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Occupational Hazards Among Governmental Healthcare Workers In the Gaza Strip: Ergonomics

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DEDICATION

I would like to dedicate this work to my family members, colleagues, and all health care workers in Palestine whose energy, support, patience, and cooperation during the course of my work have inspired me to complete this study.

Ahmed J. M. Jouda

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed *Ahmed G. M. Gouda*

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Definition of terms

These terms are chosen from different sources; books, reports, research, and websites (WHO, OSHA, NOISH, and ILO).

Arthritis: inflammation of a joint or joints.

Carpal tunnel syndrome: a compression of the median nerve as it passes through the carpal tunnel in the heel of the hand a condition affecting the hand and wrist, first signs of carpal tunnel syndrome are numbness or tingling, especially in the first two fingers of the hand next to the thumb. These often occur at night, after work.

Chronic low back pain: general soreness and fatigue of the low back; pain is usually constant, and it accompanies most activities.

Cumulative trauma disorder: damage to body tissue by outside forces that has built up over time.

Computed variable: Group of qualitative variables in the same category answered with yes or no, computed together to form new quantitative variable.

Degenerative disc disease: a breakdown of the discs that separate the vertebrae of the spine.

Epicondylitis: an inflammation of the tendons at the elbow. Also called tennis elbow (lateral or outside part of the elbow), or golfer's elbow (medial or inside part of the elbow).

Healthcare workers: all the employees and workers working in Ministry of health.

Musculoskeletal injuries (MSI) : are injuries of the soft tissues (muscles, joints, tendons, ligaments, cartilage) and nervous system. The most common examples include

repetitive strain injuries(RSI) such as tendonitis and carpal tunnel syndrome, and back injuries involving muscles, ligaments, and/or spinal discs

Non-specific backache: general soreness and fatigue of the low back.

RSI (Repetitive Strain Injuries): occur from repeated physical movements doing damage to tendons, nerves, muscles, and other soft body tissues

Sprain: overstretching of overexertion of a ligament that results in a tear or rupture of the ligament.

Strain: overstretching or overexertion of a muscle or tendon.

Tendonitis: inflammation of the tendon inside the sheath.

Tennis elbow: inflammation of a tendon in the elbow

Tenosynovitis: inflammation of the sheath around the tendon.

Thoracic outlet syndrome: compression of the nerves and blood vessels between the neck and shoulder often associated with prolonged overhead work.

Trigger finger: a common term for tendonitis or tenosynovitis that causes painful locking of the finger(s) while flexing.

Ulnar nerve entrapment: compression of the ulnar nerve as it passes through the wrist, often associated with prolonged flexion and extension of the wrist and pressure on the palm.

ملخص الدراسة

تشكل الأخطار المهنية للعاملين الصحيين الحكوميين في قطاع غزة جانب مهم في حياتهم المهنية وتلعب أخطار الملائمة مع بيئة العمل (الهندسة البشرية) دوراً خفياً في شكاوى العاملين والتي لا تظهر نتائجها على المدى القريب وليبان ذلك كانت هذه الدراسة الو صفية التقاطعية. وكان هدف الدراسة استكشاف المخاطر المهنية التي قد تنتج عن عدم ملائمة بيئة وأدوات العمل مع العاملين الصحيين الحكوميين في قطاع غزة ولتحقيق ذلك تم تحديد العينة(364) بطريقة حسابية واختيارها بطريقة عشوائية منتظمة من مجموعة العاملين في الرعاية الصحية والمستشفيات (4169) حسب التقرير السنوي للمستشفيات والرعاية وقد استخدم لجمع البيانات طريقتان هما الاستبيان والقياسات البيئية. وقد أجريت الدراسة في الفترة من شهر فبراير 2004 وحتى ديسمبر 2004 وقد جمعت البيانات من الموظفين داخل مؤسساتهم في أوقات العمل بعد أخذ موافقتهم وموافقة الجهات الرسمية، وأعد لذلك استبيان تم تحكيمه بواسطة خبراء محليين، كما أخذت القياسات البيئية لأماكن العمل بواسطة أجهزة خاصة استعيرت من وزارة العمل، وتم تحليل المعلومات بطريقة إحصائية حيث تبين أن ما نسبته 84.3% يستخدمون الأجهزة في عملهم

