

**Deanship of Graduate Studies
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**Occupational hazards among laboratory workers
in Palestinian governmental hospitals in the
West Bank**

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**Occupational hazards among laboratory workers
in Palestinian governmental hospitals in the
West Bank**

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Thesis Approval

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Jerusalem-Palestine

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Dedication

**To My Parents, Wife, Brothers, Children and Friends
To All Who Supported Me in This Study**

الإقرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان :

Occupational hazards among laboratory workers in Palestinian governmental hospitals in the West Bank

أقر بأن ما اشتملت عليه هذه الرسالة إنما هي نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه كمرجع حيثما ورد، وأن هذه الرسالة ككل، أو جزء منها لم يقبل لنيل أي درجة أو لقب علمي أو بحثي لدى أية مؤسسة تعليمية أو بحثية أخرى .

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name :

اسم الطالب :

Signature :

التوقيع :

Date:

التاريخ:

Acknowledgments

After thanking Allah, who granted me the power to finish this work, I would like to express my gratitude and appreciation, to all who have contributed to the success of this study. My most profound gratitude goes to my supervisor Dr. Mohammad Shaheen, who guided me and gave me his time till I accomplished this study.

I sincerely hope that this study will be beneficial to the policy makers, and strategic planners.

Finally, my special gratitude is due to my parents, wife, brothers, children and friends for their constant support and encouragement.

Abstract

Laboratory workers are exposed to a wide range of hazards associated with the materials they employ and the methods they use in the course of their work. These occupational hazards are chemical, physical, biological, psychosocial, and ergonomics hazards. This study aims to assess the exposure to occupational health hazards and safety for workers in Palestinian governmental hospitals in the West Bank. Cross sectional study was conducted using self-administered 5-point Likert Scale questionnaire. The study sample consists of all laboratory workers in the governmental hospitals. The total number of the study sample was 164 laboratory workers, 146 responded with a response rate 89%.

The results of the study showed that 75% of the participants have exposed to biological hazards, 70% exposed to chemical hazards, 64% exposed to physical hazards, 60% exposed to psychological hazards, and 52% exposed to ergonomic hazards. The results also showed that the biological hazards were the more severe with 68%, chemical hazards 64%, psychological hazards 58%, physical hazards 51%, and ergonomic hazards 49%. The results showed that the participants have a very high degree of knowledge about occupational hazards. Results also showed that the degree of performance information and satisfaction was medium, and the laboratory workers apply safety measures.

Moreover, there are no statistically significant differences of occupational hazards according to social status variable, educational level variable.

Similarly, there are no statistically significant differences of occupational hazards perception and knowledge, safety measures, performance information and satisfaction domains, according to age, monthly income, and years of experience variables. On the other hand, there are significant differences in the work environment, according to age, gender, monthly income, and years of experience variables.

The results showed that there are no significant differences of safety measures and performance information and satisfaction domains, attributed to gender variable, and there are significant differences of occupational hazards perception and knowledge domain, according to gender variable.

Finally, the results showed that the participants have a very high degree of knowledge about occupational hazards, means of prevention and safety that related to work environment are available, more than half of participants exposed to hazard regardless of the type of hazards, where the biological hazards was the highest and more severe.

According to the study results, several recommendations have been suggested including creating a specialized section for occupational health and safety, linked directly to senior management, to ensure the provision of specialized committees and supervisors to provide follow-up and control means and safety procedures

ملخص الدراسة

يتعرض العاملون في المختبرات للعديد من المخاطر المرتبطة مع المواد التي يستخدمونها و الوسائل التي تستخدم في سياق عملهم. هذه المخاطر المهنية هي مخاطر كيميائية وفيزيائية وبيولوجية ونفسية اجتماعية، واطار الملائمة مع بيئة العمل . تهدف هذه الدراسة لتقييم التعرض لمخاطر الصحة والسلامة المهنية للعاملين في المختبرات الطبية في مستشفيات وزارة الصحة الفلسطينية الحكومية في الضفة الغربية . وقد أجريت دراسة مقطعية باستخدام مقياس ليكرت الخماسي. تكونت عينة الدراسة من جميع العاملين في المختبرات في المستشفيات الحكومية في الضفة الغربية. وكان العدد الإجمالي لعينة الدراسة 164 ، ونسبة الاستجابة 89 %.

وأظهرت نتائج الدراسة ان 75 % من المشاركين يتعرضون لمخاطر بيولوجية ، و 70 % يتعرضون لمخاطر كيميائية ، و 64 % يتعرضون لمخاطر فيزيائية، و 60 % يتعرضون لمخاطر نفسية اجتماعية ، و 52 % يتعرضون لمخاطر الملائمة مع بيئة العمل. وأظهرت النتائج أيضا أن المخاطر البيولوجية كانت أكثر خطورة بنسبة 68 % ، تليها المخاطر الكيميائية بنسبة 64 %، والمخاطر النفسية الاجتماعية بنسبة 58 %، و المخاطر الفيزيائية بنسبة 51 %، ومخاطر الملائمة مع بيئة العمل بنسبة 49 % حسب وجهة نظر المشاركين في الدراسة.

أظهرت نتائج الدراسة ان المشاركين لديهم درجة عالية جدا من المعرفة حول المخاطر المهنية . وأظهرت النتائج أيضا أن درجة معلومات الأداء والرضا الوظيفي كانت متوسطة، وان العاملين في المختبرات يستخدمون وسائل وتدابير السلامة.

وعلاوة على ذلك ، لا توجد فروق ذات دلالة إحصائية من المخاطر المهنية وفقا لمتغير الحالة الاجتماعية، و متغير المستوى التعليمي. وبالمثل لا توجد فروق ذات دلالة إحصائية للوعي المهني للمخاطر المهنية ، وتدابير السلامة ، و معلومات عن الأداء و الرضا الوظيفي ، وفقا لمتغيرات العمر ، والدخل الشهري ، و سنوات من الخبرة. و من ناحية أخرى هناك فروق ذات دلالة إحصائية في بيئة العمل ، وفقا لمتغيرات العمر والجنس و الدخل الشهري و سنوات من الخبرة المتغيرات.

أظهرت النتائج ايضا أنه لا توجد فروق ذات دلالة إحصائية لمجالات تدابير السلامة و معلومات الأداء و الرضا الوظيفي تعزى لمتغير الجنس، وهناك فروق ذات دلالة إحصائية للمخاطر المهنية في مجال الوعي المهني وفقا لمتغير الجنس.

أخيرا ، أظهرت النتائج أن المشاركين لديهم درجة عالية جدا من المعرفة حول المخاطر المهنية ، ووسائل الوقاية و السلامة المتوفرة والتي تعود لبيئة العمل ،وان أكثر من نصف العاملين في المختبرات يتتعرضون للمخاطر المهنية بغض النظر عن نوع تلك المخاطر ، حيث كانت المخاطر البيولوجية ذات الدرجة الأعلى والأكثر خطورة.

وفقا لنتائج الدراسة، تم اقتراح عدة توصيات منها إنشاء قسم متخصص بالصحة و السلامة المهنية ، وترتبط مباشرة إلى الإدارة العليا ، لضمان توفير اللجان و المشرفين المتخصصون لمتابعة ومراقبة وسائل و إجراءات السلامة.

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CDC	Centers for Disease Control and Prevention
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCWs	Health-care workers
HIV	Human Immunodeficiency Virus
HSV	Herpes simplex virus
ILO	International Labor Organization
MOH	Ministry of Health
NGOs	Non-Governmental Organizations
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
SARS	Severe Acute Respiratory Syndrome
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
UK	United Kingdom
UNRWA	United Nation Relief Work Agency
VZV	Varicella zoster virus
WHO	World Health Organization

Chapter One

Introduction

Chapter 1

Introduction

1.1. Introduction

Occupational hazards cause or contribute to the premature death of millions of people worldwide and result in the ill health or disablement of hundreds of millions more each year. The burden of disease from selected occupational risk factors amounts to 1.5% risks of the global burden in terms of daily. The World Health Report 2002 places occupational risks as the 10th leading cause of morbidity and mortality. According to the report, work related injuries cause nearly 310,000 deaths each year. However, workers are exposed to a wider range of occupational hazards and risks including chemical, physical and biological hazards as well as inadequate ergonomics practice and high psychosocial stress. (WHO, 2002).

Approximately 100 million workers in many of the nations are exposed to some kind of occupational health hazards such as, carcinogenic agents, pulmonary or other physical disease incident, physical agents or job-related pressures of noise, crowding, or stress. Exposure to toxic chemicals or physical hazards may be associated with chronic lung disease, cancer, degenerative disease in a number of vital organ systems, birth defects, and genetic changes. These exposures are estimated to result in 100,000 Americans dying each year from occupationally related illnesses, with an additional 400,000 cases of occupationally related disease. Yet many workers are inadequately protected from common hazards. Recent experience has demonstrated that occupational hazards can be controlled by modifying the work environment, patterns of job performance, or both. Among the health protection measures available are those which alter the work environment to prevent exposures and injuries; provide workers with special protective equipment; specify design and maintenance of equipment; and provide employees with proper training. ("Health protection: Occupational safety and health," 1983)

Because their job is to care for the sick and injured, HCWs are often viewed as "immune" to injury or illness. They are often expected to sacrifice their own well-being for patients Health-care workers (HCWs) need protection from these workplace hazards

just as much as do mining or construction workers. Yet,. Indeed health protecting health-care workers has the added benefit to contributing to quality patient care and health system strengthening. Some of the same measures to protect patients from infections, such as adequate staffing, protect health-care workers from injury. The 2006 World Health Report Working Together for Health on human resources reported on a global shortage of health personnel which had reached crisis level in 57 countries, and called for the support and protection of the health workforce. Unsafe working conditions contribute to health worker attrition in many countries due to work-related illness and injury and the resulting fear of health workers of occupational infection, including from HIV and Tuberculosis. (WHO, 2006).

WHO's global occupational health strategy in the context of Health for All includes ten inter-related principles:

- ❖ Primary prevention
- ❖ Safe technology
- ❖ Optimization of working conditions
- ❖ Continuous follow-up and development of occupational health and safety
- ❖ Government responsibility, authority and leadership in the development and control of working conditions
- ❖ Primary responsibility of the employer and economic sectors on health and safety at the workplace
- ❖ Recognition of employees own interest in occupational health and safety
- ❖ Cooperation and collaboration on equal basis by employers and workers
- ❖ Right to know and principle of transparency
- ❖ Right to participate in decisions concerning one's own work.

(WHO, 1994)

Occupational health is concerned with health in its relation to work and working environment. Occupational health implies not only health protection but also health promotion. Working in a laboratory is a challenging and risk job. Whether you are performing laboratory procedure, or biological material, hazards are ever present for laboratory workers. (OSHA, 2011).

Laboratory Medicine deals with almost all medical conditions, which is a medical specialty complementary to other specialties as it is very important and irreplaceable. The Laboratory Medicine is considered as one of the basic medical branches and complementary to all other disciplines, where most clinicians need the laboratory reports to complete the examination of patients; as they depend on reports for proper diagnosis, treatment plan, and follow-up treatment. The scientific studies have proven that laboratory role of 50 % to 80% of the diagnosis, treatment and follow-up policy, and this reflects the size of the role and importance of this profession and this specialization. The laboratory medicine is relatively a new science, where it is located in the middle between science and medicine. Therefore it takes a lot of space in the field of scientific and medical research in the areas of health and life. (Palestinian Technology Association magazine: Laboratory Medicine, March 2012, p7).

Occupational hazards exist wherever health care is practiced and Safety monitoring forms an important element of workplace safety and quality of health care. In the Laboratory, existence of chemical, biological and radiological hazards in confined spaces poses questions about safety that need to be dealt with. Without proper rules, training of workers and knowledge of the nature of the risks people are facing, laboratories can be very dangerous places. (Akhter et al., 2011).

Any laboratory worker who handles blood or any biological sample may be at risk for accidental injury or exposure. Since all public- and private-sector hospital-based laboratory personnel continuously deal with known and/ or unknown pathogens, they are continuously at risk for occupational infection (Karamat et al., 2005).

Michell (2010) states that health workers have been identified as a neglected group with regard to the monitoring of their occupational health status, and their health does not get the attention it deserves by employers.

According to (WHO, 2005b) the risk of contracting an infection from the patients is emerged high in developing countries where the hygienic conditions in hospitals may be problematic and where infectious diseases are rampant.

Numerous hazards present in hospitals common with other complex employment settings and industries. A great variety of jobs are performed in health care facilities including: direct patient care, laboratory and research work, laundry, food preparation, trades, security work, waste disposal, driving, office and library work, housekeeping and maintenance, and pharmacy. The highest occupational hazards to which hospital workers may be exposed can be classified into five broad categories: biological, chemical, physical, ergonomic, and psycho-social hazards. (Sangeetha Natarajan, Hospital Supportive Service, 2010)

1.2. Occupational injuries

It is defined as sudden, anticipated, and unwanted events during work, leading to harm or damage to at least one part of the body (Poulson et al., 1995).

In Palestine, the Palestinian labor law, has defined the work injury in section one, chapter 1, article 1, as an accident that happens to worker during work, because of work or while going to or returning from work, it is considered as one of the vocation diseases specified by the system (Ministry of Labor, 2002; Palestinian labor law, 2000).

1.4. Occupational diseases

Despite the continued efforts in improving working conditions and the rapid development of safety and health technologies for the workplace, work-related hazards exist in almost all occupations. The International Labor organization (ILO), in paragraph 6(1) of the afore-mentioned recommendations N0.121 defines occupational diseases as follows; "Each Member should under prescribed conditions, related diseases known to arise out of the exposure to substances and dangerous condition in process, trades, or occupations as occupational diseases". The protocol of 2002 of the Occupational Safety and Health Convention in 1981, defines occupational disease as

any disease contracted as a result of an exposure to risk factors arising from work activity (African Newsletter on Occupational Health and Safety, 2002).

Occupational disease is any illness associated with a particular occupation or industry. Such diseases result from a variety of biological, chemical, physical, and psychological factors that are present in the work environment or are otherwise encountered in the course of employment. Occupational medicine is concerned with the effect of all kinds of work on health and the effect of health on a worker's ability and efficiency. Occupational diseases that are related to faulty working conditions can be preventable. The control of occupational health hazards decreases the incidence of work-related diseases and accidents and improves the health and morale of the work force, leading to decreased absenteeism and increased worker efficiency. In most cases the moral and economic benefits far outweigh the costs of eliminating occupational hazards. (Encyclopedia Britannica, 2009).

1.4. Problem statement

Since laboratory is the area where the employees are exposed to various occupational hazards, all laboratory workers should be aware of health hazards and should take appropriate measures to prevent that.

The right to work in a safe & healthy environment is the fundamental right of every worker. Traditionally hospitals and health institutions were considered to be safer than any other work environment and health care workers were viewed as professionals who are capable of maintaining their health without assistance, thus administrators have allocated few resources to the occupational health and safety. (Alli, 2001).

