 methodology known as Plan, Do, Check and Act (PDCA). Since the PDCA can be applied to all processes [14].

Certain structures find the OHSAS standard suitable due to their objectives. One of the objectives is to create an OHS management system. The purpose for this is to abolish or lessen the OHS risks that the employees and other parties may face when performing their duties. Other objectives are the continuous progress of the OHS management system through enforcing and up holding it and acknowledging the compliance of the OHSAS with the OHS policy. The final objective is to verify the compliance of the OHSAS standard through several methods. Creating a self-declaration, searching interested participants for their assertion on the compliance of the organization, searching an external group for confirmation of the organizations' self-declaration, or the search of an external organization for valid certification of the main organization's OHS management system are four simple methods that could be used alternatively to one other [14].

### **2.3.2 OHSAS 18002**

OHSAS 18002 helps the organization with the implementation of the OHSAS 18001:2007. Also, it is referred to the organizations that need more support on a wide range of OHS management system problems since it provides valuable informations and explanations [14].

## **2.4 International Labour Organization**

### **2.4.1 Background**

The International Labour Organization (ILO) is one of the oldest and most successful organizations. It was founded in 1919 after the World War 1 as a result of the industrial revolution, to protect labourers and others. It was based on the principle of fair treatment and equality for all. For example, the labourers should be treated and paid equally. Other principles were related to the law meaning that labourers should be above the legal age to eliminate child labour. It also stated that labourers are not a product to enforce them to work and they must have a certain number of work hours with a reasonable income and that inspection systems must be founded and to guarantee their right to join unions and create their own groups and organizations [15,16].

At the beginning of its foundation, ILO started with 42 members and became 175 members in 2001. It was the first organization that joined the UN when founded in 1946. After its formation the ILO was stated as part of the new world. The protection of labourers from the occupational hazards, the maintaining of their rights in a safe work and equality between both genders and preventing unemployment have always been the main concern of ILO. The ILO structure is characterized by its tripartite staff, which means that it works with three main teams which are the: employers, workers unions and the labour ministry which is a part of the governmental body [15,16].

In the year 2001, due to the non-existence of a national accepted official procedure regarding the management systems, the ILO authorized its guidelines related to the

health and safety management systems (ILO-OHS 2001), and announced that the translation of the guidelines into a national OHSMS can only be achieved by voluntary basis [17].

Since then the ILO-OHS 2001 guidelines have become the work plan to apply the Occupational Health and Safety Management System (OHSMS) on a national basis in many countries, such as, Germany [17].

The guidelines of the ILO-OHS 2001 are composed of three parts that are listed as follows [17]:

- 1) A brief part about the objectives of this standard.
- 2) A section on converting guidelines into national practices.
- 3) A part that contains 21 topic, including: employers, OHS policy, labourers participation, responsibilities and preventive actions and continual improvement.

Figure 1 represents the cycle of the audits to achieve the continual improvement. This process should contain the following key elements: the policy, organizing, planning and implementation, evaluation and action for improvement.



Figure 1. OHSMS referring to ILO-OHS 2001 [17].

#### **2.4.2 OHSAS 18001:2007, OHSAS 18002 and ILO-OHS 2001 Conformity Guidelines on OHS Management Systems**

There is a similarity and a key difference between ILO-OHS and OHSAS details. The organizations that are implementing the OHS management system, which is compatible with OHSAS 18001, should make sure that it is also compatible with ILO-OHS guideline [14].

The main objectives of the three standards are as following [14]:

- 1) ILO-OHS guidelines have two main objectives; to help the countries in implementing an OHS structure for the management system and to advice and lead the organizations to impact their policies and arrangements with the OHS basics.
- 2) OHSAS 18001:2007 helps the organizations in planning for hazard identification, risk assessment and risk control.

- 3) OHSAS 18002 help the organizations with the implementation of OHSAS 1800:2007 by providing more information and explanation.

ILO-OHS: 2001, OHSAS 18001:2007 and OHSAS 18002 standards have common points; such as, management commitment, setting OHS objectives, division of responsibility and authority, assessment and monitoring of performance, accountability and management review. These elements are basic to the Plan, Do, Check and Act (PDCA) of continual improvement [14].

OHSAS 18001:2007, OHSAS 18002 and ILO-OHS 2001 have no fundamental differences in their management systems, but there is a large degree of overlap in system elements and most are common requirements. Both the ILO guidelines and OHSAS standards have requirements for the occupational health and safety management system, in order to enable the organizations to control its OHS risks and improve its performance. The combination between the three standards OHSAS 18001:2007, OHSAS 18002 and ILO-OHS 2001 will lead to more effective management of OHS [14].

Both ILO-OHS and OHSAS 18001:2007 neither of them state specific OHS performance criteria, nor does it give detailed specifications for the design of a management system [14].

## **2.5 Occupational Health and Safety in UK**

Health and Safety Executive (HSE) updated the report that reviews the Health and Safety in the construction field in Great Britain until the year 2014. The report highlights that in the last four decades, there was a gradual decrease in the number of injuries. Yet construction remains a grave concern due to its unique nature. In 2014,



there was a decrease in fatal injuries to construction labourers with respect to the average of the previous five years. The number of fatal injuries for the employed labourers were 42 and for the self-employed labourers were 14, while the average of the previous five years was 46 and 17, respectively. In the year 2013/2014 there was a total of 76,000 work related ill health among which 31,000 were new cases [18].

When the causes of the fatal injuries in the construction field in UK is analyzed for the year 2014 [17] it can be seen that falling from height is the highest percentage, 45%, while the second highest percentage belongs to contact with machinery, struck by object, struck by moving vehicle and contact with electricity with 7% each. On the other hand being struck against, slip, trip, fall at the same level and trapped by a collapsing object are the lowest percentages, 2% each [18].

For the major/specified injuries a total of 1900 cases were reported in year 2013/14 which is less than the cases reported in the last five years with an average of 2457 cases.

When analyzing the major/specified injuries in the construction field based on the data given in 2013/14 by HSE, it was shown that the highest percent 31% belongs to falling from height. While slipping, tripping, and falling same level, had the second highest percent with 27%, on the other hand struck by object had the third highest percent of 13% and finally lifting and handling injuries had the lowest percent of 9% [17]. This study also highlights the fact that 46 fatalities reported during the last decade were just member of public. [18]

Figure 2 represent the UK number and rate of fatal injuries of labourers in construction from 2004/05 to 2013/14 period. Where falls from height category accounts approximately half of all the other fatality categories as shown in Table 1.

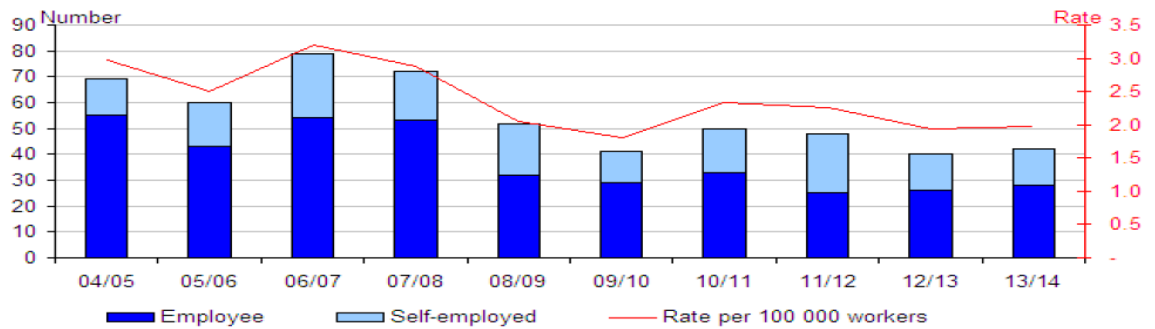


Figure 2. UK number and rate of fatal injuries to workers in construction 2013/14

[18]

Table 1. Category of fatal injuries in construction in UK 2013/14 [18]

Kind of injury	Fatal injuries 2013/14p	% of total fatal injuries to workers in construction
Fall from height	19	45%
Contact with machinery	3	7%
Struck by object	3	7%
Struck by moving vehicle	3	7%
Contact with electricity	3	7%
Struck against	1	2%
Slip, trip, fall same level	1	2%
Trapped by something collapsing	1	2%

Figure 3 represent the UK number and rate of major/specified injuries that happened to workers in construction from 2004/05 to 2013/14 period. Where fall from height was 31% of all the fatal injuries which is the highest percentage among major/specified injuries in construction, as shown in Table 2.

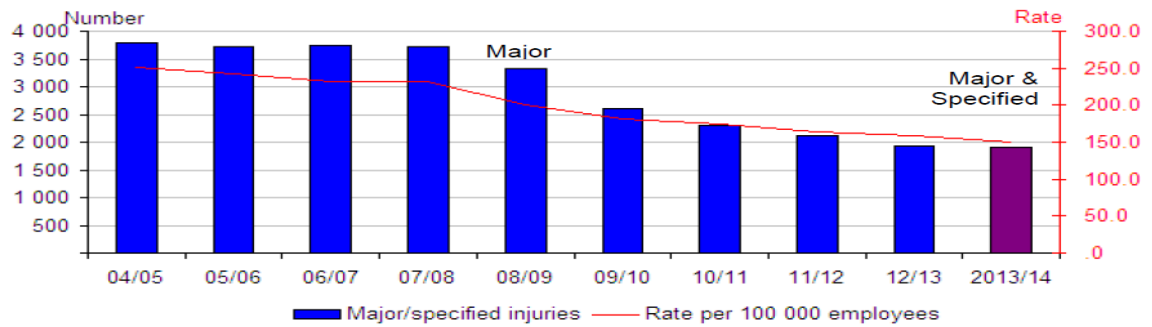


Figure 3. UK number and rate of major/specified injuries to workers in construction 2013/14 [18]

Table 2. Category of major/specified injury in construction UK 2013/14 [18].

Kind of injury to employees	Major/specified injuries in construction 2013/14p	Percentage of total of major/specified injuries in construction
Fall from height	581	31%
Slip, trip, fall same level	520	27%
Struck by object	250	13%
Lifting and handling injuries	170	9%

Figure 4 represents UK number and rate of fatal injuries to members of the public in construction 2001/02 to 2013/14 with a total of 46 cases.

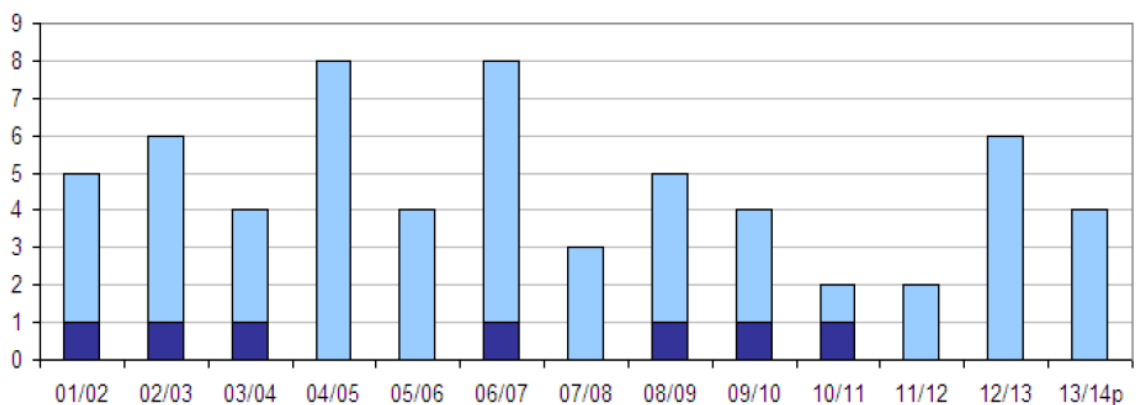


Figure 4. UK number and rate of fatal injuries to members of the public in construction 2001/02 to 2013/14 period [18]

## **2.6 Occupational Health and Safety in North Cyprus**

In Northern Cyprus construction industry also has the highest injury and fatality rates among all the other industries. There are regulations and legislations but there is inadequate enforcement of the safety and health law and both the employers and labourers do not have enough awareness about OHS [19].

The number of the construction labourers increased rapidly from approximately 4,200 in 1985 to 21,500 in 2005 due to increase in the number of buildings constructed during this period [20].