وأغلبها أجهزة طبية وحواسيب وان 45.3% لا يناسبهم التأثيث وأدوات العمل. وأن 54.4% يفتقدون إجراءات السلامة أثناء العمل وأن 54.4% يفتقدون بيئة العمل الآمنة (إضاءة وضوضاء وتهوية وأدوات وأثاث). وقد أظهر 77.2% معرفتهم بالسلامة المهنية وخدمات الصحة المهنية وأظهر 93.1% منهم معرفة بأخطار المهنة و أظهرت النتائج أن 53.8% قد تلقوا تدريباً على العمل وطبق هذا التدريب 80.3% منهم، وقد أظهرت النتائج أن 50.3% من عينة الدراسة أنها لا تعرف المعلومات الكافية عن الملائمة في العمل وما يتضمن هذا العلم. وأن 58.2% يشعرون بالتعب والإرهاق بعد العمل، 69.4% منهم كان بسبب أداءهم لعملهم وأن 41.2% من العينة لديهم اضطرا بات في النوم 64.5% بسبب عملهم، وأن 46.9% من العينة يشتكون من الألم في العضلات والمفاصل وأن النساء أكثر شكوى من الرجال وفئة التمريض أكثر المتأثرين بهذه الآلام وأكثر هذه الآلام كانت ألآم الظهر 20.3% تلاها ألآم الرقبة والرأس 16.8% والأطراف السفلية 14.8% ثم الأكتاف 12.9%، وقد شكا من ألآم العين 26.4% وأظهرت النتائج أن 33% من عينة البحث تسند لهم مهمات أكبر من طاقتهم وأن الذين لديهم قناعة تامة بأعمالهم 39.8% وأن غالبية العينة 95.3% ترغب بتغيير النظام الحالي للعمل. وقد أظهرت القياسات البيئية أن الإضاءة كانت جيده لكن الأسوأ كانت إجراءات السلامة حيث كانت 56% وكانت الضوضاء والتهوية ودرجات الحرارة تحتاج للمراقبة وبعض التعديلات.وعلى ذلك اقترحت التوصيات التالية:

- اعتماد تسجيل وعلاج ومتابعة الأمراض المهنية وإصابات العضلات للعاملين في وزارة الصحة وتكوين سجل طبي.
- إنشاء دليل وطني للسلامة المهنية والتدريب.
- التدريب على تنويع مهمات العمل وتنمية المهارات اللازمة لذلك.
- تشجيع العاملين الصحيين على التعرف وتسجيل الأخطاء المهنية وعوامل الخطر داخل العمل.
- اختيار أجهزة وأثاث عند الشراء قابل للضبط لتناسب الأحجام والمهارات المختلفة للعاملين.
- تدريب أمناء سلامة داخل العمل للمراقبة والمتابعة تحت إشراف صحي مهني.
- تشجيع القيام بأبحاث أخرى تتعلق بأخطار مهنة العاملين الصحيين.

Abstract

The occupational hazards among governmental health care workers play an important role in their working life. Ergonomical hazards in particular are the most dangerous with serous negative impact on the workers and the society where hazards start to appear on long term after exposure. This cross sectional analytical descriptive study (Occupational hazards among governmental healthcare workers In the Gaza Strip: Ergonomic Hazards) has been conducted from February 2004 to December 2004 to explore the ergonomical hazards among health care workers. The study sample consists of 364 employees, which was picked randomly from the whole population of primary health care and hospital directorates (4169) employees. The instruments used to collect the data included the interview questionnaires and the direct measurement of the environmental parameters. The results revealed that 84.3% of the participants used medical equipments, while 45.3 % complained of unsatisfactory furniture and equipments. About 54.4% of the participants reported lack of environmental safety. From the participants 53.8% have been trained for their work, and 80.3% of them applied this training. Regarding knowledge about safety and occupational services, 77.2% of the participants knows about them, while 93.1 % of them know the work hazards and 50.3% have no enough knowledge. More than half of the participants have complaints of tiredness and exhaustion; 69.4% of them referred their tiredness to their work. Sleep disturbances affect 41.2 % of the study population; 64.5% of them due to their work. Slightly less than half of the study population complained of myalgia and arthralgia where the female workers affected three times more than males. Regarding medical personnel the nurses and paramedical are affected more than doctors and administrators, back pain was the most dominant, where 26.4 % of the study population complained of eyestrain. About 95.3% of the participants wish to change their work regime, only 39, 8% of the study populations are satisfied with their work, and 33% of

them reported that their job tasks exceed their capabilities. The environmental measurements showed that illumination was the best environmental work condition, while good safety measures constituted only 56%. Other work parameters as noise, ventilations, and climate need more attention, modifications, and control.

It has been concluded that there are shortage of knowledge for ergonomics at work, and muscular pain mainly backache is presented particularly among females.

It has been recommended to consider occupational health medical records to treat and follow up different occupational diseases and accidents, initiate national guidelines for occupational safety and training, implement continuous training programs to the workers for safety at work and safe use of devices and provide them with brochures and posters, choose the adjustable work furniture and devices to suite most of the workers, and train safety keepers to recognize, identify, and early interfere to prevent occupational risks.