Occupational hazards have been a long-standing concern of the health care setting. Studies indicate that health care workers have higher rates of hazards than other professions and elevated rates of depression and anxiety linked to job stress. (NIOSH, 2008).

Health and safety in clinical laboratories is becoming an increasingly important subject as a result of emergence of highly infectious diseases such as Hepatitis, and HIV. The worker in the hospital laboratory deals with a wide variety of materials. The

workers in laboratories generally are deal with many occupational hazards at work. These hazards can be physical, chemical, biological, psychosocial hazards, and ergonomic hazards. The prevention of occupational hazards in laboratories requires a thorough knowledge of the hazards and practical measures to be taken. (Zaveri et al., 2012).

The gravity of workplace risks is seen in the recent International Labour Organization (ILO) estimate that among the world's 2.7 billion workers, at least 2 million deaths per year are attributable to occupational diseases and injuries. The ILO estimates for fatalities are the tip of the iceberg because data for estimating nonfatal illness and injury are not available for most of the globe. Underreporting of sharps injuries by employees is well documented in the literature with estimates ranging from 22% to 99%, and has been found to vary by occupation and by hospital (Nagao et al., 2009).

A medical laboratory or clinical laboratory is a laboratory where tests are done on clinical specimens in order to get information about the health of a patient as pertaining to the diagnosis, treatment, and prevention of disease.

http://en.wikipedia.org/wiki/Medical_laboratory, 2013.

1.5. Justification of the study

Laboratory workers are exposed to a wide range of hazards associated with the materials they employ and the methods they use in the course of their work. The subject has been of increasing interest in recent years and the hazards to health professionals.

Because of the permanent deal of those who working in health facilities with infectious and dangerous substances, we find that those people have a risk to get many infectious diseases, such as Hepatitis, which are transmitted in different ways and this will limit the performance of their daily tasks, those persons must not carry any disease which will influence their work.

The laboratory environment can be a hazardous place to work. Laboratory workers are exposed to numerous potential hazards including chemical, biological, physical, psychosocial hazards, and ergonomical hazards. Many workers are unaware of the

potential hazards in their work environment, which makes them more vulnerable to injury.

As occupational diseases and diseases related to the profession and injuries profession are all produced in the environment or the workplace, so we must study the work environment to detect places dangerous to health, in order to control and determine the standards appropriate to prevent incidence of occupational diseases, and therefore easier to monitor from time to time.

There are only two studies on occupational health one focus on ergonomic hazards among health workers in general and the other focus on occupational health hazards among nurses, and the two studies were done in Gaza.

1. Jouda, A, (2006), occupational health hazards among governmental health workers in the Gaza Strip: master thesis. Palestine

2. Nattat, E, (2010), occupational health hazards among nurses in governmental primary health care centers in Gaza Strip: master thesis. Palestine.

1.6. Objectives

1.6.1 General objectives

The aim of the study is to assess the exposure to occupational health hazards and safety for workers in in Palestinian governmental hospitals in the West Bank

1.7.2 Specific objectives

1 - To identify the main hazards that occurs among the laboratory workers in the governmental hospitals.

2 - To study the relationship between the actual exposure to occupational hazards and socio-demographic factors.

3- To identify safety and risk reduction measures used in the target laboratories.

4- To assess the awareness of laboratory workers of the main hazards and safety measures in their work settings.

1.7. Research questions

- 1- What are the main types of occupational hazards that face the personnel working in the medical laboratories?
- 2- Do laboratory workers have sufficient knowledge about occupational health hazards?
- 3- Are laboratories workers satisfied with their work environment?
- 4- What measures do laboratory workers take in their workplace to protect them from potential hazards?

1.8. Hypotheses of the study

- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to Age variable.
- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain according to gender variable.
- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain according to marital status variable.
- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to monthly income variable.
- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance

Information and satisfaction domains, Work Environment domain, according to years of experience variable.

- There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain according to Education variable.

1.9. Health System

The four main health providers of health services in Palestine are Ministry of health, UNRWA, NGOs, and Private for profit. MOH bears the heaviest burden, as it has the responsibility; in Gaza Strip, there are (59) primary health care centers and in the West Bank, there are (394) primary health care centers. The health services are distributed throughout Palestine. In addition MOH provides a number of specific health programs as: health education/community involvement, school health, immunization, human resources development, and referral of patients to non – MOH facilities (when services are not available in governmental facilities). UNRWA operates (18) primary health care centers scattered in eight refugee camps in the Gaza Strip and (41) centers in the West Bank. The NGOs sector operates (194) primary health care centers and general clinics, (57) of them in Gaza Strip, and in the West Bank they operate (137) primary health care centers. (MOH, 2010).

1.10. Hospitals in Palestine

There are (76) hospitals in Palestine; (51) in West Bank and (25) in Gaza Strip, with total number of (5,108) beds in government and non-government hospitals; (60%) in West Bank and (40%) in Gaza Strip. (74.5%) of them are general beds, (16.1%) specialized beds, (3.3%) rehabilitation beds and (6.5%) maternity beds. In Palestine, there are (12.6) beds per 10,000 of populations; (12.2), bed in West Bank and (13.3) bed in Gaza Strip.

The Ministry of Health owns and manages (63.6%) of public hospital beds in Palestine and (66.1%) of the specialized hospital beds, and (12.7%) of the birth beds, and all the beds of psychiatric and neurological diseases.

All of the beds of rehabilitation centers and physical therapy in Palestine are owned and managed by non-governmental organizations.

The number of hospitals of the Ministry of Health is (25), with clinical capacity of (3002) beds, (58.8%) of the total number of beds in Palestine. There are 12 hospitals of them in the West Bank, with a capacity of clinical (1367) beds. (MOH, annual report 2010).

1.12. Definitions

Occupational hazards: a working condition that can lead to illness or death.

Physical hazards: Include those hazards which are mechanical in nature or involve contact with an object that causes harm in some way.

Psychosocial hazards: those aspects of the design and management of work, and its social and organizational contexts that have the potential for causing psychological or physical harm.

Ergonomic hazards: Laboratory tasks such as looking through microscopes, working in laboratory hoods, and prolonged standing at laboratory benches and pipetting, which require repetitive movements and sustained posturing, that lead to discomfort or even injury, and musculoskeletal problems.

Chemical hazards: An element or mixture of elements or synthetic substances that are considered harmful to employees.

Biological Hazard: Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Knowledge: It is the information possessed by staff regarding occupational blood and body fluid exposure such as meaning, infections caused by the exposure, mode of transmission of infections, prevalence of infections, preventive measures , management of spillage and post exposure prophylaxis and follow up of infections measured using structured self-administered questionnaire.

A **medical laboratory** or **clinical laboratory:** is a laboratory where tests are done on clinical specimens in order to get information about the health of a patient as pertaining to the diagnosis, treatment, and prevention of disease.

Laboratory worker: (also referred to as a **medical technologist**, a **clinical scientist**, or **clinical laboratory technologist**) laboratory staff, or a healthcare professional who have a certificate, diploma, bachelor, master or PhD and performs medical analyses and tests.

Work Environment: Workplace which is a set of circumstances or a situation that could harm a person's interest, such as their health or welfare.

Job satisfaction: Is the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs.

Safety measures: Action taken to protect patients and office personnel from such known hazards as particles and aerosols from high-speed rotary instruments, mercury vapor, radiation exposure, anesthetic and sedative gases, falls, inadequate sterilization, cuts, puncture wounds, and laboratory accidents.

Chapter Two

Literature Review

Chapter 2

Literature Review

2.1. Literature review

Occupational health is defined as the promotion and maintenance of highest degree of physical, mental and social wellbeing of workers in all occupation by preventing departures from health, controlling risk and the adaptation of work to people and people to their job. (Agius, 2010).

A worker may be exposed to 5 types of hazards; physical, chemical, biological, mechanical and psychological. Diseases due to physical hazards include heat burns, heat cramps, cold trench foot, frost bite, occupational cataract etc. Causative agents of chemical hazards are gases, dusts and chemicals. Biological hazards mainly include Tetanus, and Anthrax, and psychological hazards include frustration, tension, and depression. (Park, 2000).

Occupational Safety and Health Administration studies conducted in various laboratories in the U S, states that the laboratory environment can be a hazardous place to work. Laboratory safety is governed by numerous local, state and federal regulations. Over the years, OSHA has promulgated rules and published guidance to make laboratories increasingly safe for personnel. There are several primary OSHA standards that apply to laboratories as well as other OSHA standards that apply to various aspects of laboratory activities. (OSHA, 2011).

Laboratory workers are exposed to a wide range of hazards associated with the materials they employ and the methods they use in the course of their work. The literature on medical laboratory hazards has largely centered on infections and, therefore, on microbiological establishments. This is partly because laboratory-acquired infections tend to be more easily remembered than other hazardous events. (Harrington&Shannon, 1977).

2.2. Types of occupational hazards

1. Biological hazards
2. Chemical hazards
3. Physical hazards
4. Ergonomic hazards
5. Psychosocial hazards

1. Biological hazards

Due to their dealing with infected persons health providers may get biological hazards which are caused by living organisms, these usually microscopic, which pose serious threats. There are many types of these living organisms that cause biological hazards. The epidemics of AIDS and hepatitis B have influenced the medical and assistance practice and are considered a labor exposure due to the possible contact with viruses through direct contact with patients and handling of contaminated fluids. Hepatitis B is the most frequent among occupational infectious diseases. Needles prick injuries are the most common injuries in health care sector. The prevention of transmission of HIV through needles – prick injury is very important, particularly in high HIV prevalence areas. (WHO 1997).

The World Health Organization (WHO, 2005 b) estimates that unsterilized syringes cause between 8 to 16 million cases of hepatitis B, 3 to 4.7 million cases of hepatitis C, and 80,000 to 160,000 cases of HIV every year. Needle stick and other sharps injuries are a serious hazard in any medical care situation. These injuries are caused by different types of needles and sharps, such as scalpels and broken glass containers. Contaminated needles and sharps may inject healthcare workers with blood that contains pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), all of which pose a grave, potentially lethal, risk. Although immunization is available to prevent hepatitis B illness, no immunization is available to prevent HCV or HIV (CDC, 2010).

Biological hazards, also known as biohazards, are organic substances that pose a threat to the health of humans and other living organisms. Generally speaking,

biological hazards include pathogenic micro-organisms, viruses, toxins (from biological sources), spores, fungi and bio-active substances. Biological hazards can also be considered to include biological vectors or transmitters of disease. Outside the health arena, biological hazards include substances that cause social and economic disruption, property damage and environmental degradation, such as insect plagues or infestations. Worldwide, it is estimated that around 320000 workers die each year from communicable diseases caused by work-related exposures to biological hazards (Driscoll et al., 2005; OSHA 2007).

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In the United Kingdom (UK), the Health Protection Agency (HPA) monitors significant occupational exposures and potential transmission of HIV, HCV and HBV from patients to healthcare workers through a national surveillance scheme. Needle stick or sharps injuries occur when a needle or other sharp instrument accidentally penetrates the skin. If the needle or sharp instrument is contaminated with blood or other body fluid, there is the potential for transmission of infection. (London Health Commission, 2004).

The National Audit Office report of April 2003, A safer place to work, found that needle stick and sharps injuries account for 17 per cent of accidents to national health services (NHS) staff and are the second most common cause of injury, behind moving and handling at 18 per cent. The major blood-borne pathogens of concern associated with needle stick injury are:

- Hepatitis B virus (HBV) Hepatitis C virus (HCV)

- Human immunodeficiency virus (HIV)

(Cullen et al., 2006)

In 2003, WHO published a report on the disease burden due to sharps injuries among health care workers. Three million exposures occur per year globally. As a consequence, 40% of hepatitis B, 40% of hepatitis C, and 4.4% of HIV in health care workers are due to needle stick injuries. One thousand health care workers die every year from occupational HIV, which can and should be prevented. Unfortunately, over 80% of health care workers remain unimmunized in many parts of the world, despite the 95% efficacy of HBV immunization. (WHO, 2003).

A study of healthcare workers in British Columbia showed that Laboratory assistants had the highest exposure rates from needle stick injuries and splashes, it is important that laboratory workers are well trained in all aspects of laboratory hazards such as biological hazards, chemical hygiene, and proper ergonomic use of equipment.(Akhter et al., 2011).

Medical sharps injuries have been recognized as one of the occupational hazards among healthcare workers. Medical sharps injuries cause about 2 million HBV, 900,000 HCV and 170,000 HIV infections among health-care workers each year globally (WHO, 2006). These blood borne infections have serious consequences, including long-term illness, disability and death and are a matter of concern for many African as well as Asian countries (Al-Ansi et al., 2006).

The Centers for Disease Control and Prevention (CDC) estimates that 385,000 needle sticks and other medical sharps injuries occur per year among hospital workers in the United States (CDC, 2008). Other Authors have estimated the annual rate in the United States to be between 500,000 and 800,000 (Jagger J. et al, 2008). It is estimated that 100,000 Needle stick injuries occur annually in the United Kingdom alone and 500,000 annually in Germany (Ramphal, L. et al; 2010). The epidemiology of medical sharps injuries could be higher considering studies on underreporting of medical sharps injuries. For instance, in the United States of America, an extensive survey documented an underreporting of medical sharps injuries at 58%, while other studies estimate underreporting at 90% (Braun, B., 2011).

Globally, 3 million healthcare workers are exposed to blood borne pathogens through the percutaneous route annually, 90% of these cases occur in the developing countries (WHO, 2006).

Different studies have established that healthcare workers are prone to needle stick and medical sharps injuries. In Iran, a descriptive cross-sectional study among hospitals staff found that 75.6% of the 352 healthcare workers experienced at least one needle stick injury in that year (Nasiri et al., 2010).

As a measure of likelihood of injury among hospital workers, it has been estimated that 28 sharps injuries occur annually for every 100 occupied hospital beds (Perry et al., 2009 b).

In South Africa, a cross-sectional retrospective survey assessing the prevalence of needle-stick and sharps injuries found (21%) of the respondents to have been exposed to sharps injuries despite the high risk of occupational exposure to HIV among health care workers in busy labour wards.(Wafula, 2012).

2. Chemical hazards

Occupational exposures to organic solvents on a daily basis can have serious health effects on the health and well-being of laboratory employees. There are certain common sense measures that can be taken in laboratories to prevent or limit these exposures. The harmful effect of organic solvents has been an issue of great concern for environmental and public health professionals for several years; as a result many prevention programs were established to control or reduce unnecessary exposures (Brautbar & Williams 2002).

Laboratories should be appropriately equipped for the handling of hazardous chemicals, in that hazardous chemicals should only be handled in chemical fume hoods. In addition laboratory employees should also be equipped with the correct type of personnel protective equipment (PPE) or whenever practical, elimination or substitution of the hazardous chemicals by one with similar technical properties should be employed in order to reduce the risk. Additionally it is important that laboratory personnel avoid or minimize skin contact and inhalation of solvent vapors. After using solvents, employees should wash gloves prior to removal, especially for dichloromethane, and wash hands again prior to eating or drinking (OSHA's Sanitation Standard-29CFR1910.141). However, employees should not eat or drink in the laboratory because chemical and laboratory safety should be an inherent value for every laboratory employee (29CFR 1910.1450). (Alexis, 2012).