There is significant change in the number of construction injuries and fatalities between the years 2000 and 2008. In 2000 the number of injuries and fatalities were 8 and 1 respectively, where falling from height was the cause of 5 injuries and the fatality was due to being squeezed by electrical rail way car (Table 3). During 2001 the number of injuries and fatalities increased to 9 and 6, respectively, where hit by a falling object has the highest number of injuries and falling from height has the highest number of fatalities. Throughout the year of 2002 exposure to high level of heat has the highest number of injuries 4 out of 11 and hit by a falling object was the cause of one fatality. This trend was approximately the same for the years 2003 to 2005. In 2006, 2007 and the first two months in 2008, falling down from high place is the dominant category that caused the highest number of injuries among construction labourers; 32 out of 85, 38 out of 104 and 9 out of 16 cases, respectively. For the same period 3 fatalities out of 5 caused by falling from height, 4 out of 8 caused by electric current[20].

Falling from high places, such as scaffold, walls, lorry, ladder and water tank are the main reasons for the high number of injuries and fatalities in North Cyprus. It should be highlighted that falling from scaffold is mainly due to the unsafe scaffold systems [20].

The increase in the number of the injuries and fatalities between the years 2000 and 2008 is related to the increase in the number of unqualified and cheap foreign labourer who were not even being insured by the employer [20].

Since 2009 the OHS law is in force and since 2011 the first batch of Health and Safety Experts got their certificates to officially carry out risk analysis and follow the OHS related matters in the work places. However, still the Ministry of Social Security, Work Department do not have the right capacity to do regular visits to work places and enforce the law. Until now the enforcement is contained to cases where there is a serious injury or fatality due to work accidents [19]. Furthermore, there is a movement lead by Cyprus Turkish Chamber of Civil Engineers and local Health and Safety Experts to make sure that the risk analysis and monitoring of construction sites will be carried out by civil engineers.

Table 3. Construction industry annual injuries and fatalities between the years 2000 and 2008.

Year	Injuries	Fatalities
2000	8	1
2001	9	6
2002 to 2005	11	1
2006	85	5
2007	104	8
2008 (Jan-Feb)	16	0

## **2.7 Occupational Health and Safety in Europe**

In Europe Union (EU) construction is a very large industry and construction sites are one of the most dangerous places where labourers have high probabilities of getting injured or killed. More than thirteen million labourers exist in the EU-15 member states and 99% of the companies are small and medium sized enterprises (SMEs). SMEs include small construction companies and self-employed labourers who usually work as a subcontractor on a small part of a project for other construction companies. Therefore, SMEs dominate the European construction industry regarding the number of construction companies, the number of construction accidents and the number of self-employed labourers [21].

In Europe construction labourers are exposed to different kinds of hazards, such as: chemicals, biological, physical and psychosocial hazards. According to the European Agency for Safety and Health at Work, the annual construction fatalities exceeds 1000, serious injuries exceed 800,000 and approximately half of the labourers reported to have muscular problems, such as: back, neck and shoulders and hearing difficulties for those that are subjected to noise and finally 600,000 work in fields where asbestos fibers exists [22].

The European Survey of Working Conditions (ESWC) reported in 2000 that the annual average of absence for construction labourers due to illness is 7.3 days in EU-15 member states [22]. Where:

- 32% of the total average absence was reported for labourers that are exposed to work accident. This resulted in 30 million lost work days.

[22]

- 28% of the total average absence was reported for non-accidental work related problem and 40% of the total average absence was reported for non-work related health problems. Both work related health problems result in 26 million lost work days [22].

In year 2001, ESWC indicated that the number of accidents that led to more than 3 days loss was reached to more than 822,000 cases; 7,200 non-fatal accidents per 100,000 construction labourers and the number of fatal accidents were 1,200 with 10.4 fatalities per 100,000 construction labourers in EU-15 member states [22].

The main cause for construction fatalities and injuries results from fall from heights and struck by moving or falling objects. According to EU member states, falls, slips and trips were the major causes of accidents [22]. These are in line with what reported for North Cyprus in the earlier section.

Since 1994 there was a steady decline in the number of injuries and fatalities in the EU but this decline differs between its member states [22].

The EU is one of the leaders in the establishment of OHS regulations and enforcing it for the sake of protecting labourers from injuries and to avoid fatalities. In addition, it was one of the first to organize special programs drawn over a certain period of time to make continuous improvement regarding the health and safety issues. The main programs are [23,24]:

1. First action programme (1978 - 1983): focused on specific issues related to health and safety.

2. Second action programme (1984-1988): concentrated on safety, ergonomics, health, hygiene, information, training, and initiatives of SMEs.
3. 2002-2006 programme: focused on the process of community strategy on safety and health at work.
4. 2007-2012 programme: focused on improving quality and productivity at work and growth.
5. 2013-2020 programme: a change of strategy took place during this period including major changes, such as, acknowledge research of intervention, strength the economic research of OSH, and the importance of providing support for SMEs due to globalization and economic crisis.

According to HSE-UK the European Union showed a gradual decrease in the incidence rate of fatalities over the period of 1985-2011(Figure 5) [25].

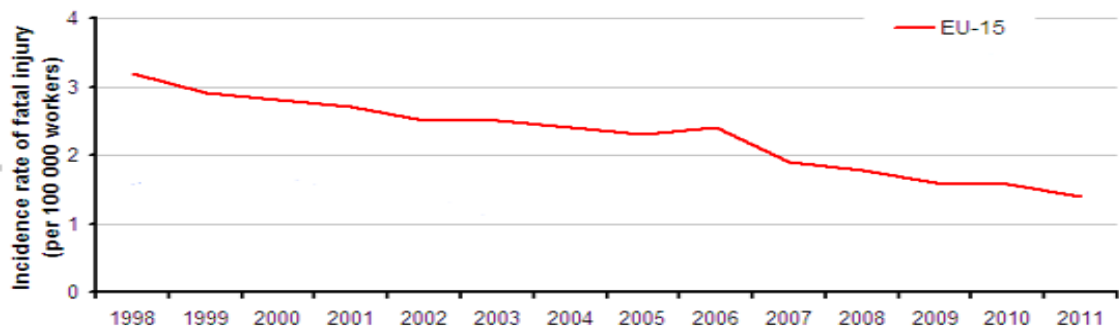


Figure 5. Incident rate of fatal injury in EU-15 [25]



## **2.8 Occupational Health and Safety Case Study for Countries in the Arab Region**

### **2.8.1 Bahrain Case Study**

In 2004, there were 17 fatalities at different construction sites and factories. According to directorate of vocational safety Nidal Al Bana, high accident rates were observed at workplaces as well as harsh working conditions for labourers. This was caused by lack of safety awareness, the reason why the Ministry of Labour in Bahrain took action [26].

The ministry of Labour launched a campaign that concentrated on safety awareness in work places. Its purpose was to find solutions for decreasing the high rate of construction site accidents. It was put under the supervision of the Directorate of vocational Safety [26].

The campaign was handled by directorate's employees that provided help and guidance for the safety supervisors. The general task of the campaign was to monitor the working conditions and safety measures of factories and industrial companies that were visited on daily basis. Its main objective was to help the employees improve their safety maintenance skills, decrease the amount of accidents taking place at worksites and encourage a safer environment for labourers [26].

Al Bana mentioned that the campaign focused on training programs and more awareness campaigns such that the employs were informed about the best measure to be taken in case of accident control. He said that to prevent workplace accidents, well organized safety measures should be followed by occupational safety managers and building owners in order to protect the labourers life [26].

He also explained that Bahrain labour's laws stressed on safety at workplace concepts and provided employees with the safety equipment required and services that will help them become more productive [26].

In 2008, 2 Indians and 1 Bangladesh labourers died on construction sites in Bahrain after the collapse of a scaffold. A special committee of health inspectors was formed by Bahrain's ministry of Labour as well as vocational safety officers that were used to monitor construction sites. The committee inspected all worksites including the one where the death of the 3 labourers took place in 2008 and report the violations of safety regulations regarding safety of labourers, said the secretary of the ministry of labour sheikh Abdulrahman bin Abdullah Al-Khalifa. That year, Bahrain set occupational health and safety at a top priority, according to Ahmed Al-Haiki director of inspections employers were inspected and warned about any worker safety violations and were given a week to correct the situation they were in. He also mentioned that government institutions, civil society organizations and the media are collaborating to deliver awareness of safety on construction sites and safety to protect workers since the awareness was missing in many construction sectors at the beginning [27].

In 2009, 35 workers died as a result of workplace accidents, while 36, 29, and 21 died in the years 2008, 2007, and 2006 respectively, as reported by Gulf Daily news in Bahrain. Most of the workers that were killed were from India, Bangladesh, Pakistan and Nepal. Most of the deaths were caused by companies breaking worker protection regulations. According to the head of occupational health and safety head Abbas Salman Matooq, this led to many accidents on workplaces such as workers falling from buildings, hit by falling debris or trapped in machines. He also

mentioned that as long as the companies continued to ignore these safety rules and regulations, the number of construction related accidents and deaths will continue to rise. The main reason behind the construction accidents is not following the safety rules despite having inspectors who printed and distributed safety brochures. Another reason of construction accidents was due to companies not hiring safety officers or supervisors at more than 1000 construction sites and labour camps that were inspected in 2009 [28].

In July 2011, 8 and in 2010 13 construction workers lost their lives on worksites. Many other workers were injured severely. Safety laws were ignored by some companies. This put the workers' lives at constant risk. Most of the construction site accidents were caused due to the absence of safety rules and regulations [29].

The following is an example of workplace accidents that happened as a result of neglecting safety rules. Where, sand collapsed on a 33 year old Bangladeshi worker 3 meters below ground and a Nepali mechanic got killed after getting trapped inside a loading machine that collected sand and rubbish [29].

Many deaths could have been avoided if only the companies followed the assigned rules and regulations of Bahrain regarding construction safety, as stated by Mr Al Sahmi, occupational health and safety acting head of Ministry of Labour. Ignoring the safety measures led to several worksite accidents. Most of the companies in Bahrain did not abide to enforce the safety rules and take it seriously. The lack of worker training and supervision was also a part of workplace accidents [29].

As soon as the Bahrain ministry of labour received knowledge of this, they tried to protect their workers through improving safety measures by enforcing the OHS law which was not enforced before. The ministry participated by spending 30,000 BD in printing many safety leaflets, posters and DVDs that were available in six languages including English, Arabic, Urdu, Hindi, Malayalam and Tamil for the foreign workers to understand the safety measures. So the only remaining problem was the hiring of illiterate workers by some companies [29].

Compared to the past years, only 8 workers lost their lives in the year of 2011, which is a noticeable fall in worksite deaths. Hence, a progress was established. According to Al Shami, the key factors to this improvement go back to the safety campaigns and improved awareness [29].

25 work related fatalities were documented in 2011. A total of 142 workers were injured in workplace accidents and 63 of them were serious cases. The major factor causing accidents was the lack of awareness from the side of the employers and the employees, as Ahmed Al Haiki, labour inspection directorate manager and trade union director stated. He also mentioned that companies equip the labourers with cheap equipment which increase the chance for accidents to take place [30].

The Ministry of Labour started doubling the number of inspectors that monitored worksites in Bahrain and also organized a new chart in order to hire more inspectors when needed to inspect health and safety measures. This increase in inspectors will help them reduce the amount of serious accidents that take place. They would check that the companies and its workers are abiding by labour laws and wearing safety uniforms, if the Companies disregard any law related to safety will face penalties. By

following rules and regulations, accidents on work places can be prevented. Al Haiki also mentioned that meetings for supervisors, managers, and owners will be held to ensure worker safety as well as handing out safety brochures in different languages and aid the foreign workers in understanding them clearly [30].

### **2.8.2 Qatar Case Study**

In Qatar, Occupational Health and Safety procedures were imposed on construction sites across the country. The reason as to why this procedure was practiced goes back to multiple reasons, such as construction injuries as a result of accidents, increase in the rate of fatality of construction workers and issues subsequent from death of migrant workers. This caused the Qatar authorities to perform the necessary occupational health and safety procedures to resolve the complications that arise from its deficiency [31].