Burnett et al conducted a study in 1999 which examined cancer mortality in healthcare science technicians. They used mortality data from death certificates collected between 1984 and 1995 in the National Occupational Mortality Surveillance Database. They calculated the Proportionate Cancer Mortality Ratios (PCMR) for selected cancers among female health and science technicians aged 18-90 years old at time of death. They found that among clinical laboratory technologists, Non-Hodgkin's lymphoma mortality was higher among women aged 18-64 years old. The authors concluded that the increase incidence of cancer could be related to chemical exposures in the work place.

Exposure to organic solvents can vary depending on work conditions and practices. These exposures can be acute (single dose, high concentration exposures over short periods) or chronic (repeated or continuous over long periods) exposures that may initiate toxic responses or cause changes to the functioning of organs in the body (Occupational Health and Safety 29CFR1910). However, a certain set of monitoring and working practices are required to prevent adverse health effects (Dimenstein, 2009).

In 2010, Viegas et al conducted a study on the genotoxic effects in occupational exposure to formaldehyde. The study was carried out in Portugal using 80 workers: 50 workers from pathology and anatomy laboratories and 30 workers from formaldehyde-based resins production. Exposure assessment was aimed at measuring the ceiling values of formaldehyde and evaluation of the genotoxic effects was performed by application of micronucleus test in exfoliated epithelial cells from buccal mucosa and peripheral blood lymphocytes. The authors observed that the frequency of micronucleus in peripheral blood nucleus was significantly higher in the group of workers from the pathology laboratories than in factory workers. A positive correlation was also found between years of exposure and micronucleus frequency in peripheral blood lymphocytes and in epithelial cells for workers with long term exposures to formaldehyde.

There is evidence that human exposure to chemicals at levels once thought to be innocuous could have potentially harmful effects. For instance formaldehyde, formalin, and xylene exposures are safety concerns in a pathology laboratory and these chemicals are considered carcinogens by the International Agency for Research on Cancer (Bancroft & Gamble, 2008).

Occupational exposures to organic solvents on a daily basis can have serious health effects on the health and well-being of laboratory employees. There are certain common sense measures that can be taken in laboratories to prevent or limit these exposures. The harmful effect of organic solvents has been an issue of great concern for environmental and public health professionals for several years; as a result many prevention programs were established to control or reduce unnecessary exposures. There is evidence that human exposure to chemicals at levels once thought to be innocuous could have potentially harmful effects. For instance formaldehyde, formalin, and xylene exposures are safety concerns in a pathology laboratory and these chemicals are considered carcinogens by the International Agency for Research on Cancer. (Alexis, 2012).

Laboratories can be places of discovery and learning but they can also be places of danger if proper common-sense precautions are not taken. The use of organic solvents is extremely widespread in laboratories for experimental and routine work, and while the degree of hazard may vary, all solvents should be considered potentially hazardous (Ridgway et al., 2003).

3. Physical hazards

A cross-sectional epidemiological study was conducted by Raskeviciene & Maroziene in 2005. The questionnaire was distributed among workers of biochemical and clinical laboratories in 6 hospitals of Kaunas city. Objectives of the study were to evaluate the main health disorders of laboratory workers and to define the relationship between the health complaints and working conditions in biochemical and clinical laboratories. Laboratory assistants were exposed to higher number of workplace hazards rather than other workers. All health complaints were also more prevalent among laboratory assistants. Weakness, sleepiness at work, headache and sleep disturbances was the most prominent complaints among them to compare with other occupations. Skin irritation due to chemicals was more frequent among laboratory assistants as well. The most frequent localization of irritation was in hands. Complaints due to eyestrain were found in almost one third of responders. Neck pain, back pain, waist pain and joint pain due to long lasting fixed position was rather frequent among laboratory workers. Inconvenient work posture increased risk for waist pain, neck pain, and sleep disorders. Mental stress is common in job of laboratory workers

A UK survey carried out in 2004 by the Health and Safety Executive showed that 7.7% of participating laboratories reported technicians' health had suffered through coming into contact with dangerous chemicals or biological agents. 99.2% said that measures taken to reduce the risk of developing an upper limb disorder were inadequate. 15.5% of respondents said adequate training of workers was not provided in respect of mechanical and electrical hazards. Stress related illnesses were the most frequent cause of serious work related ill health among laboratory workers. 15% of private sector respondents reported that technicians had left or changed their positions due to stress. (Akhter et al., 2011).

4. Ergonomic hazards

Laboratory workers are at risk for repetitive motion injuries during routine laboratory procedures such as pipetting, working at microscopes, operating microtomes, using cell counters and keyboarding at computer workstations. Repetitive motion injuries develop over time and occur when muscles and joints are stressed, tendons are inflamed, nerves are pinched and the flow of blood is restricted. Standing and working in awkward positions in front of laboratory hoods/biological safety cabinets can also present ergonomic problems. By becoming familiar with how to control laboratory ergonomics-related risk factors, employers can reduce chances for occupational injuries while improving worker comfort, productivity, and job satisfaction. In addition to the general ergonomic guidance, laboratory employers are reminded of some simple adjustments that can be made at the workplace. While there is currently no specific OSHA standard relating to ergonomics in the laboratory workplace, it is recommended that employers provide the information to laboratory workers contained in the new OSHA fact sheet highlighted below.(Gile, 2009).

Many lab tasks can lead to discomfort or even injury. Specific laboratory tasks that can lead to ergonomics problems, such as prolonged standing at laboratory benches or hoods, pipetting, microscopy, and lifting heavy objects. (Caskey, 1999).

5. Psychosocial hazards

Due to psychological factors hospitals are stressful place for staff (Sadleir, 2010). Job in hospitals combines with high level of job demand and excessive work load which create job strain and stress among health care workers. The psychological hazards like work load, highly demanded work, fatigue both mental and physical and burn out are common in hospital environment which create stress depression and mental fatigue for its workers (Sadleir, 2010).

A cross-sectional descriptive survey was conducted from November 2008 to June 2009 to assess the occupational hazards faced by the Nurses and Midwife students during their clinical practice in all Degree program Nursing and Midwifery Schools in Addis Ababa .The study results shown that the majority of the study population (93.1%) indicated that they have got needle prick, blood splash and skin cuts during their clinical practice. The result confirms that physical, biological, psychosocial and mechanical factors cause occupational hazards in the clinical practice. (Chewaka, 2009).

Managerial atmosphere also affect ratio of exposure to both psychological and physiological hazards. There is a strong link between occupational (chemical, physical) and organizational (lack of safety training, low level of safety climate, practices) risk factor on workplace injuries in public hospitals employees. Lack of training, low level of safety climate, and safety practices are reasons for which hospital workers are exposed to workplace injuries (Gimeno et al., 2005).

Despite the high-risk perception of the health care workers toward occupationally acquiring infection, there is quiet low level of practice of health care workers towards prevention of occupationally acquired infection. In response to the demand on health institution a substantial research and literature has been developed looking at the impact of AIDS on health care to identify particularly stressful factors .(Chewaka, 2009).

2.1.2. Safety measures

A cross sectional study was conducted by Ajaz Mustafa. A, and others to find out the safety measures being adopted in clinical laboratories of India (International Journal of Health Science in 2008). Seventy three percent of laboratories had safety education

program regarding hazards. In 91% of laboratories staff is using protective clothing while working in laboratories. Hazardous material regulations are followed in 78% of laboratories. Regular health check-ups are carried among laboratory staff in 43.4% of laboratories. Safety manual is available in 56.5% of laboratories. 73.9% of laboratories are equipped with fire extinguishers. In 78.26% of laboratories suitable measures are taken to minimize formation of aerosols. In 95.6% of laboratories waste is disposed of as per bio-medical waste management handling rules. Installing safety engineered devices apparently contributes to significant decrease in injuries in laboratories. (Ajaz et al., 2008).

A study was conducted by Shaikh AH, regarding safety procedures in laboratory; five types of hazards encountered in the clinical laboratory and a list of safety procedures designed to avoid or minimize them are identified. The safety procedures are written in a precise and easy-to-follow manner so that they can be adopted and used in any clinical laboratory. Medical technology educators are encouraged to teach safety procedures and enforce them in the student laboratory. (Shaikh, 1979).

Biosafety is an important issue in laboratory settings worldwide and especially in developing countries where standard operating procedures (SOPs) are lacking. Biosafety during lab work and the transferring of lab material from one place to another is a critical tool in the global fight against infectious diseases and exposures to laboratory personnel, particularly those working in microbiological laboratories as they are exposed to biohazards which may result in laboratory-acquired infections. (Aksoy et al., 2008).

Appropriate barriers (gloves, face shields, goggles, gowns, masks) are used to prevent exposure of the skin and mucous membrane when coming in contact with blood or body fluids. Hands and other areas of the body are immediately washed if they become contaminated with blood or body fluid. Sharp items should be handled with extreme care. Disposable needles, scalpel blades, and other sharp items are placed in special, marked, puncture proof containers. (Chewaka, 2009).

It is important that laboratory workers are well trained in all aspects of laboratory hazards such as biological hazards, chemical hygiene, and proper ergonomic use of equipment. A study of 84 laboratory personnel in a Turkish study found the lowest number of correct responses on a questionnaire was associated with the topic of waste

disposal. Results of this study showed that laboratory personnel would benefit greatly from educational initiatives designed to promote laboratory safety (Ozsahin et al., 2006).

An observational study was conducted for assessing the observance of universal precautions by health care workers. Doctors, trained and auxiliary nurses, laboratory scientists and domestic staffs were participated in the study. The instrument was an interviewer-administered, semi structured questionnaire. There were 433 respondents. Study result shown that less than two-thirds of respondents (63.8%) always used personal protective equipment, and more than half of all respondents (56.5%) had never worn goggles during procedures. The provision of sharps containers and screening of transfused blood by the institutions studied was uniformly high. A high percentage (94.6%) of health care workers observed hand washing after handling patients. The use of barrier equipment was variable in the institutions studied. Training programs and other relevant measures should be put in place to promote the appropriate use of protective barrier equipment by health care workers at all times. (Wilson et al., 2006).

Promoting an overall culture of safety in the workplace, eliminating the unnecessary use of needles and other sharp devices, using devices with sharps injury prevention features, employing safe workplace practices, and training health care personnel, sharps injury surveillance is also a key component of a comprehensive program. (CDC, 2008).

There have been several published studies that focused on occupational exposures to organic solvents and also discussed knowledge, attitudes and practices of workers. The laboratories in the two colleges of medicine and their teaching hospitals in Lagos, Nigeria. Their study sought to determine the knowledge, attitude and practice of universal precautions amongst medical laboratory workers. They randomly sent out 300 questionnaires to medical laboratory scientists, doctors, laboratory attendants, laboratory technicians and post graduate students. Their overall response rate was 51.3%. The attitude and practices of laboratory workers were found to be very poor because 45.6% of the respondents ate in the laboratories, 47% of respondents stored food in the refrigerators meant for chemicals and 36.5 % of respondents did not know that tissues fixed in formalin can transmit infection. This study confirmed that the ultimate responsibility for laboratory safety lies with the supervisors who should be

committed to improving safe work practices by supplying adequate training programs and the necessary information on universal precautions.

A study was conducted to assess health care workers adherence to Universal Precautions practice in a Western Algerian university hospital. A questionnaire was administered to 450 health care workers in the hospital work place setting. A field survey was also conducted in order to take into account the means and support available to the workers in those hospital departments. A total of 133 health care workers participated in the survey. The study results shown that lack of Universal Precaution adherence is primarily due to the lack of awareness and knowledge as well as insufficient supply of equipment and materials for good hand hygiene maintenance. The study highlighted the urgent need to implement a program to improve Universal Precaution adherence among health care workers. Greater adherence to Universal Precautions will also reduce the risk of occupational blood-borne injury and infection. (Beghdadli et al., 2008).

Sub-Saharan countries in Africa have a heavy burden of HIV/AIDS and other blood borne infectious diseases and high usage of injections. Lack of safe devices in hospitals because of the low expenditure on health care, occupational safety and health services and a high ratio of patients to health care worker contribute to a work environment predisposing the health care workers to a great risk of needle stick injuries, and consequently, to blood borne infections. (Chewaka, 2009).

2.1.3. Occupational hazards perception and knowledge

Exposures to blood and other body fluids occur across a wide variety of occupations. Health care workers, emergency response and public safety personnel, and other workers can be exposed to blood through needle stick and other sharps injuries, mucous membrane, and skin exposures. The pathogens of primary concern are the human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV). Workers and employers are urged to take advantage of available engineering controls and work practices to prevent exposure to blood and other body fluids. So the lack of knowledge regarding blood borne diseases and universal precaution is the main reason for increased incidence rate among health care workers. (Boal et al., 2008).

A study at Kenyatta National Hospital on the perceptions of occupational risk of exposure to blood borne pathogens among registered nurses recommends the need for further research on other risk factors which contribute to occupational exposures (Ngesa, 2008).

A cross sectional study was conducted to investigate the knowledge, attitudes and practices among health care workers towards blood borne pathogens. The study population consisted of physicians, nurses and laboratory technicians. Result shows that the knowledge of the epidemiological characteristics of blood-borne infection, the risk of acquisition and available preventative measures among health care workers are insufficient. Doctors were more knowledgeable about the transmissibility of blood borne pathogens regarding sexual transmission after percutaneous exposure. Nurses and lab technicians reported professional exposure to patient's blood more often than doctors. Less than half of health care workers used appropriate barriers (gloves, mask, and glasses) to protect them regularly. Conclusion says that the compulsory preventive measures such as continuous education, immunization against Hepatitis B, implementing Standard Precautions, as well as the development of written guidelines on the prevention of blood-borne infections must be implemented. (Stein et al., 2003)

An observational study was conducted to determine the impact of infection control activities on the rate of needle stick injuries among health care workers at Aga Khan University Hospital, Karachi. They implemented an education program for the health care workers. During the study period junior doctors, medical lab technicians and staff nurses sustained highest number of injuries. An increasing trend was pre-intervention period; however noticeable fall was noted in the post-intervention period. Major decline was noted among lab technicians. They concluded significant reduction in needle stick injuries especially during post-intervention period. That was being achieved by constant emphasis on improving awareness by regular educational sessions. (Zafar et al., 2009).

An experimental study was conducted to compare the risk of Blood-borne infections among health care workers in different hospitals and also between health care workers and students in medical field. 625 health care workers and PG students with clinical attachments were selected to participate in the study. The result obtained showed that the risk of transmission of blood-borne diseases varied significantly according to professional ranks and the medical intensive care unit, laboratory, hemodialysis, and

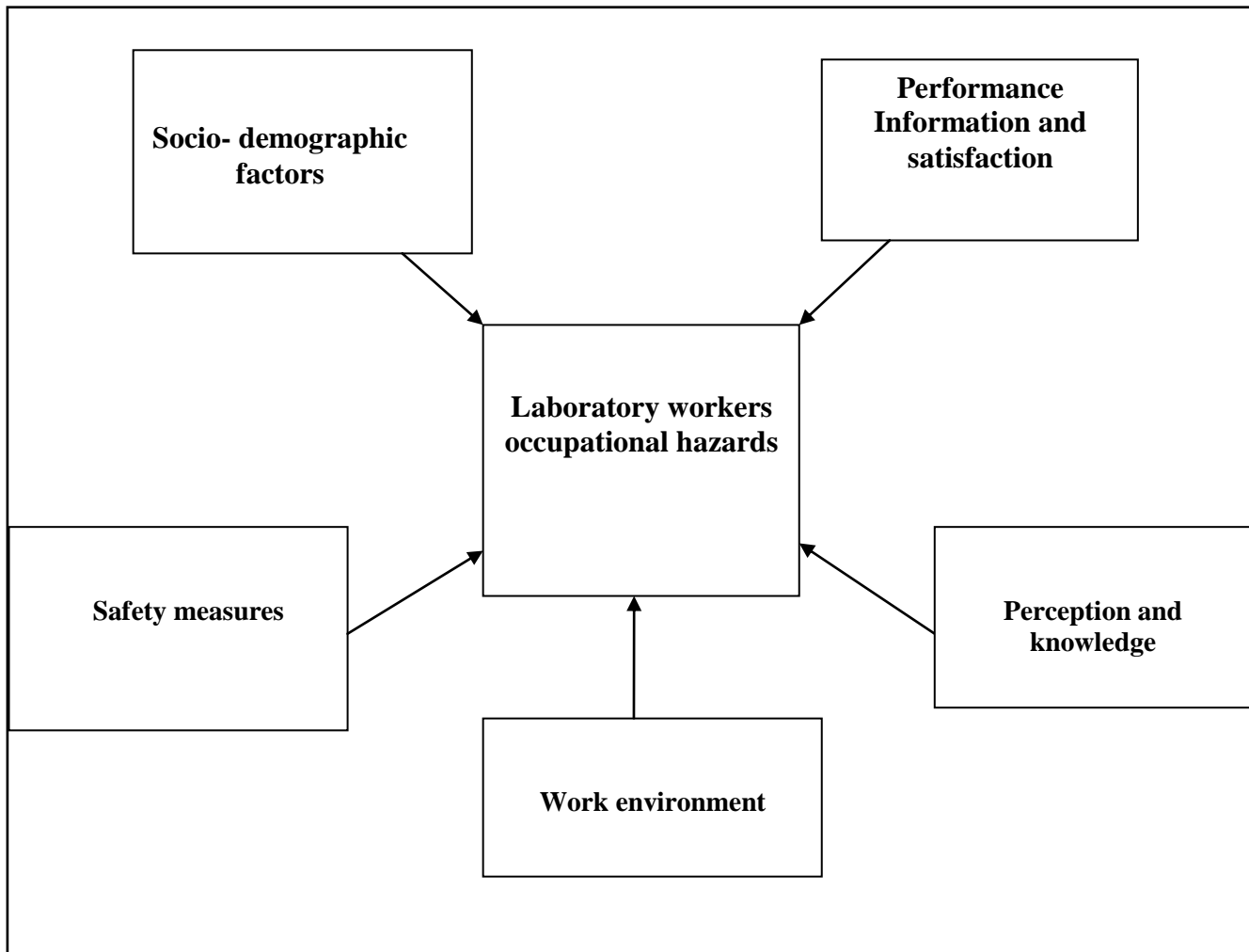
nephrology and urology units had the highest scores for the risk of infection. Preventive measures taken by the subjects in the study were not satisfactory especially with reference to the use of personal protective equipment and the practice of Universal precautions. They suggested the importance of in-service education regarding risk of blood-borne diseases and Preventive measures. (Hesham et al., 2008).

Tak-Sun et al in 2005 investigated the prevalence of good knowledge, appropriate attitude and safe practice regarding organic solvents among painting workers in Hong Kong and examined whether safe practices were influenced by the knowledge of and attitude towards the harmful effects of organic solvents. They found that the prevalence of good knowledge, appropriated attitude and safe practice among painters were low; 20.4%, 38.4% and 22.0% respectively. Thus they concluded that appropriate attitude was dependent on having good knowledge and that good knowledge of organic solvents was associated with awareness of relevant legislations. Additionally, safe practice was not dependent on knowledge and attitude but was associated with being informed of safety precautions.

A study conducted on assesses the knowledge, attitude and practices among health care workers on needle stick injuries revealed that 4% and 61% of health care workers respectively were unaware of the fact that hepatitis B and hepatitis C can be transmitted by needle-stick injuries. 52 subjects (74%) had a history of needle-stick injuries and only 21% reported the injuries to the hospital authority. 79% were of the impression that needle should be recapped after use. Only 66% were aware of Universal Precaution Guidelines. And revealed that knowledge of health care workers about the risk associated with needle-stick injuries and use of preventive measures was inadequate. (Gurubacharya et al., 2003).

2.3. Conceptual framework

Figure (1) Conceptual framework



This study was conducted to assess the exposure to occupational health hazards and safety for workers in medical laboratories of the ministry of health hospitals. Different risk factors are contributing to occupational hazards to laboratory workers. A conceptual model involving the potential risk factors was done. The laboratory workers affected by occupational hazards Biological, Chemical hazards, Physical hazards, Ergonomic hazards, and psychosocial hazards.

The occurrence of occupational hazards for laboratory workers depends on factors related to:

- The workers (socio-demographic factors) such as sex, age, knowledge, and education.
- The workplace (work environment).
- The organizational facilities such as safety measure.
- The health care system such as Performance Information and satisfaction monitoring and supervision, legislative, flexibility of the system and exposure standards.
- The occupational hazards perception and knowledge.

Chapter Three

Methodology

Chapter 3

Methodology

3.1. Study design

Cross-sectional study design was adopted due to its simplicity, time saving, less expensive, and useful for descriptive and evaluate purposes in addition to assess the cause and effect at the same point of time. Cross sectional studies are relatively quick and economic processes to conduct (Pilot &Hunger, 1999).

3.2. Study population and sampling

The target population consists of all laboratory workers in the governmental hospitals in the West Bank; their total number is (164) distributed over 12 governmental hospitals according to the Ministry of Health annual report 2010 as follows:

Table (1) distribution of sample by hospitals

Hospital	No. lab Technicians
Jenin (Khalil Suleiman)	21
Tulkarm (Thabit Thabit)	14
Al Watani – Nablus	13
Rafidia – Nablus	21
Qalqilia (Darwish Nazal)	7
Salfit (Yasser Arafat)	8
Ramallah's Sons Ward	27
Jericho	9
Beit Jala (Al Husein)	15
Hebron (Alia)	21
Yatta (Abu Al hasan Al kasem)	7
Bethlehem (Psychiatric)	1
Total	164
Males	87
Females	77

(MOH, 2010).

3.3. Setting of the study

The study was carried out at laboratories in the governmental hospitals in the West Bank which includes (12) hospitals.

3.4. Eligibility

3.4.1. Inclusion criteria

All full-time the laboratory technicians in the laboratories of governmental hospitals.

3.5. Period of the study

The study was conducted in the period between May and June 2012.

3.6. Research tool

The researcher used self-administered questionnaire, which was consists of five sections:

Section one consists of personal data including socio-demographic data, second section consists of the data related to occupational hazards perception and knowledge, the third section includes work environment, the fourth section includes questions about safety measures of the employees, and the fifth section consists questions of performance information and satisfaction.

3.7. Tool Correction

For achieving the questions purpose, means, standard deviations, percentages, and response degree for each item were used.

The items percentages were given the following scale

- More than 80.0% very High
- From 70.0-79.9% High
- From 60.0-69.9% Medium.
- From 50.0-59.9% Low
- Less than 50.0% very Low.

3.8. Validity

Validity of the questionnaire was revised by 7 experts (Annex 1); the experts approved the validity of the questionnaire in general but suggested some modifications.

3.9. Pilot Study

In order to evaluate the clarity of the questions in the questionnaire and to ensure that the validity and reliability of the instrument and the reactions of the respondents to the questions, pilot study was conducted for 20 laboratory workers. Based on the results of the pilot testing, modifications were made to questionnaire.

3.10. Reliability

To determine the reliability of the questionnaire, the researcher used Cronbach Alpha for reliability. The reliability coefficient for questionnaire was 0.764, which indicated that the questionnaire was reliable, and this reliability coefficients value is suitable for research purposes.

3.11. Ethical Considerations

The researcher attached an explanatory in Arabic to each questionnaire (Annex 2), which clarifies the purpose and confidentiality of the study. Every participant was provided with an explanatory form about the study including consent form.

3.12. Data collection

Questionnaire distribution and data collection were performed according to standard procedures. The researcher reviewed over the completed questionnaires to ensure that all information needed is completed. The data collection carried out from May 2012 to June 2012.

3.13. Data analysis

After collection, the questionnaire was coded and entered into computer and analyzed by biostatistician using SPSS (Statistical Package for Social Sciences) program and applying descriptive statistics (means, frequencies, standard deviation, and percentage), Independent Sample T-Test, cross tab, and one way ANOVA test.

3.14. Limitations of the study

- ❖ The sample of the study was small.
- ❖ Time factor because all laboratory workers do not available every day in the hospitals.
- ❖ Limited cooperation of some participants during filling the questionnaire.

Chapter Four

Results

Chapter 4

Results

4.1. Socio- demographic factors

4.1.1. Sample distribution by age.

Most laboratory workers were below 45 years in age; 23.3% of the study population was 30 years and less, 18.5% in the age group (30 – 34) years, 28.1% in the age group (35 – 39) which is the youngest group, 15.1% in the age group (40 – 44) years, 15.1% were 45 years and over, as shown in table(2).

Table (2) sample distribution by age

Age/years	Frequency	Percent	Valid Percent	Cumulative Percent
less than 30	34	23.3	23.3	23.3
30-34	27	18.5	18.5	41.8
35-39	41	28.1	28.1	69.9
40-44	22	15.1	15.1	84.9
45 and over	22	15.1	15.1	100
Total	146	100	100	

4.1.2. Sample distribution by sex

Males and females were nearly equal in number in the study population, male subjects represents 50.3% of the study population, while female represents 49.3%, this as shown in table(3).

Table (3) Sample distribution by sex

Sex	Frequency	Percent	Valid Percent	Cumulative Percent
Males	73	50.0	50.7	50.7
Females	71	48.6	49.3	100.0
Total	144	98.6	100.0	
Missing System	2	1.4		
Total	146	100.0		

4.1.3. Sample distribution by marital status

Eight seven percent (87%) of the target population was married, 12.3% was single, and 0.7% was widowed, as demonstrated in table (4).

Table (4) Sample distribution by marital status

marital status	Frequency	Percent	Valid Percent	Cumulative Percent
Married	127	87.0	87.0	87.0
Single	18	12.3	12.3	99.3
Widowed	1	0.7	0.7	100.0
Total	146	100.0	100.0	

4.1.4. Sample distribution by monthly income

The majority of the study population has monthly income between (2501 – 3500) (NIS), with 74%, 19.2% has monthly income between (3501- 4500) (NIS), 3.4% of the study population has monthly income less than 2500 (NIS), and 3.4% has monthly income more than 4500 (NIS), as shown in table (5).

Table (5) Sample distribution by monthly income

Monthly income /NIS	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 2500 (NIS)	5	3.4	3.4	3.4
2501 – 3500 (NIS)	108	74.0	74.0	77.4
3501 – 4500 (NIS)	28	19.2	19.2	96.6
More than 4500 (NIS)	5	3.4	3.4	100.0
Total	146	100.0	100.0	

4.1.5. Sample distribution by years of experience

The majority of laboratory workers (80.1%) have more than 5 years of experience, 19.9% of the respondents have had experience less than 5 years, 20.5% have experience from (5 – 9) years, 32.9% have experience from (10 – 14) years, 14.4% have experience from (15 – 19) years, 12.3% have experience more than 20 years, as it was shown in table (6).

Table (6) Sample distribution by years of experience

Experience/years	Frequency	Percent	Valid Percent	Cumulative Percent
less than 5	29	19.9	19.9	19.9
5-9	30	20.5	20.5	40.4
10-14	48	32.9	32.9	73.3
15-19	21	14.4	14.4	87.7
20+	18	12.3	12.3	100.0
Total	146	100.0	100.0	

4.1.6. Sample distribution by qualification (educational level).

The majority of the study population has Bachelor degree with 79.5%, 13% of them has Diploma degree, and 7.5% have Master degree. As indicated in table (7).

Table (7) Sample distribution by qualification (educational level)

Educational level	Frequency	Percent	Valid Percent	Cumulative Percent
Diploma degree	19	13.0	13.0	13.0
Bachelor degree	116	79.5	79.5	92.5
Master degree	11	7.5	7.5	100.0
Total	146	100.0	100.0	

4.2. Sample distribution by other jobs

Table (8) shows 6.8% of the study population has other job, 89.7% do not have other job, and 3.4% has sometime other job.

Table (8) Sample distribution by having other jobs

Other jobs	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	10	6.8	6.8	6.8
No	131	89.7	89.7	96.6
Sometimes	5	3.4	3.4	100.0
Total	146	100.0	100.0	

4.3. Distribution of participants who work other job according to extra working hours

Only 10% of the laboratory workers other or sometime have other jobs, from the participants who have other or sometimes have other job, 6.7% of them work 3 hours every week, 13.3% work 4 hours/ week, 13.3% work 7 hours / week, 6.7 % work 12 hours/week, 13.3% work 20 hours/ week, 6.7% work 25 hours/ week, 26.7% work 30 hours/ week, 13.3% work 35hours/week.

No. of hours	Frequency	Percent	Valid Percent	Cumulative Percent
3	1	6.7	6.7	6.7
4	2	13.3	13.3	20.0
7	2	13.3	13.3	33.3
12	1	6.7	6.7	40.0
20	2	13.3	13.3	53.3
25	1	6.7	6.7	60.0
30	4	26.7	26.7	86.7
35	2	13.3	13.3	100.0
Total	15	100.0	100.0	

4.4. Types of occupational hazards

Biological and chemical hazards have the highest percentages of occupational hazards that the laboratory worker exposed to, with 75% of the participants have exposed to biological hazards, and 70% exposed to chemical hazards. 64% exposed to physical hazards; 60% exposed to psychological hazards, and, 52% exposed to ergonomic hazards which was the lowest., as shown in figure (2).