Many accidents that were observed on construction sites were due to the fall of objects from height on the workers. These accidents were on constant rise by the year 2013. According to an expert in Hamad Medical Corporation (HMC) in Qatar, injuries that resulted from objects falling from heights continue to increase and the reason behind that was the lack of precaution from the employers to constitute safety measures with which the workers would have to abide by to be able to ensure their safety. Dr. Ahmed Zarour, a director of the Trauma Intensive Care Unit in HMC, stated that the center observed an increase in patients that suffered from falling object injuries at work sites, reaching more than 1000 patients per year. He also mentioned that all this could have been prevented if the Qatar authorities would take construction safety seriously by obligating the construction companies to execute safety measures on construction sites. As a result, the resolution came to this:

adequate safety precautions must be practiced by workers on the Qatari construction sites to decrease the probability of accidents taking place [31].

The ministry of labour in Qatar participated in drafting a new law for occupational health and safety, as stated by a senior official, and placing it in the workplace to be applied by all the workers. The committee has begun to work on proposing the law and the executive regulations that were based on a Cabinet decision, said Hussain Al Mulla, the undersecretary at the ministry of Labour and head of the Health and Occupational Safety Committee. After the law has been established, the draft will be passed to the Cabinet for approval and will be examined by the ministry of labour, following the normal procedures. The Cabinet decisions set up the basis of the Occupational Safety Committee that includes representatives from diverse ministries. The new law will be inclusive and it has distinct aspects of the occupational health and safety such as health, security, and safety of many divisions [32].

The Qatar railways company, a company that is responsible for building the new railways in Qatar is given a major priority to health and safety of construction workers and their wellbeing in their various projects [33].

The board member and chairman of executive committee of Qatar railways, Abdulla Abdulaziz al Subaie said that all the companies related to the Qatar railway project are forced to practice safety of high standards and protect the workers [33].

Al Bishri, The deputy head CEO and acting chief program officer of the project stated that every single worker has to go through efficient training on simulators previous to starting their tasks on the jobsite. All possible safety measures are taken

in to consideration to ensure the safety of the workers. An example is the use of colored helmets that represent a certain message such as the blue that represents extra care for a worker [33].

An analysis was done in Qatar, known as the work-place related injuries (WRI) and it is an analysis that describes the trauma registry of the Trauma center in Qatar and represents all WRI's that occur in the country. The Qatar trauma registry of 2010-2012 includes 1496 WRI patients that entered HMC. Out of all the patients that were admitted to HMC, the highest number was among construction laborers, totaling 42.4 percent of all the WRI patients. The mechanism of the injuries that the construction laborers suffered from consisted of falling from height (FFH) (49.7%), motor vehicle crash (MVC) (4.8%), struck by a heavy object (FHO) (58.6%), machinery (65.6%), burns(6.9%),and pedestrians during work (52.9%). The percent distribution for the labour patients not using personal protective equipment after the injury are respectively 73.9% FFH, 41.1% MVC, 67.9% FHO, 63.5% machinery, 53.3% burns, and 32.4% pedestrians. Their respective brought in dead rates are 1.2%, 2%, 0.7%, 3.2%, 6.7%, and 5.9%. And the respective mortality rates are 2.8%, 6%, 3%, 3.2%, 16.7%, and 11.8%. Various foreign nationalities suffered from WRI and were patients at the HMC, many of which were Nepalese, Indian, Bangladeshi, Sri Lankan, Pakistani, Philippine, and Egyptian. The foreign workers were victims of accidental injuries which could have been prevented if there were safety regulations to protect their health and safety [32].

Many of the mortalities were due to contact with equipment, fatal falls, slips, and trips, and others like fire and explosions that happened at the work site. Most were not compiled with safety regulations that must be followed at the work place. The

utmost common injury mechanism and fatality was caused by falling from heights. The cause for all the recognized injuries and deaths was ascribed to the absence of stern regulations related to safety of workers, constant implementation to these regulations, and an appropriate orientation for emigrant workers and their training [34].

The statistic arrived to one conclusion: strict safety regulations and the use of personal protective equipment must be mandatory at all work places, including construction sites, and should be implemented on all laborers, construction laborers being a crucial part of it [34].

In addition to that, the sponsorship system of the world cup 2022 in Qatar was criticized to be irresponsible and indifferent towards its treatment with foreign workers, and is in need of immediate reform after the death of 964 workers at its construction sites in the year 2012 and 2013, consisting of foreign workers from Nepal, India, and Bangladesh. The reasons of their deaths varied, death from falls being a share of it [35].

The verdict from the DLA Piper commissioned the sponsorship system, or as it is known in Qatar, the kafala system, to go through a reform of its system and commit to developing a program that tackles the migrant worker issues, such as their health and protect them from abuse after it has been measured that the rate of death of the workers goes beyond 1 per day [35].



After studying the appalling working conditions under which the foreign workers are subjected to, DLA piper verdict came across several recommendations to improving the work sites and worker conditions, a couple include [33, 35]:

1. Health and safety of the workers: This dictates that the migrant workers must be educated about their health and safety rights on foreign soil, as well as regularly collecting and submitting reports regarding all the injuries and deaths that occur at working sites [33].
2. Inspections: More inspections must be done by the labour inspection department in order to complete their task sufficiently and with essential thoroughness. It asserts that inspectors must also go through better training and a better transparency from them even after Qatar has claimed that the number of their inspections has already increased [35].

Qatar is also taking serious measures in the protection of foreign construction workers. According to the minister of labour and social affairs HE Dr Abdullah bin Saleh al khulaifi, the ministry to on its way to protecting the rights of the foreign workers and forming legislations and policies that are suitable for the import of these workers, safety, health, and other segments. He stated as well that labour law was to be amended which will result in power given to the inspectors whose number has been increased to 200 instead of 150. They were also discussing a cooperation program with the international labour organization (ILO). The organization will provide assistance through supervision of the working conditions and enhance the capabilities of their supervisors [36].

By adopting new laws for safety and health regulations on worksites, and founding and fixing systems to find resolutions for the issues related to construction, the country was able to decrease the number of deaths resulted from accidents on construction sites and protect their workers by configuring protective outfits and equipment for workers and enforce them to follow the regulations that were developed for their safety.

### **2.8.3 Comparison Among Bahrain, Qatar and Lebanon**

Bahrain and Qatar are selected as case studies since each of them has recently improved their health and safety at the work fields. Their successful commitment to OHS system resulted in positive outcomes in their construction sector.

In Bahrain, where the OHS law already existed it witnessed a decrease in the number of injuries and fatalities of workers at work place since the enforcement of OHS laws and regulations in the year 2011. The improvement was involved doubling the number of inspectors, organizing a chart to hire more inspectors when needed to cover all work places and handing out OHS related brochures in different languages for the international workers to remove the communication barrier.

While in Qatar, there is no OHS laws and regulation until the year 2013. In 2013 new OHS laws and regulation was adopted and enforced after being examined by the ministry of labour in Qatar. Since the enforcement of the new OHS law and increase in the number of inspectors who are better trained to handle OHS related matters, Qatar has seen decrease in the number of accidents.

Lebanon's current situation regarding OHS relates best to Qatar's. Lebanon has no OHS system to monitor construction related accidents and hence no statistical

information is available. Therefore, considering the accidents reported in the media the work related injuries and fatalities are assumed to be constantly rising. Thus Lebanon must learn from its geographical neighbors to adopt a modernized OHS law and enforce its system at all Lebanese worksites.

Table 4. Comparative summary among Bahrain, Qatar and Lebanon.

Bahrain	Qatar	Lebanon
OHS laws and regulation exist.	No OHS laws and regulations before 2013	No OHS laws and regulations till our modern time ( February 2015)
Inspector number doubled and a chart was organized to hire more inspectors when needed.	New OHS laws and regulations are adopted in 2013 after it was examined by the ministry of labour.	
Handing out safety brochures in different languages	<ul style="list-style-type: none"> <li>• Efficient training for the workers.</li> <li>• PPE are mandatory at all work places.</li> <li>• Inspectors number increased and they are better trained.</li> <li>• Educating migrant workers.</li> <li>• Injuries and fatalities reporting is obligatory especially that occur at worksites.</li> <li>• Cooperation programs with ILO</li> </ul>	
Noticeable fall in worksite deaths and injuries	A decrease in the mount of injuries and accidents	

## 2.9 EU Occupational Safety and Health Legislation

### 2.9.1 EU Legislation on Occupational Safety and Health – General

There are 75 legislative documents (directives and regulations) for the European legislation in the field of health and safety at work [37].

### **2.9.2 Defining Directives**

A directive is a legislative act that sets out a goal that all EU countries must achieve and individual countries decide on local implementation. Directives aim at ensuring health and safety of workers and creating minimum basis of protection for all community workers by a timely detection of adverse health effects arising or likely to arise from exposure to mechanical vibrations, noise, chemical, physical and biological agents, from the use of work equipment [37].

### **2.9.3 The OSH Framework Directive**

The council implemented the European Framework Directive on safety and health at work in 1989. It ensured minimum safety and health obligations across Europe whereas member states are allowed to maintain or establish more stringent rules [37].

The objective of the framework is to introduce measures to urge progress in the safety and health of workers at work. It is an act that lists general principles concerning the protection of workers against occupational accidents and diseases. It is used as a base for measures applied by the employers [37].

General principles [37]:

- Avoid and evaluate risks.
- Adapting the work to the individual.
- Adapting to technical progress.
- Replacement of dangerous stuff with less or no dangerous stuff.
- All preventive policies should be developed in a coherent way.
- Protective measures should be given the priority.
- Instruction to the worker should be given in an appropriate way.

The directive forces the employers to take the suitable preventive measures based on the listed principles to attain safer and healthier work. In addition, it introduces the principle of risk assessment as a key element, defines its main elements, contains principles concerning the assessment of risks, the elimination of risks and accident factors, the informing, consultation and balanced participation and training of workers and their representatives [37].

The framework defines several terms and contains basic obligations for employers and workers [37].

#### **2.9.4 European Directives and Standards in Health and Safety – Construction Industry**

The European directives that deal with the health and safety aspects in the construction industry provide general conditions on occupational health and safety, as well as directives for signs and symbols and temporary construction sites [37]. The directive states the minimum requirements for providing safety and/or health sign at work and it defines several terms some of which are given below [37].

Signs related to health and safety: those signs should offer information or instruction depending on the case such as [37]:

- Safety colors: where colors are used to represent a specific meaning regarding a hazard.
- Warning signs: that warns about the possible occurrence of an accident related to a specified hazard or danger in case of not following the instructions.

- Verbal communication with the worker: provide information in a direct way through face to face or through an artificial sound.
- Sign boards: provides more specific information about hazards through combination of symbol, color and shade.
- Electrical illuminated signs that attract the sight.
- Prohibition sign: where prohibited symbols are used that gives information about a behavior that is forbidden.
- Emergency sign: are used to tell or indicate the exit, rescue facilities or first aid equipment's.
- Hand signal: that guides the person using a hand movement or position of the arms.

Directive states that employers must provide safety and/or health signs in places where hazards can't be avoided or reduced are supported by annexes. Annexes provide detailed information about the minimum requirements for all safety and health signs. There are 9 annexes that give detailed technical specifications of health and safety signs. It is adapted in their relative directives and in technical progress in the field of health and safety signs at work [37].

#### **2.9.5 Common Observations on the Directives Relevant to Health and Safety Aspects in Construction:**

Directives related to OSH set obligations for employers that asses and measure risk of exposure on a technical specification level. The risk assessment results must be recorded on a proper medium and it must be kept updated on a regular basis for any significant changes which could cause it to be out of date or if necessity appears on the results of health surveillance. Employers must take measures based on the results

of the risk assessment to reduce risks. They must ensure that workers who are exposed to risks on the workplace or their representatives receive the required information and training associated with the outcome of the directives' risk assessment. The workers are to be informed of the accumulated measures and appropriate training or instruction should be provided [37].

Other provisions concerning member states obligations in view of the OSH directives:

Member states have to accept provisions to confirm health surveillance that is appropriate for the workers. They must form measures in order to guarantee workers can consult their individual health records. The directives must be transposed within a specific timeline in member states [37].