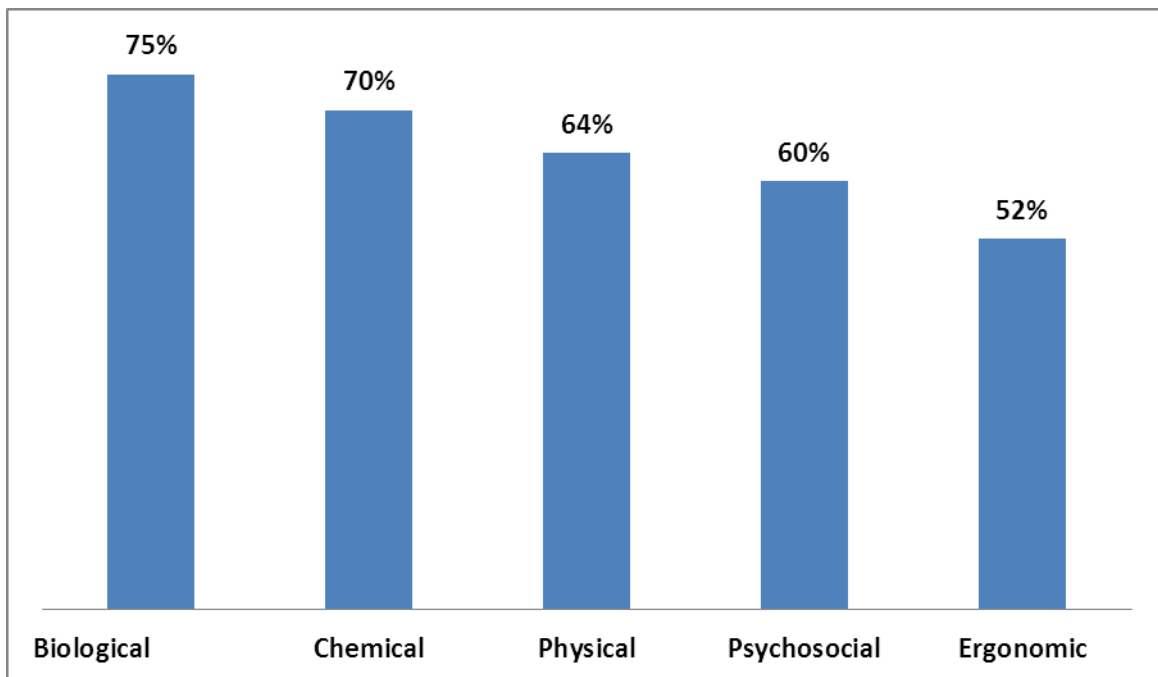


Figure (2) Type of hazard the participant exposed to

4.5. Severity of occupational hazards.

The occupational hazards that participants exposed to were more severe for biological and chemical hazards as shows in figure (3) , with biological hazards 68%; chemical hazards 64%, psychological hazards58%, physical hazards51%, and ergonomic hazards 49%,. Biological and chemical hazards have the highest percentages among others due to the nature of the laboratory works. The lowest percentages refer to ergonomic and psychological hazards.

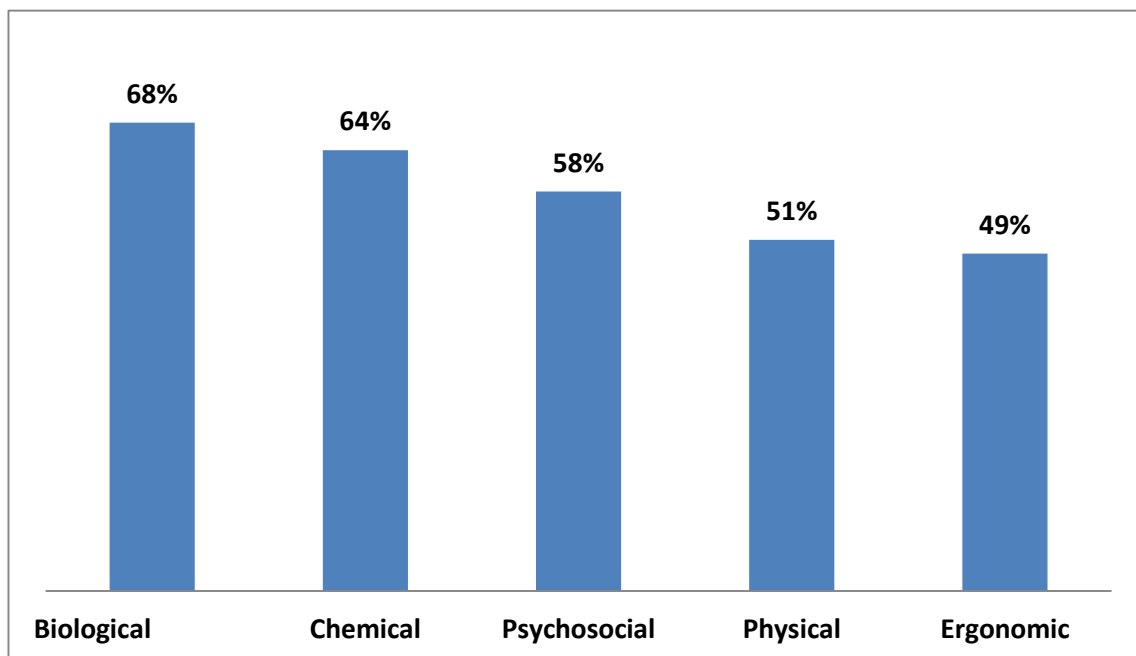


Figure (3) ranking of hazards according to severity

4.6. Occupational hazards perception and knowledge

Table (10) Means, standard deviation, and percentage for Occupational hazards perception and knowledge domain.

N	statement	Mean	Std. Deviation	percent	Estimation level
11	I have information about occupational health	4.21	0.589	84.2	Very high
12	I am aware of the occupational hazards at work	4.42	0.572	88.4	Very high
13	I know how to avoid occupational hazards	4.25	0.616	85.0	Very high
14	I know about preventive measures to be taken at work	4.19	0.646	83.8	Very high
15	I know what hazards I am being exposed to	4.27	0.677	85.4	Very high
16	I know how I may be affected	4.24	0.613	84.8	Very high
17	I know what I have to do to keep myself and others safe	4.17	0.678	83.4	Very high
18	I know how to check and spot when something goes wrong, and to whom I will report any problems	3.92	0.765	78.4	High
Total score of Occupational hazards perception and knowledge domain		4.20	0.495	84.0	Very high

The results in table (10) showed that the present status of occupational hazards among laboratory workers in occupational hazards perception and knowledge domain, which are very high on items (11, 12, 13, 14, 15, 16 and 17) where the percentages of responses are respectively (84.2%, 88.4%, 85.0%, 83.8%, 85.4%, 84.8% and 83.4%), and high on item (18), where the percentages of responses are respectively (78.4%). These items refer to the possession of information, awareness about the hazards, knowing the avoidance of these hazards and preventative measures and knowing ways of being safety.

The total score of the occupational hazards perception and knowledge domain is very high where the percentage of responses is (84.0%). This indicates that the participants have a very high degree of knowledge about occupational hazards.

4.7. Work Environment

Table (11) Means, standard deviation, and percentage for work environment domain

No.	statement	Mean	Std. Deviation	percent	Estimation level
21	The application of safety measure	4.71	0.525	94.2	Very high
22	Standing for long hours	4.31	0.86	86.2	Very high
23	Carrying heavy weights	2.44	1.15	48.8	Low
24	Wearing gloves	4.74	0.588	94.8	Very high
25	Wearing special shoes	3.97	1.117	79.4	High
26	Wearing a mask	3.77	1.002	75.4	High
27	Concentration and intensity of attention	4.79	0.598	95.8	Very high
Total score of Work Environment domain		4.10	0.45	82.0	Very high

The result of table (11) show that the present status of occupational hazards among laboratory workers in work environment domain which are very high on items (21, 22, 24, 27) where the percentages of responses are respectively (94.2%, 86.2%, 94.8%, 95.8%). These items refer to the application of safety measures, efforts of standing for long hours, wearing gloves and paying attention during works. The responses are high on items (25, 26), where the percentages of responses are respectively (79.4%, 75.4%). These items refer to wearing special shoes and masks. On the other hand, the responses were low in carrying heavy weights and stuffs and this due to the laboratory works circumstances which don't demand this kind of jobs.

The total score of the work environment domain is high where the percentage of responses is (82.0%). This indicates that means of prevention and safety that related to work environment are available.

4.8. Safety measures

Table (12) Means, standard deviation, and percentage for safety measure domain

No	statement	Mean	Std. Deviation	percent	Estimation level
28	Eating, drinking, smoking and applying cosmetics are prohibited in this laboratory.	4.01	1.06	80.2	Very High
29	Pipetting by mouth is prohibited	4.83	0.688	96.6	Very high
30	Appropriate protective clothing worn at all times in the laboratory, and gloves worn when required	4.06	1.182	81.2	Very High
31	The laboratory clean and tidy	3.95	1.11	79.0	High
32	All work surfaces appropriately decontaminated at the end of each working day and immediately after any spillage	3.72	1.185	74.4	High
33	I wash my hands when I leave the laboratory	4.71	0.55	94.2	Very high
34	Care taken to avoid the formation of aerosols or splashing of materials	3.84	1.057	76.8	High
35	All contaminated waste or reusable materials appropriately decontaminated before disposal or reuse	3.75	1.253	75.0	High
36	Access to the laboratory to authorized personnel only	2.93	1.413	58.6	Low
37	All incidents or accidents reported immediately and appropriate action taken to prevent further occurrences	3.77	0.96	75.4	High
38	Sharp containers used and disposed of properly	4.02	1.054	80.4	Very High
39	The disinfectant used is appropriate and its efficacy ensured	3.86	0.975	77.2	High
Total score of Safety measures domain		3.96	0.69	79.2	High

The result of table (12) show that the occupational hazards among laboratory workers in Safety measures domain which are very high on items (28, 29,30 and 33), with the percentages of responses are respectively (80.2%, 96.6%, 81.2%, 94.2% and 80.4%), high on items (31,32,34,35,37, 39) , with the percentages of responses are respectively (79% 74.4%,76.8%,75%,75.4%,and 77.2%), low in item (36) where the percentage is (58.6%).

The total score of the Safety measures domain is high where the percentage of responses is (79.2%). This indicates that the participants apply safety measures.

4.9. Performance Information and satisfaction

Table (13) Means, standard deviation, and percentage for Performance Information and satisfaction

No	statement	Mean	Std. Deviation	percent	Estimation level
40	My assigned work tasks exceed my capabilities.	3.36	1.21	67.2	Medium
41	I want to change my work place	3.19	1.39	63.8	Medium
42	Usually I arrive late to my work.	1.78	0.85	35.6	Very low
43	I am intentionally reducing my performance at work	1.55	0.8	31.0	Very low
44	I am satisfied with my work.	3.53	1.13	70.6	High
45	I feel I am being paid a fair amount for the work I do (salary)	2.23	1.15	44.6	Very Low
46	My job gives me a reasonable level of financial security	2.36	1.19	47.2	Very Low
47	My salary is able to cater for my needs and my family needs	2.08	1.04	41.6	Very Low
48	I have opportunity to participate in decision-making.	2.86	1.21	57.2	Low
49	There is really too little chance for promotion on my job	3.65	1.22	73.0	High
50	I feel my job is meaningless	2.05	0.992	41.0	Very Low
51	My supervisor is unfair to me	2.69	1.27	53.8	Low
52	I do not feel that the work I do is appreciated	3.13	1.24	62.6	Medium
53	There are few rewards for those who work here	3.23	1.52	64.6	Medium
54	I am satisfied with my chances for promotion	2.03	1.06	40.6	Very Low
55	There is too much bickering and fighting at work	3.10	1.2	62.0	Medium
56	If I am given another opportunity, I will still choose this same profession	2.82	1.46	56.4	Low
57	I feel I am adequately valued, recognized and appreciated as a laboratory technician	2.67	1.51	53.4	Low
Total score of Performance Information and satisfaction domain		2.68	0.35	53.6	Low

The result of table (13) show that the occupational hazards among laboratory workers in Performance Information and satisfaction domain were high on items (44,49) ,with the percentages of responses were respectively (70.6%, 73%,), which refer to the employee's satisfaction and the little chance to development into the occupation , medium on items (40, 41, 52, 53, 55) , where the percentages of responses were respectively (67.2%,63.8%,62.6%,64.6%,62.0) which refer to hardness of the tasks, the desire to change the work, the feeling with not appreciation, few rewards and the dispute among workers , low on items (48, 56,57), where the percentages of responses are respectively (57.2%, 56.4%, 53.4) the practicing of decision- making process, and choosing the same job in another opportunity , and very low on (42, 43, 45,46, 47,50, 54), where the percentages of responses are respectively (35.6%, 31.0%, 44.6%, 47.0%,41.0%, 40.6%) which refer to arriving late to work, reducing performances intentionally , paid a fair amount for the work, the adequateness of the salary, and feeling the meaningless of the job .The total score of the Performance Information and satisfaction is medium where the percentage of responses is (53.6%), this indicates that the degree of Performance Information and satisfaction was medium.

In order to answer the hypotheses of the study about if there is a relationship between the means of occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, according to the variables of age, gender, marital status, monthly income, years of experience and educational qualification, Two independent sample t- test and One way ANOVA test have been used and the following tables show the results.

Table (14) Frequencies, means and standards deviations of occupational hazards and its domains, according to age variable.

One way

Domain	Age/years	N	Mean	Std. Deviation
Occupational hazards perception and knowledge	less than 30	34	4.2132	0.44
	30-34	27	4.1759	0.53
	35-39	41	4.1311	0.57
	40-44	22	4.2386	0.51
	45 and over	22	4.3523	0.36
	Total	146	4.2080	0.50
Work Environment	less than 30	34	4.2815	0.41
	30-34	27	4.3175	0.48
	35-39	41	4.0592	0.42
	40-44	22	3.8571	0.46
	45 and over	22	3.9026	0.34
	Total	146	4.1047	0.45
Safety measures	less than 30	34	3.9853	0.79
	30-34	27	3.8910	0.71
	35-39	41	3.8476	0.66
	40-44	22	3.9848	0.65
	45 and over	22	4.2197	0.57
	Total	146	3.9649	0.69
Performance Information and satisfaction	less than 30	34	2.6601	0.35
	30-34	27	2.5453	0.35
	35-39	41	2.7642	0.29
	40-44	22	2.6490	0.37
	45 and over	22	2.7753	0.39
	Total	146	2.6838	0.35

Table (15) Results of One Way ANOVA Test for occupational hazards and its domains according to age variable

Domain	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Occupational hazards perception and knowledge	Between Groups	0.75	4	0.19	0.76	0.555
	Within Groups	34.92	141	0.25		
	Total	35.66	145			
Work Environment	Between Groups	4.62	4	1.15	6.45	0.000*
	Within Groups	25.23	141	0.18		
	Total	29.85	145			
Safety measures	Between Groups	2.41	4	0.60	1.27	0.285
	Within Groups	66.86	141	0.47		
	Total	69.27	145			
Performance Information and satisfaction	Between Groups	1.01	4	0.25	2.15	0.078
	Within Groups	16.61	141	0.12		
	Total	17.62	145			

***. The mean difference is significant at the 0.05 level.**

Table (15) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, according to Age variable. Also table (15) indicates that there are significant differences at the level ($\alpha = 0.05$) in the means of Work Environment domain, according to Age variable.