### **2.9.6 Accident Prevention in Construction Industry**

European directives include the following relevant requirements. First of all the occupational safety and health should be planned, then the coordination of the construction work between the parties that are in the plan. The working equipment must be safe. Health and safety signs must be placed in the region of dense hazardous substances in order to avoid them; preventative measures can be performed in such cases. In order to avoid any risks that could happen on site, relevant personal protective equipment (PPE) must be provided to ensure the safety of workers. In addition, safe working environment must be provided for the construction workers as well as welfare facilities. Health and safety must be engaged by adopting a general frame work [37]. The use of the PPE in the appropriate way is obligatory. It is considered as the minimum that should be used when other methods are not available but PPE alone cannot reduce or eliminate the hazards. The

employer should provide PPE to the workers. The PPE are worn to minimize the exposure of the worker to hazards [38]. PPE includes the following [38]:

- Head protection: it is used to protect the workers from falling objects.
- Eye protection: it is used to prevent the occurrence of eye injury, for example when chemical are used.
- Protective foot wear: to protect the feet of the worker in case of stepping on a nail or sharp objects or a heavy object falling on the feet.
- Full body suits: it is used to protect the skin of the worker when they are subjected to chemicals.
- Gloves: it is used to protect the hands of the worker during the use of tools.
- Fall protection: it is used to protect the workers working at heights.
- Respirator: it is used to protect the worker from the dust in the air
- Ear protection: it is used when the worker is subjected to a loud noise.

### **2.9.7 Responsibility of Workers**

The workers have several responsibilities toward himself and the people around him.

The responsibilities of the worker towards himself are [37]:

- To take care of his health and safety;
- Get knowledge and experience,
- Inform the employer in case an injury happens to him;
- Report any changes in the workplace and participate in the risk assessment;
- Make the correct use of the machinery, tools and PPE.

The responsibilities of the worker for the people around him are [37]:

- To inform immediately the employer of any work situation that presents a danger on the workers and the pedestrians;



- Cooperate with the employer to ensure that the working environment and working conditions are safe and pose no risks.

### **2.9.8 Responsibility of Employers**

The employers have several responsibilities [37]:

- To evaluate all the risks regarding safety and health of workers.
- Implement measures that insure an improvement in the level of protection.
- Make adequate health and safety training for the workers.
- Report occupational accidents.
- Make periodical medical examination for the workers.
- Take the necessary measures for first aid, firefighting and evacuation of the workers.
- Take required actions in the events of serious and imminent danger.
- Consult workers and involve them in discussion with matters related to OHS at work.

### **2.9.9 Health and Safety Management**

The primary focus of the Directive 92/57/EEC is the coordination required between various parties during the stages of project preparation and construction [37].

#### **2.9.9.1 Pre-Construction Phase**

The following stage revolves around the recognition of the health and safety climate [35].

- The planning process requires time [37].
- Hazards must be eliminated whenever possible or to be reduced [37].
- Make design decisions to avoid foreseeable risks [37].
- For risks that cannot be eliminated, than at least it should be minimized [37].

### **2.9.9.2 Construction Phase**

Managers supervising the work taking place must make sure it is well planned, organized, controlled and revised. The labourers performing the job are to be trained and competent for their workplace, as well as consulted regularly on safety and health issues. There should be good coordination between different employers regarding health and safety issues [37].

### **2.9.9.3 Post-Construction Phase**

There must be a construction and maintenance procedure to allow related safe work procedures. The client's information regarding the structure is of great importance [37].

### **2.9.10 Risk Assessment**

According to the directives, an inclusive OHSM process must begin with risk assessment. In order to aid the employers, employees and member stated in implementing their risk assessment duties, the European commission established important guidelines for them to follow. The guidelines come with a series of steps [37].

In the first step, certain hazards that put labourers at risk must be recognized. The second step includes evaluating the risks and placing them as top priorities. Deciding on the appropriate preventive action is the third step which is followed by the fourth step –taking the required action. The last step is monitoring the assessment followed with constant review [37].

### **2.9.11 Occupational Health and Safety in Education**

The International Section of the ISSA on education and training for prevention is committed to make individuals more aware of risks that are likely to be encountered.

It also enables them to take part in preventing accident training needs analysis in health and safety at work in construction industry [37].

“Actions to improve Safety and Health in construction” was a brochure published by EU-OSHA and it offers short summaries on 14 projects that contributed in generating a more safety-conscious environment in the construction industry. A good opportunity of risk reduction on construction was provided by them [37].

Training should be given to new and existing labourers, especially those who speak a different language. When work practices or equipment change as well as job change or introduction of new technology, training must be provided for the labourers [37].

The main focuses of training procedure are numerous. Such as, include the safety management system principles and responsibilities of the employees, workplace risks and their relative hazards, the skills needed for accurate task performance, avoiding risks by following specific procedures, the preventative measures used throughout the task at hand, the use of specialized health and safety instructions when working with dangerous products and technical equipment, the collective and individual protection information and ability to obtain information regarding safety and health dilemmas by employees [37].

## **Chapter 3**

### **METHODOLOGY**

#### **3.1 Introduction**

The information collected was retrieved from interviews done at certain authorities; International Labour Organization (ILO), Workers Union and Engineering Union. Observations and monitoring were carried out through repeated visits to construction sites in regions like Byblos, Tripoli, Zgharta and Dannieh. In addition, surveys were designed and spread around university campuses, construction sites and companies to be completed by engineers, employees, and citizens. Then analysis of these investigations was done to come up with a general hypothesis leading back to the general knowledge of occupational health and safety and its effects on Lebanon.

#### **3.2 Findings from Authorities**

##### **3.2.1 International Labour Organization**

The International Labour Organization (ILO) regional office for the Arab countries which is located in Western Asia is in Beirut. This gave us the opportunity to visit the office and found out the main problems that reside in the construction field in Lebanon.

During the visit to the ILO in Beirut, a labourer was interviewed and was asked questions related to the construction field; questions were aimed at finding out the main problems that occupational health and safety have in Lebanon and the reasons why there is no statistics done for the injuries and fatalities at work.

### **3.2.2 Workers Union**

Further interviews were carried out with two workers in Federation of Workers Unions and employee in North Lebanon to find out why OHS not applied at construction sites in Lebanon.

### **3.2.3 Engineering Union**

No measures are taken by the engineering union towards OHS.

## **3.3 Construction Site Visits**

Varioust sites were visited in several regions, each visit carrying a certain objective. Every visited site had a specific type of company: big, medium or small. The type of the company was recognized from the projects that they executed and the number of the workers and engineers found at those sites.

Among 30 sites only 15 construction sites were visited. Pictures were taken and a specific site was chosen to be visited multiple times at several work stages, where health and safety advice was given to the workers verbally and visually. Most of the sites that were visited had no supervisors or construction managers and all the workers were working without supervision.

## **3.4 Questionnaires**

There are three forms of questionnaire that were done which depend on the purpose of the study revolving around occupational health and safety on the construction field. The three questionnaire forms are: public questionnaire (Appendix A), labour questionnaire (Appendix B) and construction company questionnaire (Appendix C). The aim of these three questionnaires was to get all the view points from the parties that are involved in OHS matter. The public questionnaire was mainly filled by university students from different departments. On the other hand the labour

questionnaire was filled by the poorly educated workers. All the construction company questionnaires were filled by head of the companies who are engineers.

Table 5. Responders categories.

	Public questionnaire	Labour questionnaire	Construction company questionnaire
Responders	121	68	13
Educated / Non-educated	Majority are educated	All of the labourers had low level of education	Educated / Engineers
Nationality	59 Lebanese and 62 other nationalities	16 Lebanese and 52 other nationalities	13 Lebanese

The questionnaires were asked to be filled thoroughly by a sample of people and the aim was to collect important data on the knowledge and awareness of the responders to matters relating to OHS. Each set of completed questionnaire contains various sample sizes of people with respect to the results and this is used to predict the results of the more general public and not only the people involved in filling the forms.

The content of the questionnaires were focused on the health and safety of construction labourers. The questions were grouped into two types: the first group concentrates on the general opinion, while the second group concentrates on the behavior and characteristics of the individuals.

While setting up the questionnaire, initially the objectives were set out in such a way that they would be explicit, particular for the people who fill out these

questionnaires. In addition the variable time needed in completing the questionnaires was taken into consideration.

The design of the questionnaires was straight forward, aimed at achieving questions that are not difficult to understand by general public. Most of the questions are close ended and were executed in a fine structure. The concept of the questionnaire was expressed in a clear and simple method.

The data collected from all three questionnaire were evaluated individually (Appendices D, E and F), together and comparatively to understand the problems relating to OHS, people's awareness about this issue and their concerns in the case of inadequate actions regarding this matter.

## **Chapter 4**

### **FINDINGS FROM AUTHORITIES, CONSTRUCTION SITES AND QUESTIONNAIRE**

#### **4.1 International Labour Organization**

As part of evaluating labour issues, the ILO studies the national laws that are related to labourer. From this investigation it became clear that the Lebanese law forms a great obstacle against applying the health and safety regulations in Lebanon.

In Lebanon, the ministry of labour is responsible to prepare statistics and take actions against violators. In order to protect the workers they should prepare legislations and carry out regular inspections. The non-existence of reliable statistics for injuries is a major problem. There are inadequate number of inspectors. Therefore, there is no guidance, checks or enforcement of government on the employees and employers.

In Lebanon there are approximately 4.2 million residents [39] and there are only nine labour inspectors that are spread over 25 constituency that cover not only construction labourers but Lebanese from all types of business labour in the region whether they are official or not. Unfortunately, the number of inspectors is insufficient for checking the vast amount of labourers and they are not trained to handle OHS related matters. Recently there are more than a million Syrian labourers estimated to have arrived to Lebanon [40] who are compete with the Lebanese labourers for all types of job. Currently the main role of the labour inspectors is to investigate and distinguish the number of foreign labours and their salaries. It is not



their duty to enforce the OHS rules and certainly not to deal with the number of work related injuries or fatalities among labourers.

According to Lebanese law occupational accidents and /or injuries should be reported within 24 hours. However, this is not followed most of the time and therefore the information available is not necessarily reliable.

Finally, one of the main reasons of why there are no reliable statistics and data on the number of injuries and fatalities for labourers is the political problems, civil war in Lebanon during the last four decades.

## **4.2 Workers Union**

In the investigation for the reason why OHS is not applied yet in Lebanon, the point of view of the workers union is very important and straight to the point since they are the ones who starve to reach the goals they fight to achieve. According to that, interviews were made with several office workers at the Federation of workers Unions and users in North Lebanon about the reason why health and safety is not applied in the construction field. All the workers replied that the construction sites are still full dangerous for construction workers and employers and site owners are not concerned regarding this matter. Thousands of construction workers attend hospitals every year due to work related injuries and accidents, in addition to the annual death of hundreds of workers. Therefore, it can be stated that employers are not doing their basic duties for providing safe working environment and personal protective equipment for the workers and Ministry of Labour is not performing its main responsibility, which is to protect the workers and enforce occupational safety

law in the construction sector. Ministry is also not enforcing the OHS law in public projects.

### **4.3 Engineering Union**

The technical office of the Engineering union in the Northern Province was visited to collect the information about the measures taken to protect the construction workers. Unfortunately the technical office responded that the engineering union has no measures taken to protect the construction workers, and it doesn't force any construction companies to take any measures.

### **4.4 Lebanese Laws and Regulations**

The law of 23 September 1946 contains outdated OHS regulations that are shown in the Code of Labour [41]. These are summarized as follows [41]:

- Workers should be trained by the employer and the trainee should receive a certificate at the end of the training.
- Medical certificates must be given by the ministry of public health to the adolescent worker until the adolescent reaches the age of eighteen.
- Employing adolescents before the age of sixteen in jobs of dangerous nature is forbidden.
- The adolescent workers should not work more than six hours a day. It is forbidden to send them to work between seven o'clock in the evening and seven o'clock in the morning.
- The maximum duration of work per week is forty eight hours.
- Unbroken nine hours of rest time should be given for the workers every day, except in the case the circumstances of work compel otherwise.
- Unbroken thirty six hours should be given for the worker every week.

- Workers are to be granted an annual leave of fifteen days per year with full payment.
- The salary of the worker must be sufficient to meet his essential needs and his family.
- The establishments should be kept at a constant rate of cleanliness. The set-up of machines, transmission devices, tools and engines must be maintained in the best possible conditions of security.
- General measures of protection and prevention that are applied in the work places are determined through decrees adopted by the council of the ministers after taking the opinion of the minister of the labour.
- Enforcement of the decrees is the responsibility of the inspectors.
- The warning is made in writing and reproduced on the register provided for this purpose; a deadline is given to fix the irregularities.
- It is forbidden to have alcoholic drinks for consumption or distribution in the working field. Anyone who has taken alcohol is also not allowed to be within the construction site.

## **4.5 Construction Site Visits**

The aim of construction site visits was to collect information relating to health and safety at construction sites through which one can get a wider picture of the general conditions of construction sites around Lebanon.