The highest significant rates were for domain one and three (Occupational hazards perception and knowledge and Safety measures).

In order to know for whom the differences are, LSD Test for comparable distance was used to clarifying the differences which is shown in the following table.

Table (16): shows LSD Test for comparable distance for the degree of the second domain (Work Environment) according to age

Level Age/years	Less than 30	30-34	35-39	40-44	45 and more
Less than 30	***	-0.03595	0.22228*	0.42437*	0.37892*
30-34	***	***	0.25823*	0.46032*	0.41486*
35-39	***	***	***	0.20209	0.15664
40-44	***	***	***	***	-0.04545
45 and more	***	***	***	***	***

*. The mean difference is significant at the 0.05 level.

Table (16) indicates that there are differences between (Less than 30) and (35- 39, 40-44 and 45 and more) and these differences are for the level of (Less than 30). Similarly, there are differences between the level of (30-34) and (35-39, 40-44 and 44 and more) and these differences are for the level of (30-34).

Table (17) Results of t-test for occupational hazards and its domains according to gender

Domain	Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Occupational hazards perception and knowledge	Male	73	4.29	0.48	2.198	142	0.030*
	Female	71	4.11	0.50			
Work Environment	Male	73	3.93	0.39	-4.703-	142	0.000*
	Female	71	4.27	0.46			
Safety measures	Male	73	3.90	0.77	-1.121-	142	0.206
	Female	71	4.03	0.61			
Performance Information and satisfaction	Male	73	2.64	0.35	-1.321-	142	0.189
	Female	71	2.72	0.35			

*. The mean difference is significant at the 0.05 level.

Table (17) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of Safety measures and Performance Information and satisfaction domains, attributed to gender variable. Also Table (17) indicates that there are significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and

knowledge and Work Environment domains, according to gender variable, in favor of females.

The female means were high in all domains except for the first one (Occupational hazards perception and knowledge)

The highest significant values were for domain three and four (Safety measures and Performance Information and satisfaction).

Table (18) Results of t-test for occupational hazards and its domains according to marital status variable

Domain	Marital status	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Occupational hazards perception and knowledge	Married	127	4.20	0.495	-0.510	142	0.611
	Single	18	4.260	0.525			
Work Environment	Married	127	4.12	0.417	0.550	142	0.583
	Single	18	4.06	0.650			
Safety measures	Married	127	3.98	0.672	0.726	141	0.469
	Single	18	3.85	0.784			
Performance Information and satisfaction	Married	127	2.68	0.355	-0.771	142	0.442
	Single	18	2.74	0.317			

Table (18) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of all domains according to marital status variable. All domains have highest significant values.

Table (19) Frequencies, means and standards deviations of occupational hazards and its domains, according to Monthly income variable

One way

Domain	Monthly income(NIS)	N	Mean	Std. Deviation
Occupational hazards perception and knowledge	Less than 2500	5	3.90	0.083
	2501 - 3500	108	4.18	0.049
	3501 - 4500	28	4.33	0.087
	More than 4500	5	4.38	0.227
	Total	146	4.21	0.047
Work Environment	Less than 2500	5	4.46	0.029
	2501 - 3500	108	4.15	0.045
	3501 - 4500	28	3.90	0.073
	More than 4500	5	3.94	0.140
	Total	146	4.10	0.038
Safety measures	Less than 2500	5	3.98	0.290
	2501 - 3500	108	3.95	0.067
	3501 - 4500	28	3.98	0.139
	More than 4500	5	4.10	0.119
	Total	146	3.96	0.057
Performance Information and satisfaction	Less than 2500	5	2.58	0.170
	2501 - 3500	108	2.67	0.032
	3501 - 4500	28	2.75	0.081
	More than 4500	5	2.80	0.042
	Total	146	2.68	0.029

Table (20) Results of One Way ANOVA Test for occupational hazards and its domains according to Monthly income variable.

Domain	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Occupational hazards perception and knowledge	Between Groups	1.101	3	0.367	1.508	0.215
	Within Groups	34.564	142	0.243		
	Total	35.665	145			
Work Environment	Between Groups	2.165	3	0.722	3.702	0.013*
	Within Groups	27.683	142	0.195		
	Total	29.849	145			
Safety measures	Between Groups	0.119	3	0.040	0.083	0.969
	Within Groups	67.252	141	0.477		
	Total	67.370	144			
Performance Information and satisfaction	Between Groups	0.290	3	0.097	0.791	0.501
	Within Groups	17.331	142	0.122		
	Total	17.621	145			

*. The mean difference is significant at the 0.05 level.

Table (20) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, according to monthly income variable. On the other hand, the same table indicates that there are significant differences at the level ($\alpha = 0.05$) in the means of the second domain (work environment) domain, according to monthly income variable.

The highest significant values were for domain three and four (Safety measures and Performance Information and satisfaction).

In order to know for whom the differences are, LSD Test for comparable distance was used to clarifying the differences which is shown in the following table.

Table (21): shows LSD Test for comparable distance for the degree of the second domain (Work Environment) according to monthly income variable.

Level				
Monthly income (NIS)	Less than 2500	2501-3500	3501-4500	More than 4500
Less than 2500	***	0.30767	0.55918*	0.51429
2501-3500	***	***	0.25151*	0.20661
3501-4500	***	***	***	-0.04490
More than 4500	***	***	***	***

***. The mean difference is significant at the 0.05 level.**

Table (21) indicates that there are differences between (Less than 2500) and (3501-4500) and these differences are for the level of (Less than 2500). Similarly, there are differences between the level of (2501-3500) and (3501-4500) and these differences are for the level of (3501-3500).

Table (22) Frequencies, means and standards deviations of occupational hazards and its domains, according to years of experience.

Domain	Experience/years	N	Mean	Std. Deviation
Occupational hazards perception and knowledge	less than 5	29	4.17	0.418
	5-9	30	4.20	0.556
	10-14	48	4.10	0.554
	15-19	21	4.46	0.409
	20+	18	4.28	0.342
	Total	146	4.21	0.496
Work Environment	less than 5	29	4.20	0.428
	5-9	30	4.31	0.438
	10-14	48	4.07	0.490
	15-19	21	3.99	0.367
	20+	18	3.83	0.327
	Total	146	4.10	0.454
Safety measures	less than 5	29	3.99	0.594
	5-9	30	3.89	0.898
	10-14	48	3.88	0.623
	15-19	21	4.12	0.681
	20+	18	4.10	0.574
	Total	146	3.96	0.684
Performance Information and satisfaction	less than 5	29	2.73	0.371
	5-9	30	2.49	0.295
	10-14	48	2.76	0.330
	15-19	21	2.71	0.417
	20+	18	2.69	0.266
	Total	146	2.68	0.349

Table (23) Results of One Way ANOVA Test for occupational hazards and its domains according to years of experience.

ANOVA						
Domain		Sum of Squares	df	Mean Square	F	Sig.*
Occupational hazards perception and knowledge	Between Groups	2.061	4	0.515	2.162	0.076
	Within Groups	33.604	141	0.238		
	Total	35.665	145			
Work Environment	Between Groups	3.343	4	0.836	4.446	0.002*
	Within Groups	26.505	141	0.188		
	Total	29.849	145			
Safety measures	Between Groups	1.325	4	0.331	0.702	0.592
	Within Groups	66.045	141	0.472		
	Total	67.370	145			
Performance Information and satisfaction	Between Groups	1.436	4	0.359	3.127	0.017*
	Within Groups	16.185	141	0.115		
	Total	17.621	145			

*. The mean difference is significant at the 0.05 level.

Table (23) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, and Safety measures according to years of experience variable. In the contrast, the same table indicates that there are significant differences at the level ($\alpha = 0.05$) in the means of work environment, and Performance Information and satisfaction domains according to years of experience variable. The highest significant value was for the third domain (Safety measures).

In order to know for whom the differences are, LSD Test for comparable distance was used to clarifying the differences which is shown in the following tables.

Table (24): LSD Test for comparable distance for the degree of the fourth domain (Work Environment) according to years of experience variable.

Level Experience /years	less than 5	5-9	10-14	15-19	20+
less than 5	***	-0.11232	0.13054	0.21558	0.37657*
5-9	***	***	0.24286*	0.32789*	0.48889*
10-14	***	***	***	0.08503	0.24603*
15-19	***	***	***	***	0.16100
20+	***	***	***	***	***

*. The mean difference is significant at the 0.05 level.

Table (24) indicates that there are differences between (Less than 5) and (20 and more) and these differences are for the level of (Less than 5). Similarly, there are differences between the level of (5-10) and other levels and these differences are for the level of (5-9). Moreover, there are differences between (10-14) and (20 and more) and these differences are for the level of (10-14)

Table (25): LSD Test for comparable distance for the degree of the second domain (Performance Information and satisfaction) according to years of experience variable.

Level Experience /years	less than 5	5-9	10-14	15-19	20+
less than 5	***	0.23736*	-0.02862	0.02545	0.04044
5-9	***	***	-0.26597*	-0.21190*	-0.19691
10-14	***	***	***	0.05407	0.06906
15-19	***	***	***	***	0.01499
20+	***	***	***	***	***

*. The mean difference is significant at the 0.05 level.

Table (25) indicates that there are differences between (Less than 5) and (5-9) and these differences are for the level of (Less than 5). Similarly, there are differences between the level of (5-10) and other levels and these differences are for the level of (5-9).

Table (26) Frequencies, means and standards deviations of occupational hazards and its domains, according to Education variable

One way

Domain	Education	N	Mean	Std. Deviation
Occupational hazards perception and knowledge	Diploma degree	19	4.28	0.359
	Bachelor degree	116	4.17	0.512
	Master degree	11	4.50	0.443
	Total	146	4.21	0.496
Work Environment	Diploma degree	19	3.93	0.382
	Bachelor degree	116	4.13	0.458
	Master degree	11	4.12	0.494
	Total	146	4.10	0.454
Safety measures	Diploma degree	19	4.28	0.773
	Bachelor degree	116	3.93	0.674
	Master degree	11	3.76	0.488
	Total	146	3.96	0.684
Performance Information and satisfaction	Diploma degree	19	2.79	0.473
	Bachelor degree	116	2.65	0.335
	Master degree	11	2.81	0.149
	Total	146	2.68	0.349

Table (27) Results of One Way ANOVA Test for occupational hazards and its domains according to Education variable.

ANOVA						
Domain	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Occupational hazards perception and knowledge	Between Groups	1.201	2	0.601	2.492	0.086
	Within Groups	34.464	143	0.241		
	Total	35.665	145			
Work Environment	Between Groups	0.651	2	0.326	1.595	0.207
	Within Groups	29.197	143	0.204		
	Total	29.849	145			
Safety measures	Between Groups	2.430	2	1.215	2.657	0.074
	Within Groups	64.940	143	0.457		
	Total	67.370	145			
Performance Information and satisfaction	Between Groups	0.480	2	0.240	2.004	0.139
	Within Groups	17.140	143	0.120		
	Total	17.621	145			

*. The mean difference is significant at the 0.05 level.

Table (27) indicates that there are no significant differences at the level ($\alpha = 0.05$) in the means of all domains according to Education variable.

The highest significant values were for domains two and four (Work Environment and Performance Information and satisfaction).

Chapter Five

Discussion, Conclusion

Recommendations

Chapter 5

Discussion, Conclusion Recommendations

5.1. Introduction

The study was conducted for the purpose of assessing the exposure to occupational health hazards and safety for workers in medical laboratories in the hospitals of the ministry of health.

Finding of the study informed us information about the occupational hazards perception and knowledge, work environment, safety measures, performance information and satisfaction of the laboratory workers in the governmental hospitals.

5.2. Socio – demographic factors

About 85% of participants were below 45 years old, which indicate that most laboratory workers were in the youngest age as shown in table (2).

Both genders were represented in the sample and they are nearly equal in number, with 50.3% males, and 49.3% females as shown in table (3). Eighty seven of participants were married (table 4).

The majority of the participants 74% have monthly income between (2501 – 3500) as shown in table (5), which mean that the participants have good income.

Laboratory workers are well qualified because eighty (80) % of them have more than 5 years of experience (table 6), and 79.5% of them have Bachelor degree (table 7). Most of the participants 89.7% do not have other job, which means that participants do their profession and duties very well (table 8).

5.3. Results

This section deals with the discussion of the obtained results as a result of analyzing the study questions and hypothesis. Also, it includes conclusion and recommended suggestions.

5.3.1 Results of the study questions

Do laboratory workers have sufficient knowledge about occupational health hazards?

The results in table (10) showed that the present status of occupational hazards among laboratory workers in occupational hazards perception and knowledge domain, which are very high on items of having information about occupational health, having aware of the occupational hazards at work, knowing how to avoid the occupational hazards, knowing the use of preventing measures, knowing the hazards at work, I know how I am be affected, and knowing how to keep self and the others safe. These high results are positive and refer to high and adequate knowledge that the laboratory workers have about occupational hazards they are exposed to. The total degree in the same table which has a percentage of (84.0%) refers to very high degree about the sufficient knowledge.

The results of this study differ from Zaveri (2012), that knowledge, attitude, perception, and compliance amongst laboratory technicians are poor and also match the results of Nattat (2010) ,that 92% of study population has knowledge and are aware about occupational hazards.

The researcher explains the percentages of the study sample responds ranged between (high) to (very high) degree for several reasons includes the awareness that the laboratory workers have about occupational hazards which gained from their daily practices of this profession , the theoretical knowledge obtained from their studies and may be from the preventative protocols that they have in their wards.

In regard to work environment , the result of table (11) show that the estimation level was very high in the items of the application of safety measure, Standing for long hours, Wearing gloves and Concentration and intensity of attention. These procedures

are very important for the safety of the laboratory workers according to the safety protocols aiming at reducing infections among laboratory workers in the health institutions. Wearing gloves and wearing special shoes scored high degree which is also considered from the most important safety procedures. Carrying heavy weights scored low degree. The explanation is that working in the laboratories does not need this kind of work and this affects the ergonomics hazards positively.

Finally, the total degree of this domain is (82.0) which is very high estimation.

The researcher explained these results that the means of prevention and safety that related to work environment are available and the laboratory workers use these means of protection and safety. The results of this study match the results of Abood study (2005) "Evaluation of practicing medical analysis profession in Tripoli "that elements of occupational safety in laboratories are available".

What are the main types of occupational hazards that face the personnel working in the medical laboratories?

Figure (1) shows that 75% of the participants have exposed to biological hazards,70% exposed to chemical hazards,64% exposed to physical hazards, 60% exposed to psychological hazards, and 52% exposed to ergonomic hazards. We can conclude that more than half of participants exposed to hazard regardless of the type of hazards. As shows in figure (2) which rank the hazards exposed to, according to the severity ,the results show that the biological hazards were the more severe with 68%; chemical hazards 64%, psychological hazards58%, physical hazards51%, and ergonomic hazards 49%,which indicate that the biological hazards were the more severe.