### **4.5.1 General Findings on the Sites Visited**

Predetermined sites in Lebanon were visited especially in Tripoli, Dannieh, Zgharta, Byblos, and Beirut to investigate the problems that workers might face in their work places that could harm them. Through these visits and talks to workers it is expected that the workers would start becoming more aware of the importance of OHS and

why they need to protect themselves and their fellow workers by following the OHS guidelines.

While visiting the construction sites, the labourers work was observed as well as their personal protective equipment, such as, head protection, eye protection and protective footwear. The observation also focused on the safety procedures for workers working at heights.

It was discovered that companies of all types have a common problem in OHS, such as: absence of head and eye protection, protective footwear, and safety harnesses for workers at heights. When advice was offered to wear the safety equipment and work in a clean and obstacle-free environment, the workers were amused and did not take it seriously. They were not interested and carried on with their work, ignoring the advice. Even the site engineers at some sites did not allow any conversations with the workers, as it may cause a delay in their work progress.

Some pictures were taken from the visited sites that reflect the observations made in the earlier paragraph.



Figure 6. Hazardous site.

Figure 6 shows a working site that does not meet the workplace health and safety obligations.

- First, the workers are not wearing any personal protective equipment.
- Second, the worker standing on the wooden support frame can be harmed and killed in case of a sudden fall due to the vertical steel bars located below him.
- Finally, the ground of the work place is not clean since it contains many dangerous obstacles for workers that may result in serious injuries.



Figure 7. Old scaffold supporting system.

Figure 7 shows an old scaffolding supporting system. It is made of wooden boards that support the worker. The board is connected to the window on the right and scaffolding system to the left. Using the wooden boards in the scaffolding system is an old technique. Today it is replaced by a modern technique, such as, aluminum cradle system or steel scaffolding frames instead of wooden. This demonstrate how construction progress is falling behind in Lebanon were old construction techniques are still used. The technique lacks safety and shows the construction's sector lack of care towards offering their workers even the standard safety conditions. In addition to that, the workers are not wearing any personal protective equipment.



Figure 8. Worker at third floor is in danger of falling from height and the one at ground floor may be hit by a falling object.

Figure 8 shows a construction site where a worker in the bottom of the picture filling a mini crane by sand and masonry without a head protection against injury from a falling object. On the other hand, the worker at the top of the photo, the one controlling the crane, is standing in a very dangerous way and the worker might fall in case he loses his balance or stumble by an obstacle. This photograph is typical evidence on the dangers faced by unprotected workers on construction sites in Lebanon.



Figure 9. Environment cluttered with obstacles.

Figure 9 shows a construction site that is messy, similar to many other sites in Lebanon. This site is filled with obstacles and might lead to the injury of the workers. This picture shows the circumstances in which the worker is placed to work. As a result, the working condition here is the main factor of most accidents.





Figure 10. Lifting reinforcing steel bars using a tower crane near electric pole.

Figure 10 shows a tower crane used in lifting construction steel bars near an electrical pole. This may lead to an electrical shock in case of a contact between the electrical wires and the steel bars. In addition, if a worker lifts any long steel bars near the electric wires it may result in an electric shock too. This kind of hazards is a major cause of fatalities at construction sites where overhead power lines exist.

During site visits it was noticed that particularly Syrian workers were not happy for their pictures being taken on site. Mostly they would start moving away from their location as they are being photographed. They feared that the purpose of the picture was to penalize them for the dangerous and unprotected state that they were working in. The workers paid no attention to the health and safety warnings regarding the site since they are used to work in such dangerous conditions.

As for the engineer of the site, he avoided any questions related to the unsafe working conditions by pretending to be a technician even after being verified by several workers that he indeed was an engineer. This demonstrates the unwillingness of the managers and employers to take responsibility for the unsafe environment of their employees.

#### **4.5.2 Case Study on a Construction Site**

For the case study the focus was directed to a work site of a five story villa in Harefsiyad, north of Lebanon (Figure 11). A small company managed by one engineer and an architect was responsible from the works on this site. The main reason of focused onto this company was because of the work being carried out by limited number of workers and therefore, the work environment can be studied in more detail, including the state in which the work was performed.

The Lebanese engineer supervising the construction barely made any appearance at the construction site, hence the workers were left unsupervised and this helped the study to be carried out without any interruptions. The workers were all Syrians and had many years of experience in construction work.

The site was a mess, filled with hazards. Some of the floors had holes through the floors without any protection around against possible falls. The floors were covered with nails and the stairs had no railings. The environment was anything but clean or safe. Some workers revealed certain injuries that took place at that site, either from stumbling over obstacles or not using head protection and accidentally bumping the head with the wooden board that was above.

The workers in this villa were not using any personal protective equipment and no safety harnesses whilst working at heights, as all of them were working on the 5<sup>th</sup> story.



Figure 11. Various views from the site investigated.

Through visiting the construction sites, certain regulations were proposed to be taken regarding the safety and environment of the site. An educational video was played for the workers about the health and safety importance and procedures. The workers were surprised to learn about these procedures that they never heard of even after years of working in construction. The lack of knowledge of the workers in construction safety is partly the fault of their employers whose job was to enforce the

health and safety regulations and at least inspect to check the progress of the work. Neither took place.

## **4.6 Questionnaire**

### **4.6.1 Public Questionnaire**

The public questionnaire was constructed to be filled out by diverse ordinary people living in the community. It was spread around in distinct regions in Lebanon to be able to collect and study a wide range of opinions regarding occupational health and safety of workers. Among the places that questionnaires were distributed; cafes, public streets universities, such as, University of Balamand (UOB), the Lebanese American University (LAU), where students and academics from different parts of Lebanon are gathered (Figure 12). A total of 121 questionnaires were filled. This helped the collection of a variety of opinions and results in the questionnaires. The findings of this questionnaire are given in APPENDIX D.



Figure 12. University students filling the public questionnaire.

#### **4.6.2 Labour Questionnaire**

The labour questionnaire was distributed to be filled out by construction labourers on site to collect a wide range of labourers' opinions regarding occupational health and safety at workplace (Figure 13). Fifteen different sites in Lebanon were visited including Tripoli, Bakhoun, Dannieh, Zgharta and Byblos. A total of 68 people filled the questionnaire. The findings of this questionnaire form are given in APPENDIX E.



Figure 13. One of the workers filling in the Labour Questionnaire.

#### **4.6.3 Employer Questionnaire**

The employer questionnaire was prepared to be filled out by diverse construction companies. This aim was to collect a wide range of employers' opinions regarding occupational health and safety and then study the obtained results. Different construction companies in Lebanon welcomed our visit especially those in Tripoli and Byblos. A total of 13 companies were participated by filling in the questionnaire. This help in gathering information on the views of companies with regards to OHS. The findings of this questionnaire are given in APPENDIX F.

#### 4.6.4 Results of Questionnaire

Tables 6 to 8 represent the results of public, labour and construction company questionnaires according to their age, ranging from 17 up to 75 years old, gender and nationalities consisting of Lebanese and others.

##### 4.6.4.1 Results of Public Questionnaire

Table 6. Public Questionnaire Results

Questions and Choices	Answers Count				
Gender:					
Female	47				
Male	74				
	Answer	Male	Female		
Age:					
17 or less	13	9	4		
18-25	76	45	31		
26-35	19	12	7		
36-45	8	3	5		
46-55	3	3	0		
56-65	1	1	0		
66-75	0	0	0		
75 or more	1	1	0		
Nationality:					
Lebanese	59	46	13		
Other	62	28	34		
	Yes	M.	F.	Leb.	O.
	No				
Have you heard about OHS being enforced in Lebanese Construction sites?	40	17	23	0	40
	81	57	24	59	22
Do you think that construction companies in Lebanon trains workers for safe work practices?	44	6	38	3	41
	77	68	9	56	21
Have you heard or seen before, about an accident happened during construction?	81	62	19	52	29
	40	12	28	7	33
	Ans.	M.	F.		
Case you heard or seen:					
Worker struck by a falling object.	32	30	2	Note: more than one answer was chosen.	
Worker struck by a moving vehicle.	17	9	6		
Worker exposed to electrical shock.	24	8	16		
Worker working from height.	32	30	2		
All of the above.	21	18	3		
None/other	2	0	2		

The public questionnaire was filled by 121 persons, 74 of them were male gender and the 47 were female gender (Table 6). The age boundary between 18-25 was the dominant one with a frequency of 76, where 45 of them were male and 31 female (Figure 14). Approximately 50% of the questionnaire were filled by Lebanese nationals where male gender was dominant and the rest were filled by other nationalities where the female was dominant (Figure 15). 100% of the Lebanese with the majority being male said that they had never heard about OHS being enforced in the Lebanese construction sites (Figure 16). In addition, most of the Lebanese male participants said that the Lebanese construction companies never train their labourers for safe work practices (Figure 17). On the other hand, 81 out of 121, majority being Lebanese male, said that they heard or seen an accident that happened to a labourer during construction before (Figure 18). 32 accidents were mentioned out of which 30 of them were falling from height and being struck by a falling object and 30 out of 32 were reported by male participants (Figure 19).

Figures 14 and 15 shows that the age group 18-25 has the highest frequency and half of the questionnaire was filled by Lebanese and the other half by other nationalities. Most of the public questionnaire was filled in universities where students from different nationalities are present.

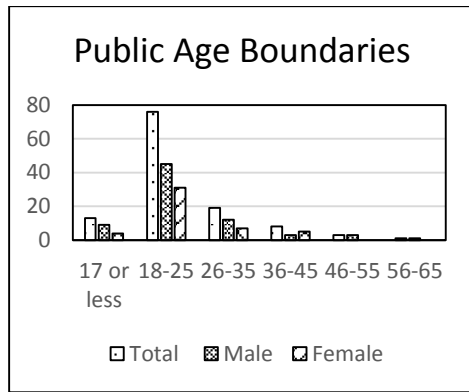


Figure 14. Age group frequency of public.

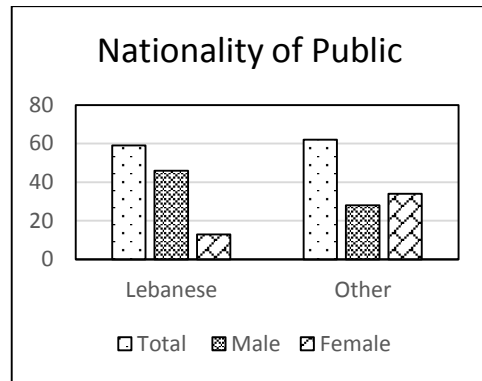


Figure 15. Nationality frequency of public.

Figure 16 shows that all the males who are Lebanese nationality has no knowledge about OHS and if it is enforced in the Lebanese construction sites or not. On the other hand most of the other nationalities heard about OHS before.

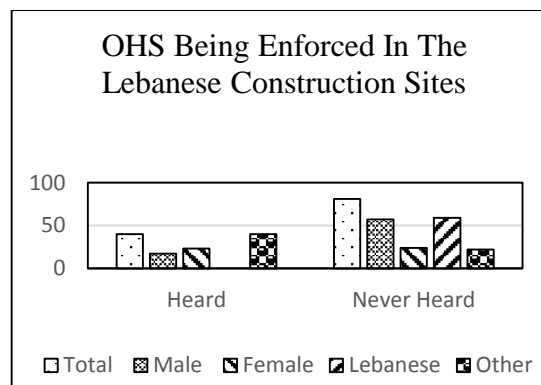


Figure 16. Frequency of public opinion on the enforcement of OHS on Lebanese construction sites.

In Figure 17 majority of the Lebanese said that companies does not train their labourers for safe work practices.



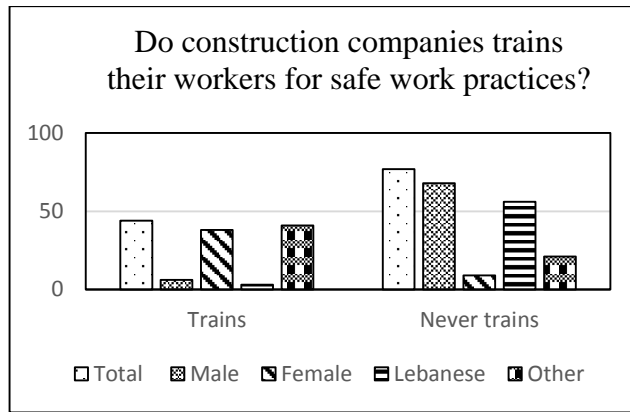


Figure 17. Frequency of public, with regards to awareness of construction companies training of their workers for safe work practices.

Figure 18 shows that most of the public have heard about accidents that happened in construction sites.

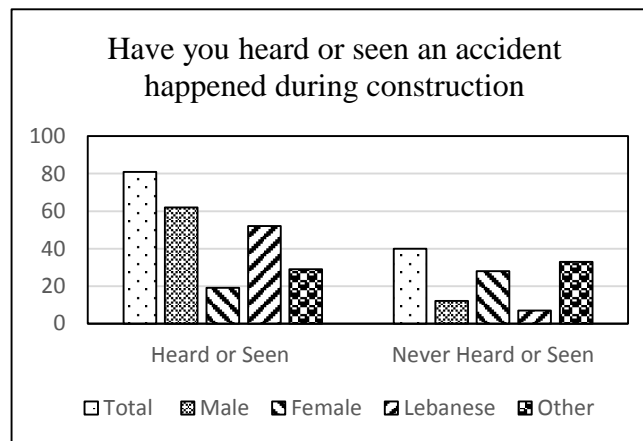


Figure 18. Frequency of public on whether they have heard or seen an accident happened during construction before.

Figure 19 shows the accidents heard or seen by the responders, where it revealed that falling from height and struck by a falling object are common problems

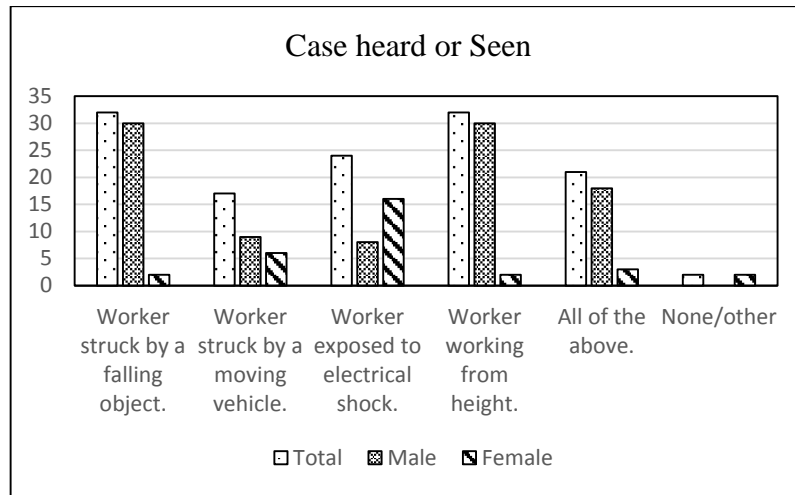


Figure 19. Case of Accident Heard or Seen by Public

#### 4.6.4.2 Results of Labour Questionnaire

Table 7. Labour Questionnaire Results

Questions and Choices	Answers Count		
	Ans.	Lebanese	Syrian
1) Nationality:			
Lebanese	16		
Syrian	52		
Egyptian	0		
Other	0		
2) Age:			
17 or less	0	0	0
18-25	14	1	13
26-35	27	4	23
36-45	16	5	11
46-55	9	4	5
56-65	2	2	0
66-75	0	0	0
75 or more	0	0	0
3) Gender:			
Female	0	0	0
Male	74	16	52
4) How long you have been working for your employer?			
Less than 1 year	24	1	23
1 year	9	1	8
2-3 years	8	2	6
4-5 years	8	1	7
6-7 years	3	2	1

8-9 years	6	5	1
10 years or more	10	4	6
5) Have you ever experienced an accident at work?			
Yes	60	16	44
No	8	0	8
6) Have you heard about OHS before?			
Yes	7	6	1
No	61	10	51
7) Does your company trains workers for safe work practices?			
Yes	3	3	0
No	65	13	52

The labour questionnaire was filled by 68 labourers. 52 labourers were Syrian nationality while the rest were Lebanese (Table 7).

The age range of 26 to 35 was the highest with a frequency of 27 out of which 4 were Lebanese and 23 were Syrian. For the age group of 36 to 45, there were 16 people out of which 5 were Lebanese and 11 were Syrian. The age range 18 to 25, occupy the third place with a frequency of 14 out of which 1 was Lebanese and 13 were Syrian. The age group 46 to 55 occupied the fourth position with a frequency of 9, out of which 4 Lebanese and 5 Syrians. However, the age range 56 to 65, were only 2 Lebanese. On the other hand there were no people for the age groups of 17 or less, 66 to 75 and 75 or more (Figure 20).

The male gender is dominant among construction labourers. Considering how long the labourer is employed by the current employer this depends on the nationality (Figure 21).

The highest frequency of the labourers worked for less than one year for their employer with a total of 24. On the other hand, the lowest frequency of labourers was

a total of 3 who worked 6 to 7 years for their employers. As for Lebanese, the highest frequency of labourers was those with 8 to 9 years of work for their employer with a total number of 5. The lowest frequency was those labourers who worked for their employers for less than one year, 1 year and 4 to 5 years with a frequency of 1. As for the Syrian labourers, the highest frequency was for those with less than 1 year of work for their employer with a total of 23, and the lowest frequency was labourers that work for their employer for 6 to 7 years and 8 to 9 years with a frequency of 1 (Figure 22).

The frequency of labourers who experienced accident at work is 60 where 16 of them were Lebanese and 44 were Syrian. 8 who did not experience an accident at work were all Syrian. 51 Syrian and 10 Lebanese labourers did not hear about OHS before. On the other hand 7 people heard about OHS where 6 were Lebanese and only 1 was Syrian (Figure 23).

Majority of the respondents said that their companies do not train labourers for safe work practices where 52 were Syrian and the remaining 13 were Lebanese. Only 3 Lebanese confirmed that their companies train labourers for safe work practices (Figure 24).

Figure 20 shows that the age boundary 26 to 35 has the highest frequency and most of the labourers at this age are Syrian.

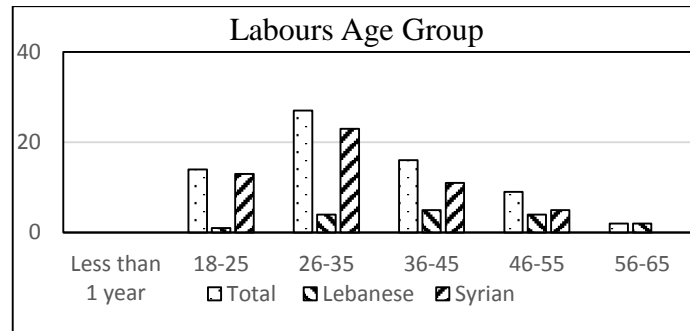


Figure 20. Age group of labourers and their frequency.

Figure 20 shows that the male gender is dominant in the construction works in general, and the Syrian workers are dominant among workers in this field.

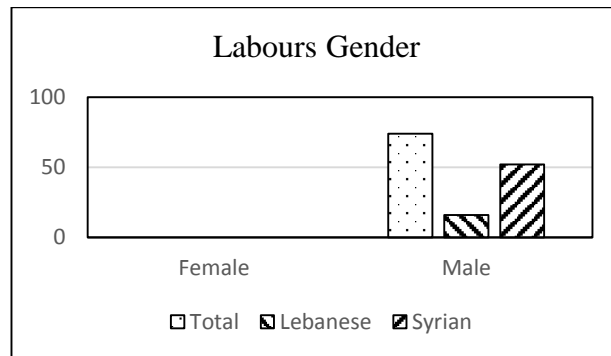


Figure 21. Labourers gender frequency.

Figure 22 shows that majority of the workers are employed before a year by their employer, where the majority of the workers are from the Syrian nationality due to the low salary they get.

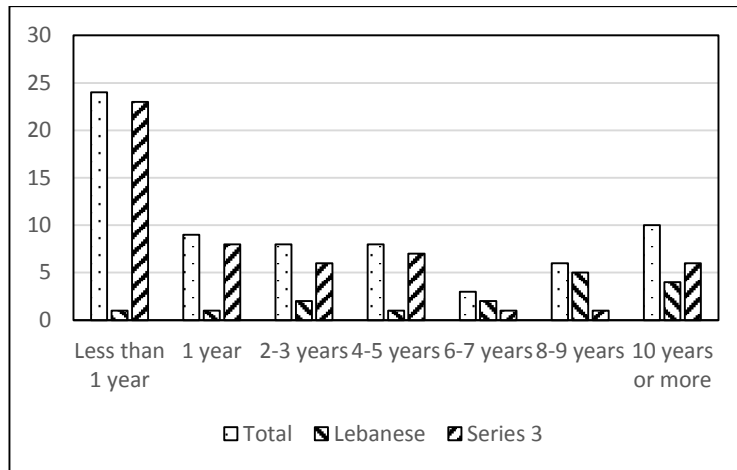


Figure 22. Length of work in years with the current employer.

Figure 23 shows that all labour responders experienced an accident in their work except 3 labours from Syrian nationality.

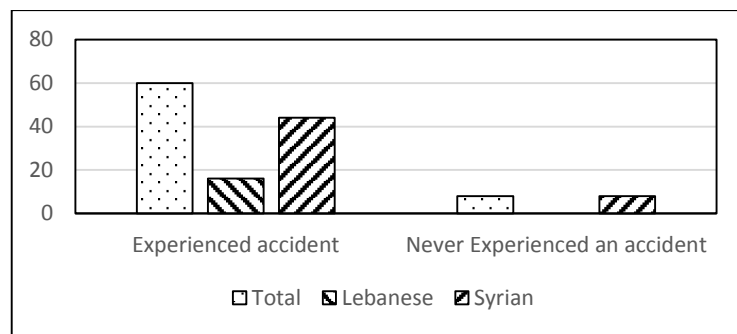


Figure 23. Frequency of workers that experienced an accident or not.

Figure 24 shows that the majority of the workers have never heard about OHS before.

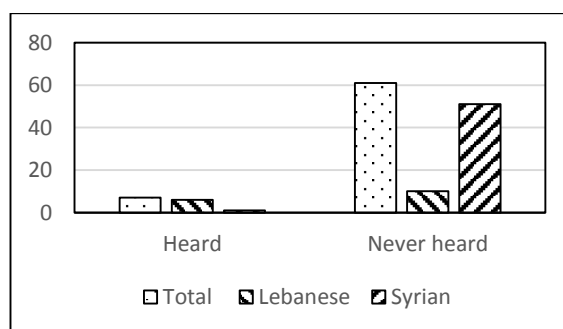


Figure 24. Frequency of workers who heard of or not heard of OHS before.

Figure 25 shows that the workers on the site are not trained by their companies.

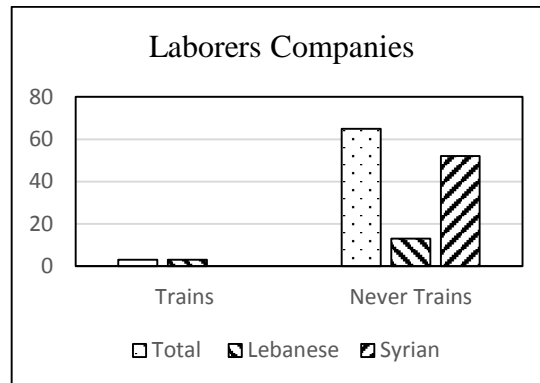


Figure 25. Availability of labourers training by companies.

#### 4.6.4.3 Results of Construction Company Questionnaire

Table 8. Construction Company Questionnaire Results.

Questions and choices	Answers
<b>Gender:</b>	
Female	0
Male	13
<b>Nationality</b>	
Lebanese	13
Other	0
<b>Does your company take into consideration OHS during construction process?</b>	
Yes	7
No	6
<b>Does your company, trains workers on safe work practices?</b>	
Yes	3
No	10
<b>Did any of your workers had an accident during construction?</b>	
Yes	12
No	1
<b>Do the accidents cause any financial issues to your company?</b>	
Yes	13
No	0
<b>Case you heard or seen:</b>	
Worker struck by a falling object.	7
Worker struck by a moving vehicle.	4
Worker exposed to electrical shock.	1

Worker working from height.	7
All the above	1
None/Other	1

The construction company questionnaire was filled by 13 engineers (Table 8). The results show that 100% of the responders were male gender from Lebanese nationality. 7 of them took OHS into consideration during construction process, while the remaining 6 did not. On the other hand, the statistical data showed that among the 13 responders, 10 said that their company never trained workers on safe work practices and 3 said that they do train workers. Moreover, 12 out of 13 admitted that they had heard or seen workers involved in accidents during construction. But all the engineers unanimously agreed that accidents cause financial problems to their companies. Finally, a list of problems was detected of what causes the accident from those who selected that they heard or seen about workers had accidents during construction. The workers struck by a falling object or working from height ranked the highest, each of total 7. The second highest rank went to the 4 workers who were struck by a vehicle. Whereas the workers struck by electrical shock were placed last with a total of 1, similar to the all of the above and none of the above options (Table 8).