The results of this study differ with Nattat (2010) , that 49% of the participants have exposed to physical hazards, 31.8% exposed to biological hazards,30.9% exposed to ergonomic hazards, 29.1% exposed to psychological hazards, and 26.4% exposed to chemical hazards.

The researcher dues the results to the fact that workers at the laboratories are mostly deals patients and exposed to their body fluids which are highly infectious, and also

laboratory workers deal with chemical substances that need to do tests for patients, so laboratory workers are in contact with dangerous biological and chemicals agents .

What measures do laboratory workers take in their workplace to protect them from potential hazards?

The results of table (12) show that the present status of occupational hazards among laboratory workers in safety measures domain which are very high on items of eating, drinking, smoking and applying cosmetics are prohibited in this laboratory, Pipetting by mouth is prohibited, Appropriate protective clothing worn at all times in the laboratory, and gloves worn when required, washing hands when leaving the laboratory and Sharp containers used and disposed of properly. These items refer to dangerous practices which cause infection among workers when dealing with patients or biological agents. So, the prohibition of smoking, eating, pipetting by mouth, wearing protective clothes and washing hands can indeed reduce transferring infections among laboratory workers.

Also, the present status of occupational hazards among laboratory workers in safety measures domain which very high on items the cleanness of the laboratory, any spillage is decontaminated immediately , Care taken to avoid the formation of aerosols or splashing of materials, All contaminated waste or reusable materials appropriately decontaminated before disposal or reuse, accidents reported immediately and appropriate action taken to prevent further occurrences and The disinfectant used is appropriate and its efficacy ensured . These results refer to acceptable procedures that could reduce any spread of infection and control any un- preferable dangerous accident. On the other hand, item (36) in the same table is low refers to restriction the laboratory for authorized workers show a negative indicator for spreading infection causing hazards for untrained persons .

The total degree reached (79.2%) which means that measures which laboratory workers take in their workplace to protect them from potential hazards are high.

This results match with the results of DeJoy & others (2003) Creating safer workplaces: assessing the determinants and role of safety climate, that the environmental conditions, safety policies and programs, and organizational climate each

made significant contributions to safety climate. And also match with the results of Khalil (2008):” Evaluation of Occupational Safety and preventive means which available in public hospitals in Gaza Strip and its effect on workers performance’’, that there is a statistically significant connectivity between the availability of means of protection, prevention and the extent to which workers use, commitment of employees to use, and performance among employees.

Are laboratories workers satisfied with their work environment?

The result of table (13) show that the present status of occupational hazards among laboratory workers in Performance Information and satisfaction domain which are high on items I am satisfied with my work, and there is really too little chance for promotion on my job which means that there is satisfaction among workers about their tasks and duties . On the contrary, they complain about the little chances of promotion.

The estimation level according to the study sample was medium in items of the laboratory workers assigned work tasks exceed my capabilities, the desire to change the place work, the appreciation and rewarding as a result for accomplishing the successful tasks.

In the same token, the low estimation level appears on items having the opportunity to participate in decision-making., still choosing the same profession if given alternatives and feeling of adequately valued, supervisor is unfair, recognized and appreciated as a laboratory technician.

The results show very low estimation levels in items of arriving late to the work place, reducing performance at work, being paid a fair amount for the work I do (salary), job gives a reasonable level of financial security, salary is able to cater for my needs and my family needs, feeling that the current job is meaningless, and satisfaction with chances for promotion.

The total degree of satisfaction is (53.6%) which means a low level of satisfaction among laboratory workers.

This result matches the results of Jouda (2006) “evaluation of occupational hazards among governmental health care workers in Gaza strip. Fifty-six percent of respondents were satisfied overall with their jobs, but 44% were not satisfied, and also match with the results of Al-Enezi and others (2008), that Fifty-six percent of respondents were satisfied overall with their jobs, but 44% were not satisfied.

5.3.2 Results of the study Hypotheses

To test the first hypotheses of the study " There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to Age variable, One Way ANOVA Test was used .

As it is clearly seen from table (15) , the computed significant values were (0.555) for the first domain (Occupational hazards perception and knowledge) , (0.000) for the second one (Work Environment) , (0.285) for the third one (Safety measures) and (0.078) for the fourth domain (Performance Information and satisfaction) and that means there are no significant differences at the level ($\alpha = 0.05$) in the means of occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, according to Age variable .Significant is more than (0.05) . On the other hand, there are significant differences at the level ($\alpha = 0.05$) in the means of Work Environment domain, according to Age variable. Significant is less than (0.05) and these differences are in favor of the levels of small ages (Less than 30 and 30-34).

The researcher dues the result for the fact the laboratory workers when get employed they are in young age and in the beginning of their first years of employment they always use the means of prevention and safety that are related to the work environment that are available in the laboratory, as the years passed they became more experienced and do not use the means of prevention and safety always.

The second hypotheses " There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain according to gender variable. Two Independent Sample T-test done and the results in table (17) indicate that the computed significant values were (0.030) for the first domain (Occupational hazards perception and knowledge), (0.000) for the second domain (Work Environment) and these values are less than (0.05). For the third domain (Safety measures) the value was 0.206, and (0.289) for the fourth domain (Performance Information and satisfaction). These two values are more than (0.05) and that means there are no significant differences at the level ($\alpha = 0.05$) in the means of Safety measures and Performance Information and satisfaction domains, according to gender variable, Significant is more than (0.05). On the other hand, there are significant

differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, and work environment domains, according to gender variable. The differences are for males in the first domain (Occupational hazards perception and knowledge) because of their mean which is (4.29) while they are for the females in the second one (work environment) because their mean is (4.27).

Similarly, third hypotheses " There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain according to marital status variable, this was tested by Two Independent Sample T-test and the results in table (17) indicate that there are no significant differences at the level ($\alpha = 0.05$) in the means of all domains according to marital status variable. The significant values are respectively (0.611, 0.583, 0.469 and 0.442) which are more than (0.05).

The researcher dues the result for the fact of that laboratory worker is well qualified and this profession is a practice profession.

In the same token, testing the fourth hypotheses "There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to monthly income. Variable has been accomplished by using One Way ANOVA test and the results of table (20) indicate the significant differences are only in the second domain (work environment). The significant value was (0.013) and these differences are for the levels of low salaries (Less than 2500 and 2501-3500).

The researcher dues the result for the fact the laboratory workers with low salaries do not meet their family financial obligations.

Also, when testing the fifth hypotheses " There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to years of experience variable " by using One Way ANOVA test, Differences appeared in the second and fourth domain (work environment) and (Performance Information and satisfaction). The significant were respectively (0.002 and 0.017) which are less than (0.05). These differences are for the levels of the lowest years of experience (Less than 5, 5-10, and 10-14 years).

According to Performance Information and satisfaction the degree of Performance Information and satisfaction will Decreasing with years, because when the laboratory workers be employed they may be singles and do not have more family financial obligations, after that and when they getting married their family financial obligations will increased and their satisfaction also decreased because they need more money and the salaries do not increased and the cost of living rises and prices go up.

Finally, testing the sixth one " There are no significant differences at the level ($\alpha = 0.05$) in the means of Occupational hazards perception and knowledge, Safety measures, Performance Information and satisfaction domains, Work Environment domain, according to educational level variable" showed that there are no significant differences at the level ($\alpha = 0.05$) in the means of all domains according to Education variable. The significant values were respectively (0.086, 0.207, 0.74 and 0.139) which are more than (0.05).

The researcher attributes this result to that the laboratory workers are well qualified as they have diploma, bachelor or master degree and this profession is practice profession.

5.4. Conclusions

It is widely acknowledge that laboratory workers are crucial component in healthcare system. In this study 85% of participants were below 45 years old, both genders were represented in the sample and they are nearly equal in number, with 50.3% males, and 49.3% females, 87% of participants were married, 74% have monthly income between (2501 – 3500) NIS, 80% of participants have more than 5 years of experience, 79.5% of them have Bachelor degree, and 89.7% do not have other job.

The results showed that the laboratory workers apply safety measures that are available to protect themselves from occupational hazards, and their performance information and satisfaction was medium.

Biological and chemical hazards have the highest percentages of occupational hazards that the laboratory worker exposed to, with 75% of the participants have exposed to biological hazards, and 70% exposed to chemical hazards. 64% exposed to physical hazards; 60% exposed to psychological hazards, and, 52% exposed to ergonomic hazards which were the lowest.

Also biological and chemical hazards to were more severe, with biological hazards 68%; chemical hazards 64%, psychological hazards58%, physical hazards51%, and ergonomic hazards 49%.

5.5. Recommendations

According to the study results, the researcher suggested several recommendations including that interesting in a scientific material about occupational safety and health for students to avoid risks in the laboratories. This suggestion due to the importance of having knowledge about risks and work hazards when dealing with chemical substances.

In the theoretical side of safety procedures, creating a specialized section for occupational health and safety, linked directly to senior management, to ensure the provision of specialized committees and supervisors to provide follow-up and control means and safety procedures is very important for workers and students in this field of work. Conducting further studies and research on the subject of occupational safety and health has the same important of the previous suggestions. The studies are essential theoretical tools in order to reach the deeper results contribute to the development of better educational institutions.

Moreover, the selection of hazards controls and programs evaluation activities , identification and assessment of the risks from health hazards ,encourage laboratory workers to know their legal rights if they exposed to any occupational hazards and encouraging laboratory workers to record any occupational hazards should be conducted for the development of the workers' abilities .

Encouraging further researches to compare the results with different setting.

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Annex (1)
Names of Experts

- | | |
|--------------------------------|------------------------------|
| 1. Dr. Mohammed Shaheen | Al- Quds University |
| 2. Dr. Motsem Hemdan | Al- Quds University |
| 3. Dr. Asma Imam | Al- Quds University |
| 4. Dr. Noha Shereef | Al- Quds University |
| 5. Dr. Mahmoud Sroor | Al- Quds University |
| 6. Dr. Imad Odeh | Al- Quds University |
| 7. Dr. Majdi Dwikat | An - Najah University |

Annex (2)

تقييم المخاطر المهنية بين العاملين في المختبرات الطبية في المستشفيات الحكومية في فلسطين

عززي المشارك في هذه الدراسة

تحية طيبة وبعد.....

ان هذا الاستبيان يهدف الى تقييم المخاطر المهنية للعاملين في المختبرات الطبية في مستشفيات وزارة الصحة الفلسطينية في الضفة الغربية.

ان مشروع هذه الدراسة هو عمل بحثي لتقييم المخاطر المهنية التي يتعرض لها العاملون في المختبرات في مستشفيات وزارة الصحة الفلسطينية وذلك تحت اشراف جامعة القدس ضمن برنامج ماجستير السياسات والادارة الصحية.

وننوه الى ان المشاركة في هذه الدراسة طوعية وان السرية التامة حول هوية المشارك مضمونة وان الاجابات سوف تستخدم لاغراض البحث العلمي فقط.

شاكرين حسن تعاونكم

الباحث / ظافر علقم

0599734405

Annex (3)

Part one: Personal data:

1- Age: ----- years.

2- Gender : 1. Male 2. Female

3- Governorate: -----.

4- Marital status:

1. Married 2. Single 3. Divorced

4. Widow 5. Others -----

5- Number of family members: -----

6- Monthly income:

1. Less than 2500 2. 2501 – 3500

3. 3501 - 4500 4. More than 4500

7- Years of experience as a laboratory technician -----

8- Educational level:

1. Diploma degree 2. Bachelor degree

3. Master degree 4. PhD

5. Other -----

9- Do you have other jobs than the current one?

1. Yes 2. No 3. Sometimes

10- If yes or sometimes, how many extra hours do you work in the other job(s) weekly? -----

Part three: Work Environment:

My work needs

		Strongly agree	agree	neutral	disagree	Strongly disagree
21	The application of safety measure	5	4	3	2	1
22	Standing for long hours.	5	4	3	2	1
23	Carrying heavy weights.	5	4	3	2	1
24	Wearing gloves	5	4	3	2	1
25	Wearing special shoes	5	4	3	2	1
26	Wearing a mask	5	4	3	2	1
27	Concentration and intensity of attention	5	4	3	2	1

Part four: Safety measures

		Strongly agree	agree	neutral	disagree	Strongly disagree
28	Eating, drinking, smoking and applying cosmetics are prohibited in this laboratory.	5	4	3	2	1
29	Pipetting by mouth is prohibited.	5	4	3	2	1
30	Appropriate protective clothing worn at all times in the laboratory, and gloves worn when required.	5	4	3	2	1
31	The laboratory clean and tidy.	5	4	3	2	1
32	All work surfaces appropriately decontaminated at the end of each working day and immediately after any spillage.	5	4	3	2	1
33	I wash my hands when I leave the laboratory.	5	4	3	2	1
34	Care taken to avoid the formation of aerosols or splashing of materials	5	4	3	2	1
35	All contaminated waste or reusable materials appropriately decontaminated before disposal or reuse.	5	4	3	2	1
36	Access to the laboratory to authorized personnel only.	5	4	3	2	1
37	All incidents or accidents reported immediately and appropriate action taken to prevent further occurrences.	5	4	3	2	1
38	Sharp containers used and disposed of properly	5	4	3	2	1
39	The disinfectant used is appropriate and its efficacy ensured.	5	4	3	2	1

Part five: Performance Information and satisfaction

		Strongly agree	agree	neutral	disagree	Strongly disagree
40	My assigned work tasks exceed my capabilities.	5	4	3	2	1
41	I want to change my work place.	5	4	3	2	1
42	Usually I arrive late to my work.	5	4	3	2	1
43	I am intentionally reducing my performance at work.	5	4	3	2	1
44	I am satisfied with my work.	5	4	3	2	1
45	I feel I am being paid a fair amount for the work I do (salary)	5	4	3	2	1
46	My job gives me a reasonable level of financial security	5	4	3	2	1
47	My salary is able to cater for my needs and my family needs	5	4	3	2	1
48	I have opportunity to participate in decision-making.	5	4	3	2	1
49	There is really too little chance for promotion on my job.	5	4	3	2	1
50	I feel my job is meaningless	5	4	3	2	1
51	My supervisor is unfair to me.	5	4	3	2	1
52	I do not feel that the work I do is appreciated.	5	4	3	2	1
53	There are few rewards for those who work here	5	4	3	2	1
54	I am satisfied with my chances for promotion	5	4	3	2	1
55	There is too much bickering and fighting at work	5	4	3	2	1
56	If I am given another opportunity, I will still choose this same profession	5	4	3	2	1
57	I feel I am adequately valued, recognized and appreciated as a laboratory technician	5	4	3	2	1

Annex (4)

الجزء الأول: معلومات شخصية:

1. العمر/السنوات: _____
2. الجنس 1. ذكر 2. أنثى
3. المحافظة -----
4. الحالة الاجتماعية:
 1. متزوجة
 2. اعزب/عزباء
 3. مطلق/ة
 4. أرمل/ة
5. عدد أفراد العائلة : _____
6. الدخل الشهري
 1. اقل من 2500
 2. 2501 – 3500
 3. 3501 - 4500
 4. اكثر من 4500
7. سنوات الخبرة كفني/ة مختبر : _____
8. المؤهل العلمي:
 1. دبلوم
 2. بكالوريوس
 3. ماجستير
 4. دكتوراه
 5. غير ذلك -----
9. هل لديك وظيفة /وظائف اخرى غير العمل الحالي؟
 1. نعم
 2. لا
 3. احيانا
10. إذا كانت الإجابة بنعم او احيانا كم ساعة اضافية تعمل/ ين في الوظيفة/ الوظائف الاخرى اسبوعيا؟.....