#### **4.6.4.4 Comparative Discussion Among the Three Questionnaires**

The three questionnaires were used to collect important data about the knowledge and awareness of the responders related to OHS. Perspectives of all responders are included in these questionnaires.

The comparison among the three questionnaire responses, indicate similarities and differences in perspective of people taken part. Three questions are chosen from each questionnaire to discuss and compare the answers.



Question 4 and 15 from public and labour questionnaire respectively show that the responders are not aware of OHS and this is due to the lack of advertisement and initiatives from the government toward this matter. However, the responses to question number 5 of construction company questionnaire reveals that companies are more aware of OHS, where 7 out of 13 respondents have heard about OHS.

The results of questions 9, 21 and 10 from public, labour and construction company questionnaire respectively show that all the responders agree that the workers do not have any kind of trainings for job site. Hence, public and labourers admit that companies are responsible for providing OHS trainings for workers. On the other hand, the construction companies say that they do not train their workers because it is not their responsibility. OHS laws state that companies are responsible to train their workers for safety matters.

The findings of questions 12 and 13 from public and construction company questionnaire respectively indicate falling from height and struck by a falling objects have the highest frequency of accidents occur at construction sites.

## Chapter 5

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

Construction is one of the most hazardous industries in the world. Some of the major hazards where workers are subjected to various kinds of hazards that can be summarized as: being struck by a falling object or a moving vehicle, vibration, loud noise, exposure to dangerous substances, being exposed to electrical shock and falling from heights. According to this research and based on several studies in the UK and Northern Cyprus it is revealed that falling from heights is the main reason for accidents resulting in fatalities. Many countries such as UK, European Union, Northern Cyprus, Qatar and Bahrain are making a big effort to improve their health and safety performance. This improvement can be achieved by implementing Health and safety regulations which aim to protect the workers from hazards and reduce the number of accidents and fatalities. Due to the globalization leading to exchange of migrant workers and due to the nature of the construction work, construction continues to stay as one of the most hazardous jobs.

Conclusion of the findings from authorities:

- Lebanese laws are out-of-dated, forms a great obstacle against applying health and safety regulations in Lebanon.
- Ministry of labour is not performing its main responsibility in adopting and enforcing OHS in the construction field.

- There are no reliable statistics for work injuries.
- The number of inspectors in Lebanon are inadequate and are not trained to handle OHS related matters.
- Employers and site owners are not providing for the workers any appropriate personal protective equipment and a safe working environment.
- No measures are taken by the engineering union to protect construction workers.

Conclusion from the site visits:

- There is absence in the use of any Personal protective equipment.
- Most of the construction sites were scattered with obstacles.
- Labourers had no knowledge regarding OHS.
- Labourers don't know their health and safety rights.
- Absence of the site engineer from the work site.

Conclusion from questionnaire:

- Labourers and public from Lebanese nationals do not know or never heard about OHS before whereas public from other nationalities are more familiar with the OHS.
- Male gender is the dominant among construction workers.
- Construction companies are not training their workers for work practices.
- Most accidents are related to: Falling from height and struck by falling objects.

## 5.2 Recommendations

The recommendations are to enhance Lebanon's OHS for construction workers, companies and the public, for achieving better and safer working environments.

The recommendations are as follows:

- The government must collaborate with the Ministry of Labour in order to enforce the laws and regulations regarding health and safety and commit to occasional inspections and the provisions of the vital tools or needs for the workers.
- Implement new health and safety rules and regulations that provide a better working environment.
- Provide technical advice to review labour laws and modify or introduce new regulations for health and safety to develop an effective system of inspection of labour standards.
- Train inspectors on health and safety to promote and comply with the basic rights for all workers.
- Increase the number of inspectors, so all sites are maintained safely.
- Improve relations and cooperation's in the field of labour management.
- Accidents should be reported at work and Ministry of Labour should have incident reports.
- The use of media for health and safety education and public awareness.
- Enhance safe working condition and respect for fundamental principles and rights by promoting compliance with international labour standards.
- Educating the younger generation on OHS to be more aware of the dangers surrounding workers and specifically construction workers.

- Make technical consultative meetings periodically to improve work process, management issues and reporting mechanism.
- Provide OHS training courses for construction workers and provide each worker with a form of ID to enter jobsites and provide the same form of ID for first aid.
- The obligation to wear PPE should be the minimum requirement to enter a job site.

### **5.3 Recommendations for Further Studies**

The following area can be considered for further study in future:

- Investigate the laws in Lebanon to see if any new OHS laws and regulations are adopted.
- Inspect if there are any work injury statistics exist from the ministry of labour.
- Check the availability of new inspectors that are trained to handle OHS related matters.
- Inspect sites to see if there are any enforcement to OHS laws. Research new construction techniques to be used in Lebanon and eliminate old one for safer construction.
- Investigate the reasons for the absence of OHS laws and regulations in Lebanon and propose solutions to this issue.
- Collaborate with neighboring countries to share knowledge regarding improvement of construction and the progress of OHS laws and regulations.

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## **APPENDICES**

# Appendix A: Public Questionnaire

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



## Public Questionnaire

<i>Occupational Health and Safety (OHS) Questionnaire in Lebanese Construction Field</i>	
<i><u>Name:</u></i>	
<i><u>Survey Date:</u></i>	
<i><u>Survey location:</u></i>	

### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

### About You

#### 1. Your Age

(Select only one.)

1.  17 or less
2.  18-25
3.  26-35
4.  36-45
5.  46-55
6.  56-65
7.  66-75
8.  76 or more

#### 2. Your Gender

(Select only one.)

1.  Female
2.  Male

#### 3. Nationality

(Select all that apply.)

1.  Lebanese
2.  Other

If you check other please specify your nationality: \_\_\_\_\_

### Health and Safety Background

#### 4. Have you heard about OHS being enforced in Lebanese construction sites?

(Select only one.)

1.  Yes
2.  No

#### 5. Check the personal protective equipment's (PPE) that you see being used by workers in Lebanon?

(Select more than one.)

1.  Head protection
2.  Eye protection
3.  Protective footwear
4.  Fall protection harnesses
5.  All of the above
6.

Other \_\_\_\_\_

7.  None

#### 6. Do you have emergency procedures and emergency phone number displayed at the construction site?

(Select only one.)

1.  Yes
2.  No

#### 7. Please check: Duties that Construction Company assigns or checks at construction site throughout the construction works.

1.  Remove hazards from work area
2.  Regular safety inspection
3.  Safety manager assign responsibilities
4.  Inspection made for equipment's to make sure that the operators can see you
5.  All of the above
6.  Other \_\_\_\_\_
7.  None

#### 8. Which procedure is right in lifting weight?

(Select only one.)

1.  Lift with legs, not the back
2.  Lift with back, not the legs

**9. Do you think that the construction companies in Lebanon trains workers for safe work practices?**

(Select only one.)

1.  Yes
2.  NO

**10. Have you heard before that: A clean jobsite means a safe jobsite?**

(Select only one.)

1.  Yes
2.  No

**11. Have you heard or seen before, about an accident happened during construction?**

(Select only one.)

1.  Yes
2.  No

**12. In case you answered yes in the previous question, please specify the case you heard or seen.**

1.  Worker struck by a falling object.
2.  Worker struck by a moving vehicle
3.  Worker exposed to electrical shock.
4.  Worker working from height.
5.  All of the above
6.  Non/Other

## Appendix B: Labour Questionnaire

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



### Labour Questionnaire

<i>Health and Safety Questionnaire in Lebanese Construction Field</i>	
<u>Name:</u>	
<u>Survey Date:</u>	
<u>Company name:</u>	

#### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

#### About You

##### 1. Your Age

(Select only one.)

1.  17 or less
2.  18-25
3.  26-35
4.  36-45
5.  46-55
6.  56-65
7.  66-75
8.  76 or more

##### 2. Your Gender

(Select only one.)

1.  Female
2.  Male



### 3. Nationality

(Select all that apply.)

1.  Lebanese
2.  Syrian
3.  Egyptian
4.  Other

If you check other please specify your nationality: \_\_\_\_\_

### Background Information

#### 4. Type of work:

(Select only one.)

1.  Full time
2.  Part time

#### 5. Do you have a private health insurance?

(Select only one.)

1.  Yes
2.  No

#### 6. Do the company you work for, make insurance for their workers?

(Select only one.)

1.  Yes
2.  No

#### 7. Type of company:

(Select only one.)

1.  Small
2.  Medium
3.  Large

#### 8. How long you have been working for your employer?

(Select only one.)

1.  less than (<) 1 year
2.  1 year
3.  2-3 years
4.  4-5 years
5.  6-7 years
6.  8-9 years
7.  10 years or more

#### 9. How long you have been working in construction field?

(Select only one.)

1.  less than (<) 1 year
2.  1 year

3.  2-3 years
4.  4-5 years
5.  6-7 years
6.  8-9 years
7.  10 years or more

**10. Are you satisfied for working for your employer?**

(Select only one.)

1.  Very Satisfied
2.  Satisfied
3.  Neither
4.  Unsatisfied
5.  Very Unsatisfied

**OHS Background**

**11. Have you ever experienced an accident at work?**

(Select only one.)

1.  Yes
2.  No

**12. Is there any symptoms you have as a result of work accidents?**

(Select only one.)

1.  Yes
2.  No

**13. What are the symptoms?**

1.  Headache
2.  Dizziness
3.  Irritation of eyes, nose or throat
4.  Breathing problems
5.  Pain and discomfort of: back, neck, hands, wrist, shoulder or others

**14. Have you seen a doctor for these symptoms?**

(Select only one.)

1.  Yes
2.  No

**15. Have you heard about OHS before?**

(Select only one.)

1.  Yes
2.  No

**16. Is there any OHS checklist in your job?**

(Select only one.)

1.  Yes
2.  No

**17. Check the most protection equipment's you are familiar with.**

1.  Head protection
2.  Eye protection
3.  Protective footwear
4.  Fall protection harnesses
5.  None

**18. Is there an emergency procedure or an emergency phone number displayed in the work place?**

(Select only one.)

1.  Yes
2.  No

**19. Please check the one that you are most familiar with.**

1.  Remove hazards from work area
2.  Regular safety inspection
3.  Safety manager assign responsibilities
4.  Inspection made for equipment's to make sure that the operators can see you
5.  None

**20. Which procedure is right in lifting weight?**

(Select only one.)

1.  Lift with legs, not the back
2.  Lift with back, not the legs

**21. Does your company trains workers for safe work practices?**

(Select only one.)

1.  Yes
2.  NO

**22. Do you know that: A clean jobsite means a safe jobsite?**

(Select only one.)

1.  Yes
2.  No

# Appendix C: Construction Company Questionnaire

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



## Construction Company Questionnaire

<i>Health and Safety Questionnaire in Lebanese Construction Field</i>	
<i><u>Name:</u></i>	
<i><u>Survey Date:</u></i>	
<i><u>Company name:</u></i>	

### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

### About You

#### 1. Your Gender

(Select only one.)

1.  Female
2.  Male

#### 2. Nationality

(Select all that apply.)

1.  Lebanese
2.  Other

If you check other please specify your nationality: \_\_\_\_\_

### Company Background Information

#### 3. Type of your company:

(Select only one.)

1.  Small
2.  Medium company
3.  Large company

**4. Do your company insure their labourer?**

(Select only one.)

1.  Yes
2.  No

**OHS Background**

**5. Does your company take into consideration OHS during construction process?**

(Select only one.)

1.  Yes
2.  No

**6. Check the personal protective equipment's that your construction company provides workers to use at construction site.**

(Select more than one.)

1.  Head protection
2.  Eye protection
3.  Protective footwear
4.  Fall protection harnesses
5.  All of the above
6.  Other \_\_\_\_\_
7.  None

**7. Do you have emergency procedures and emergency phone number displayed at the construction site?**

(Select only one.)