الجزء الثاني: الوعي المهني للمخاطر المهنية

معارض بشدة	معارض	محايد	موافق	موافق بشدة	
1	2	3	4	5	11 يوجد لدي معلومات حول الصحة المهنية
1	2	3	4	5	12 أنا أدرك المخاطر المهنية في مكان العمل
1	2	3	4	5	13 أعرف كيفية تجنب المخاطر المهنية
1	2	3	4	5	14 أعرف عن التدابير الوقائية الواجب اتخاذها في مجال العمل
1	2	3	4	5	15 أنا أعرف ما هي المخاطر التي أتعرض لها
1	2	3	4	5	16 أنا أعرف كيف يمكن ان أتعرض للمخاطر الصحية
1	2	3	4	5	17 أنا أعرف ما يجب أن أفعله لابقى انا والآخرين بأمان
1	2	3	4	5	18 أعرف كيفية التحقق والرصد عند حدوث اي خطأ ولمن سوف ابلغ عن اي من المشاكل

19. أي نوع من المخاطر تتعرض/ين لها كفني/ة مختبر.

1. مخاطر جسدية 2. مخاطر كيميائية 3. مخاطر نفسية
4. مخاطر بيولوجية 5. مخاطر عدم الملائمة

20. رتب المخاطر التي تتعرض/ين لها وفقا لشدة الخطورة (قليل الخطورة 1 2 3 شديد الخطورة 4 5)

1	مخاطر جسدية	1	2	3	4	5
2	مخاطر كيميائية	1	2	3	4	5
3	مخاطر نفسية	1	2	3	4	5
4	مخاطر بيولوجية	1	2	3	4	5
5	مخاطر عدم الملائمة	1	2	3	4	5

الجزء الثالث: بيئة العمل: عملي يحتاج الى

معارض بشدة	معارض	محايد	موافق	موافق بشدة		
1	2	3	4	5	تطبيق تدابير السلامة	21
1	2	3	4	5	الوقوف لساعات طويلة	22
1	2	3	4	5	حمل اوزان ثقيلة	23
1	2	3	4	5	ارتداء القفازات	24
1	2	3	4	5	ارتداء احذية خاصة	25
1	2	3	4	5	ارتداء كمامة	26
1	2	3	4	5	تركيز وشدة انتباه	27

الجزء الرابع: تدابير السلامة

معارض بشدة	معارض	محايد	موافق	موافق بشدة		
1	2	3	4	5	الأكل والشرب والتدخين ووضع مستحضرات التجميل ممنوع في هذا المختبر	28
1	2	3	4	5	سحب المواد بواسطة الفم ممنوع	29
1	2	3	4	5	الملابس الواقية المناسبة يتم ارتداؤها في جميع الأوقات في المختبر، وارتداء القفازات عند الحاجة	30
1	2	3	4	5	المختبر نظيف ومرتب.	31
1	2	3	4	5	جميع أسطح العمل يتم تعقيمها بشكل مناسب في نهاية كل يوم عمل، وعلى الفور بعد أي انسكاب	32
1	2	3	4	5	انا اغسل يداي عند الخروج من المختبر.	33
1	2	3	4	5	يتم اخذ الحذر لتجنب تشكل الرذاذ او الهباء الجوي للمواد	34
1	2	3	4	5	جميع النفايات الملوثة أو المواد القابلة لإعادة الاستخدام يتم تعقيمها بشكل مناسب قبل التخلص منها أو إعادة استخدامها	35
1	2	3	4	5	الوصول إلى المختبر للموظفين المخولين فقط	36
1	2	3	4	5	يتم الإبلاغ عن جميع الحوادث فوراً ويتم اتخاذ الإجراءات المناسبة لمنع وقوع المزيد	37
1	2	3	4	5	حاويات الأدوات الحادة تستعمل ويتم التخلص منها بشكل سليم	38
1	2	3	4	5	المواد المعقمة المستخدمة مناسبة وفعاليتها مضمونة	39

الجزء الخامس : معلومات الأداء والرضا الوظيفي

معارض بشدة	معارض	محايد	موافق	موافق بشدة		
1	2	3	4	5	40	مهام العمل المناطة بي تتجاوز إمكانياتي
1	2	3	4	5	41	أريد تغيير مكان عملي
1	2	3	4	5	42	عادة اصل متأخرا إلى عملي
1	2	3	4	5	43	انا بشكل متعمد اقلل ادائي في العمل
1	2	3	4	5	44	أنا راض عن عملي
1	2	3	4	5	45	اشعر انني اتقاضى مبلغ كاف للعمل الذي اقوم به (الراتب)
1	2	3	4	5	46	عملي يعطيني مستوى معقول من الأمن المالي
1	2	3	4	5	47	راتبي قادر على تلبية احتياجاتي واحتياجات عائلتي
1	2	3	4	5	48	لدي فرصة للمشاركة في صنع القرار
1	2	3	4	5	49	هناك فرصة ضئيلة جدا للترقية في وظيفتي
1	2	3	4	5	50	اشعر ان وظيفتي بلا معنى
1	2	3	4	5	51	مشرفي غير عادل معي
1	2	3	4	5	52	انا لا اشعر ان العمل الذي اقوم به هو محل تقدير
1	2	3	4	5	53	هناك مكافآت قليلة لأولئك الذين يعملون هنا
1	2	3	4	5	54	انا راض عن فرصتي في الترقية
1	2	3	4	5	55	هناك الكثير من المشاحنات والنزاعات في العمل
1	2	3	4	5	56	إذا أعطيت الفرصة مرة أخرى، سأختار نفس هذه المهنة
1	2	3	4	5	57	اشعر بقدر كاف من التقويم والاعتراف والتقدير كفي مختبر

Annex (5)

Means, standard deviation, percentage, and number and percentage of each scale for Occupational hazards perception and knowledge domain.

No.	statement		Strongly agree	agree	neutral	disagree	Strongly disagree	Mean	Std. Deviation	percent	Estimation level
11	I have information about occupational health	N	41	97	7	0	1	4.21	0.589	84.2	Very high
		%	28.1	66.4	4.8	0	0.7				
12	I am aware of the occupational hazards at work	N	67	73	6	0	0	4.42	0.572	88.4	Very high
		%	45.9	50	4.1	0	0				
13	I know how to avoid occupational hazards	N	47	90	8	0	1	4.25	0.616	85.0	Very high
		%	32.2	61.6	5.5	0	0.7				
14	I know about preventive measures to be taken at work	N	45	86	8	2	0	4.19	0.646	83.8	Very High
		%	30.8	58.9	8.9	1.4	0				
15	I know what hazards I am being exposed to	N	57	72	16	1	0	4.27	0.677	85.4	Very high
		%	39	49.3	11	0.7	0				
16	I know how I may be affected	N	49	83	14	0	0	4.24	0.613	84.8	Very high
		%	33.6	56.8	9.6	0	0				
17	I know what I have to do to keep myself and others safe	N	44	86	14	1	1	4.17	0.678	83.4	Very High
		%	30.1	58.9	9.6	0.7	0.7				
18	I know how to check and spot when something goes wrong, and to whom I will report any problems	N	27	88	25	4	2	3.92	0.765	78.4	High
		%	18.5	60.3	17.1	2.7	1.4				
Total score of Occupational hazards perception and knowledge domain								4.20	0.495	84.0	Very high

Annex (6)

Means, standard deviation, percentage, and number and percentage of each scale for work environment domain

No	statement		Strongly agree	agree	neutral	disagree	Strongly disagree	Mean	Std. Deviation	percent	Estimation level
21	The application of safety measure	N	109	32	5	0	0	4.71	0.525	94.2	Very high
		%	74.7	21.9	3.4	0	0				
22	Standing for long hours	N	70	62	5	7	2	4.31	0.86	86.2	Very high
		%	47.9	42.5	3.4	4.8	1.4				
23	Carrying heavy weights	N	10	18	28	60	30	2.44	1.15	48.8	Low
		%	6.8	12.3	19.2	41.1	20.5				
24	Wearing gloves	N	115	27	2	1	1	4.74	0.588	94.8	Very high
		%	78.8	18.5	1.4	0.7	0.7				
25	Wearing special shoes	N	59	44	30	5	8	3.97	1.117	79.4	High
		%	40.4	30.1	20.5	3.4	5.5				
26	Wearing a mask	N	42	44	48	9	3	3.77	1.002	75.4	High
		%	28.8	30.1	32.9	6.2	2.1				
27	Concentration and intensity of attention	N	124	18	2	0	2	4.79	0.598	95.8	Very high
		%	84.9	12.3	1.4	0	1.4				
Total score of Work Environment domain								4.10	0.45	82.0	Very high

Annex (7)

Means, standard deviation, percentage, and number and percentage of each scale for safety measure domain

No	statement		Strongly agree	agree	neutral	disagree	Strongly disagree	Mean	Std. Deviation	percent	Estimation level
28	Eating, drinking, smoking and applying cosmetics are prohibited in this laboratory.	N	62	41	27	14	2	4.01	1.06	80.2	Very High
		%	42.5	28.1	18.5	9.6	1.4				
29	Pipetting by mouth is prohibited	N	133	9	0	0	4	4.83	0.688	96.6	Very high
		%	91.1	6.2	0	0	2.7				
30	Appropriate protective clothing worn at all times in the laboratory, and gloves worn when required	N	71	42	10	17	6	4.06	1.182	81.2	Very High
		%	48.6	28.8	6.8	11.6	4.1				
31	The laboratory clean and tidy	N	57	49	21	14	5	3.95	1.11	79.0	High
		%	39	33.6	14.4	9.6	3.4				
32	All work surfaces appropriately decontaminated at the end of each working day and immediately after any spillage	N	44	52	23	19	8	3.72	1.185	74.4	High
		%	30.1	35.6	15.8	13	5.5				
33	I wash my hands when I leave the laboratory	N	110	31	4	1	0	4.71	0.55	94.2	Very high
		%	75.3	21.2	2.7	0.7	0				
34	Care taken to avoid the formation of aerosols or splashing of materials	N	45	53	32	11	5	3.84	1.057	76.8	High
		%	30.8	36.3	21.9	7.5	3.4				
35	All contaminated waste or reusable materials appropriately decontaminated before disposal or reuse	N	52	42	26	15	11	3.75	1.253	75.0	High
		%	35.6	28.8	17.8	10.3	7.5				
36	Access to the laboratory to authorized personnel only	N	25	32	28	28	32	2.93	1.413	58.6	Low
		%	17.2	22.1	19.3	19.3	22.1				
37	All incidents or accidents reported immediately and appropriate action taken to prevent further occurrences	N	32	67	33	10	4	3.77	0.96	75.4	High
		%	21.9	45.9	22.6	6.8	2.7				
38	Sharp containers used and disposed of properly	N	58	51	25	6	6	4.02	1.054	80.4	Very High
		%	39.7	34.9	17.1	4.1	4.1				
39	The disinfectant used is appropriate and its efficacy ensured	N	38	67	27	10	4	3.86	0.975	77.2	High
		%	26	45.9	18.5	6.8	2.7				
Total score of Safety measures domain								3.96	0.69	79.2	High

Annex (8)

Means, standard deviation, percentage, and number and percentage of each scale for Performance Information and satisfaction.

No	statement		Strongly agree	agree	neutral	disagree	Strongly disagree	Mean	Std. Deviation	percent	Estimation level
40	My assigned work tasks exceed my capabilities.	N	31	44	23	43	5	3.36	1.21	67.2	Medium
		%	21.2	30.1	15.8	29.5	3.4				
41	I want to change my work place	N	37	28	25	38	18	3.19	1.39	63.8	Medium
		%	25.3	19.2	17.1	26	12.3				
42	Usually I arrive late to my work.	N	0	7	19	55	65	1.78	0.85	35.6	Very low
		%	0	4.8	13	37.7	44.5				
43	I am intentionally reducing my performance at work	N	1	3	13	41	88	1.55	0.8	31.0	Very low
		%	0.7	2.1	8.9	28.1	60.3				
44	I am satisfied with my work.	N	31	50	41	14	10	3.53	1.13	70.6	High
		%	21.2	34.2	28.1	9.6	6.8				
45	I feel I am being paid a fair amount for the work I do (salary)	N	5	21	23	50	47	2.23	1.15	44.6	Very Low
		%	3.4	14.4	15.8	34.2	32.2				
46	My job gives me a reasonable level of financial security	N	5	25	33	37	46	2.36	1.19	47.2	Very Low
		%	3.4	17.1	22.6	25.3	31.5				
47	My salary is able to cater for my needs and my family needs	N	4	10	30	51	51	2.08	1.04	41.6	Very Low
		%	2.7	6.8	20.5	34.9	34.9				
48	I have opportunity to participate in decision-making.	N	7	48	36	27	28	2.86	1.21	57.2	Low
		%	4.8	32.9	24.7	18.5	19.2				
49	There is really too little chance for promotion on my job	N	43	46	32	13	12	3.65	1.22	73.0	High
		%	29.5	31.5	21.9	8.9	8.2				
50	I feel my job is meaningless	N	4	7	30	56	49	2.05	0.992	41.0	Very Low
		%	2.7	4.8	20.5	38.4	33.6				
51	My supervisor is unfair to me	N	16	24	34	43	29	2.69	1.27	53.8	Low
		%	11	16.4	23.3	29.5	19.9				
52	I do not feel that the work I do is appreciated	N	21	44	30	35	16	3.13	1.24	62.6	Medium
		%	14.4	30.1	20.5	24	11				
53	There are few rewards for those who work here	N	40	36	20	18	32	3.23	1.52	64.6	Medium
		%	27.4	24.7	13.7	12.3	21.9				
54	I am satisfied with my chances for promotion	N	3	15	21	51	56	2.03	1.06	40.6	Very Low
		%	2.1	10.3	14.4	34.9	38.4				
55	There is too much bickering and fighting at work	N	20	37	43	30	16	3.10	1.2	62.0	Medium
		%	13.7	25.3	29.5	20.5	11				
56	If I am given another opportunity, I will still choose this same profession	N	24	30	30	20	42	2.82	1.46	56.4	Low
		%	16.4	20.5	20.5	13.7	28.8				
57	I feel I am adequately valued, recognized and appreciated as a laboratory technician	N	8	29	43	39	27	2.67	1.51	53.4	Low
		%	5.5	19.9	29.5	26.7	18.5				
Total score of Performance Information and satisfaction domain								2.68	0.35	53.6	Low