1.  Yes
2.  No

**8. Please check: Duties that your company assigns or check during construction.**

1.  Remove hazards from work area
2.  Regular safety inspection
3.  Safety manager assign responsibilities
4.  Inspection made for equipments to make sure that the operators can see you
5.  All of the above
6.  None

**9. Which procedure is right in lifting weight?**

(Select only one.)

1.  Lift with legs, not the back
2.  Lift with back, not the legs

**10. Does your company, trains workers in safe work practices?**

(Select only one.)

1.  Yes
2.  NO

**11. Have you heard before that: A clean jobsite means a safe jobsite?**

(Select only one.)

1.  Yes
2.  No

**12. Did any of your workers had an accident during construction?**

(Select only one.)

1.  Yes
2.  No

**13. In case you answered yes in the previous question, please specify the case you heard or seen.**

1.  Worker struck by a falling object.
2.  Worker struck by a moving vehicle
3.  Worker exposed to electrical shock.
4.  Worker working from height.
5.  All of the above
6.  Non/Other

**14. Do the accidents cause any financial issues to your company?**

(Select only one.)

1.  Yes
2.  No

**15. Do you recommend other companies to use OHS check list?**

(Select only one.)

1. Yes
2. No

## Appendix D: Public Questionnaire Results

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



### Public Questionnaire

<i>Occupational Health and Safety (OHS) Questionnaire in Lebanese Construction Field</i>	
<i><u>Name:</u></i>	
<i><u>Survey Date:</u></i>	
<i><u>Survey location:</u></i>	

#### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

#### **About You**

##### **1. Your Age**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> 17 or less	13
2. <input type="checkbox"/> 18-25	76
3. <input type="checkbox"/> 26-35	19
4. <input type="checkbox"/> 36-45	8
5. <input type="checkbox"/> 46-55	3
6. <input type="checkbox"/> 56-65	1
7. <input type="checkbox"/> 66-75	0
8. <input type="checkbox"/> 76 or more	1

##### **2. Your Gender**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Female	47
2. <input type="checkbox"/> Male	74

### 3. Nationality

(Select all that apply.)

Choice	Answer
1. <input type="checkbox"/> Lebanese	59
2. <input type="checkbox"/> Other	62

## Health and Safety Background

### 4. Have you heard about OHS being enforced in Lebanese construction sites?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	40
2. <input type="checkbox"/> No	81

### 5. Check the personal protective equipment's (PPE) that you see being used by workers in Lebanon?

(Select more than one.)

Choice	Answer
1. <input type="checkbox"/> Head protection	52
2. <input type="checkbox"/> Eye protection	26
3. <input type="checkbox"/> Protective footwear	27
4. <input type="checkbox"/> Fall protection harnesses	13
5. <input type="checkbox"/> All of the above	21
6. <input type="checkbox"/> Other	0
7. <input type="checkbox"/> None	23

### 6. Do Lebanese Companies, have emergency procedures and emergency phone number displayed at their construction site?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	49
2. <input type="checkbox"/> No	72

### 7. Please check: Duties that Construction Company assigns or checks at construction site throughout the construction works.

Choice	Answer
1. <input type="checkbox"/> Remove hazards from work area	20



2. <input type="checkbox"/> Regular safety inspection	30
3. <input type="checkbox"/> Safety manager assign responsibilities	15
4. <input type="checkbox"/> Inspection made for equipment's to make sure that the operators can see you	11
5. <input type="checkbox"/> All of the above	20
6. <input type="checkbox"/> Other	1
7. <input type="checkbox"/> None	25

### 8. Which procedure is right in lifting weight?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Lift with legs, not the back	77
2. <input type="checkbox"/> Lift with back, not the legs	44

### 9. Do you think that the construction companies in Lebanon trains workers for safe work practices?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	44
2. <input type="checkbox"/> NO	77

### 10. Have you heard before that: A clean jobsite means a safe jobsite?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	74
2. <input type="checkbox"/> No	47

### 11. Have you heard or seen before, about an accident happened during construction?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	81
2. <input type="checkbox"/> No	40

### 12. In case you answered yes in the previous question, please specify the case you heard or seen.

Choice	Answer
1. <input type="checkbox"/> Worker struck by a falling object.	32
2. <input type="checkbox"/> Worker struck by a moving vehicle	17
3. <input type="checkbox"/> Worker exposed to electrical shock.	24
4. <input type="checkbox"/> Worker working from height.	32
5. <input type="checkbox"/> All of the above	21
6. <input type="checkbox"/> Non	2

## Appendix E: Labour Questionnaire Results

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



### Labour Questionnaire

<i>Health and Safety Questionnaire in Lebanese Construction Field</i>	
<u>Name:</u>	
<u>Survey Date:</u>	
<u>Company name:</u>	

#### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

#### About You

##### 1. Your Age

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> 17 or less	0
2. <input type="checkbox"/> 18-25	14
3. <input type="checkbox"/> 26-35	27
4. <input type="checkbox"/> 36-45	16
5. <input type="checkbox"/> 46-55	9
6. <input type="checkbox"/> 56-65	2
7. <input type="checkbox"/> 66-75	0
8. <input type="checkbox"/> 76 or more	0

##### 2. Your Gender

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Female	0
2. <input type="checkbox"/> Male	68

### 3. Nationality

(Select all that apply.)

Choice	Answer
1. <input type="checkbox"/> Lebanese	16
2. <input type="checkbox"/> Syrian	52
3. <input type="checkbox"/> Egyptian	0
4. <input type="checkbox"/> Other	0

### Background Information

#### 4. Type of work:

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Full time	33
2. <input type="checkbox"/> Part time	35

#### 5. Do you have a private health insurance?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	13
2. <input type="checkbox"/> No	55

#### 6. Do the company you work for, make insurance for their workers?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	22
2. <input type="checkbox"/> No	46

#### 7. Type of company:

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Small	24
2. <input type="checkbox"/> Medium	42
3. <input type="checkbox"/> Large	2

#### 8. How long you have been working for your employer?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> less than (<) 1 year	24
2. <input type="checkbox"/> 1 year	9
3. <input type="checkbox"/> 2-3 years	8
4. <input type="checkbox"/> 4-5 years	8
5. <input type="checkbox"/> 6-7 years	3
6. <input type="checkbox"/> 8-9 years	6
7. <input type="checkbox"/> 10 years or more	10

### 9. How long you have been working in construction field?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> less than (<) 1 year	3
2. <input type="checkbox"/> 1 year	9
3. <input type="checkbox"/> 2-3 years	10
4. <input type="checkbox"/> 4-5 years	18
5. <input type="checkbox"/> 6-7 years	12
6. <input type="checkbox"/> 8-9 years	6
7. <input type="checkbox"/> 10 years or more	10

### 10. Are you satisfied for working for your employer?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Very Satisfied	9
2. <input type="checkbox"/> Satisfied	30
3. <input type="checkbox"/> Neither	20
4. <input type="checkbox"/> Unsatisfied	6
5. <input type="checkbox"/> Very Unsatisfied	3

## OHS Background

### 11. Have you ever experienced an accident at work?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	60
2. <input type="checkbox"/> No	8

### 12. Is there any symptoms you have as a result of work accidents?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	60
2. <input type="checkbox"/> No	8

**13. What are the symptoms?**

Choice	Answer
1. <input type="checkbox"/> Headache	22
2. <input type="checkbox"/> Dizziness	7
3. <input type="checkbox"/> Irritation of eyes, nose or throat	7
4. <input type="checkbox"/> Breathing problem	13
5. <input type="checkbox"/> Pain and discomfort of: back, neck, hands, wrist, shoulder or others	43

**14. Have you seen a doctor for these symptoms?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	27
2. <input type="checkbox"/> No	41

**15. Have you heard about OHS before?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	7
2. <input type="checkbox"/> No	61

**16. Is there any OHS checklist in your job?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	14
2. <input type="checkbox"/> No	54

**17. Check the most protection equipment's you are familiar with.**

Choice	Answer
1. <input type="checkbox"/> Head protection	25
2. <input type="checkbox"/> Eye protection	12
3. <input type="checkbox"/> Protective footwear	15
4. <input type="checkbox"/> Fall protection harnesses	19
5. <input type="checkbox"/> None	12

**18. Is there an emergency procedure or an emergency phone number displayed in the work place?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	15
2. <input type="checkbox"/> No	53

**19. Please check the one that you are most familiar with.**

Choice	Answer
1. <input type="checkbox"/> Remove hazards from work area	27
2. <input type="checkbox"/> Regular safety inspection	11
3. <input type="checkbox"/> Safety manager assign responsibilities	15
4. <input type="checkbox"/> Inspection made for equipment's to make sure that the operators can see you	19
5. <input type="checkbox"/> None	8

**20. Which procedure is right in lifting weight?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Lift with legs, not the back	45
2. <input type="checkbox"/> Lift with back, not the legs	23

**21. Does your company trains workers for safe work practices?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	3
2. <input type="checkbox"/> No	65

**22. Do you know that: A clean jobsite means a safe jobsite?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	30
2. <input type="checkbox"/> No	38

# Appendix F: Construction Company Questionnaire Results

Survey as part of the research for a Master's degree in Civil Engineering Department EMU



## Construction Company Questionnaire

<i>Health and Safety Questionnaire in Lebanese Construction Field</i>	
<b><u>Name:</u></b>	
<b><u>Survey Date:</u></b>	
<b><u>Company name:</u></b>	

### *Instructions*

Answer questions as they relate to you. For most answers, check the box(es)  most applicable to you or fill in the blanks.

### **About You**

#### **1. Your Gender**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Female	0
2. <input type="checkbox"/> Male	13

#### **2. Nationality**

(Select all that apply.)

Choice	Answer
1. <input type="checkbox"/> Lebanese	13
2. <input type="checkbox"/> Other	0

### **Company Background Information**

#### **3. Type of your company:**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Small	1
2. <input type="checkbox"/> Medium	12
3. <input type="checkbox"/> Large	0

#### 4. Do your company insure their labourer?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	10
2. <input type="checkbox"/> No	3

### OHS Background

#### 5. Does your company take into consideration OHS during construction process?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	7
2. <input type="checkbox"/> No	6

#### 6. Check the personal protective equipment's that your construction company provides workers to use at construction site.

(Select more than one.)

Choice	Answer
1. <input type="checkbox"/> Head protection	9
2. <input type="checkbox"/> Eye protection	2
3. <input type="checkbox"/> Protective footwear	5
4. <input type="checkbox"/> Fall protection harnesses	1
5. <input type="checkbox"/> All the above	1
6. <input type="checkbox"/> others	0
7. <input type="checkbox"/> None	3

#### 7. Do you have emergency procedures and emergency phone number displayed at the construction site?

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	5
2. <input type="checkbox"/> No	8



**8. Please check: Duties that your company assigns or check during construction.**

Choice	Answer
1. <input type="checkbox"/> Remove hazards from work area	5
2. <input type="checkbox"/> Regular safety inspection	6
3. <input type="checkbox"/> Safety manager assign responsibilities	1
4. <input type="checkbox"/> Inspection made for equipment's to make sure that the operators can see you	1
5. <input type="checkbox"/> All the above	1
6. <input type="checkbox"/> None	3

**9. Which procedure is right in lifting weight?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Lift with legs, not the back	10
2. <input type="checkbox"/> Lift with back, not the legs	3

**10. Does your company, trains workers in safe work practices?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	3
2. <input type="checkbox"/> No	10

**11. Have you heard before that: A clean jobsite means a safe jobsite?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	8
2. <input type="checkbox"/> No	5

**12. Did any of your workers had an accident during construction?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	12
2. <input type="checkbox"/> No	1

**13. In case you answered yes in the previous question, please specify the case you heard or seen.**

Choice	Answer
1. <input type="checkbox"/> Worker struck by a falling object.	7

2. <input type="checkbox"/> Worker struck by a moving vehicle	4
3. <input type="checkbox"/> Worker exposed to electrical shock.	1
4. <input type="checkbox"/> Worker working from height.	7
5. <input type="checkbox"/> All of the above	1
6. <input type="checkbox"/> Non	1

**14. Do the accidents cause any financial issues to your company?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	13
2. <input type="checkbox"/> No	0

**15. Do you recommend other companies to use OHS check list?**

(Select only one.)

Choice	Answer
1. <input type="checkbox"/> Yes	13
2. <input type="checkbox"/> No	0