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List of abbreviations:

AIDS Acquired Immunodeficiency Syndrome.

ANA	American Nurses Association
AOA	American Optometric Association
ASL	Assistant Secretary for legislation
BCG	Bacilli Calmette-Guérin
BLS	Bureau Labor Statistics
BMJ	British Medical Journal
CCOHS	Canadian Centre for Occupational Health and Safety
CDC	Center for Disease Control
CMV	Cytomegalovirus
COPD	Chronic Obstructive Pulmonary Disease
CTS	Carpal Tunnel Syndrome
EORM	Environmental and Occupational Risk Management
EU	Electrical United (democratic national union USA)
GS	Gaza Strip
HCW	Health Care Workers
HSE	Health and Safety Executive
ILO	International Labor Organization
LBP	Low Back Pain.
MOH	Ministry Of Health.
MOL	Ministry Of Labor
MSDs	Musculoskeletal Disorders.
NIOSH	National Institute for Occupational Safety and Health
OH	Occupational Health.
OHS	Occupational Health Service.
OSHA	Occupational Safety and Health Administration
PHC	Primary Health Care
PLL	Palestinian Labor Low.
PLO	Palestinian Liberation Organization
RSI	Repetitive Strain Injuries.

UCSD University of California San Diego

UNEP United Nations Development Programme

UOEH University of Occupational and Environmental Health Japan

USA United State of America

USLS United State Labor Statistics

UWM University of Wisconsin-Milwaukee

VDT Visual Display Terminals

VDU Visual Display Users

WB West Bank

WHO World Health Organization

Chapter one

Introduction

Chapter 1. Introduction

1. 1 Historical background

The world has started to pay attention to occupational health problems since the 1556, when the British Engineer Agricora, wrote the first occupational health (OH) book. Where, he specified some OH symptoms and other health problems associated with the daily life of the workers at different types of the industry. This great work was followed by the work of the American Professor, Bernardini Ramazzini who differentiated the Occupational diseases in his first OH book in 1700 (UOEH 2002).

Ergonomics has been a problem appearing in the last decades, with the first attention coming from Great Britain in 1907 followed by USA on 1970. Then other countries including the USA have started to pay more attention to such a problem and have prepared for safety ergonomic programs in 1992. This has been enhanced by the revolution of the sophisticated technology, by increasing demand for use of many new devices and by the complexity of the work tasks. (UOEH 2002).

Occupational diseases came under focus after the industrial revolution and the spread of the industrial activities in the west countries prior to the First World War and the great demand for the heavy industry, especially the steel industry (casting). Therefore, there were needs to differentiate and classify the occupational diseases according to type of hazards and system affected to facilitate their control. Ergonomical problems have started to be of concern internationally in the 1980's, then many organizations and associations have paid more attention to the quality of life for the workers and the

employees in the different work fields, and to the importance of worker's health, which affects the productivity and the economical status in the whole country(UOEH, 2002).

Health care workers (HCW) are one of the work populations who use many devices and computerized equipment to do their work, they do their work sometimes under stressful atmosphere which make them exposed to many work hazards, their ergonomic status represent one of the hidden hazards in their life. In most countries, where work become more sophisticated and more mechanical, and a number of work processes has been developed, but still the owners and employers treat the workers as tools in the production process, putting their health and lives at risk.

This research will focus on ergonomical hazards due to its importance and impacts on the health of the employees and workers as noticed in the daily practices or situations.

1.2 Ergonomics

Definitions

Pauline Kan, and Lee K.H. in 1989, defined Ergonomics: "As an applied science concerned with the design of facilities, equipment tools, and tasks that are compatible with the anatomical, physiological, biomechanical perceptual and behavioral characteristics of humans." (Pauline K, and Lee, K.H. 1989)

In 1989, UE NEWS defined ergonomics as "the science that seeks to change and redesign the work process in order to reduce worker injuries and illness", since over half

of all work-related, illnesses in the U.S. are caused by ergonomical hazards (UE NEWS, 1989).

Stephen Pheasant in 1991 defined ergonomics as the science "concerned with the design of work systems in which human beings interact with machines." It is "the science of fitting the workplace to the worker, not the worker to the workplace" (Stephen Ph, 1991).

CDC defined Ergonomics in 1991 as "the science of adapting work processes and conditions to fit the physical capabilities of the workers". They clarify that Ergonomics is matching the job to the worker as the product to the user. Ergonomics and human factors are often used interchangeably in workplaces. Both describe the interaction between the worker and the job demands. The difference between them is that ergonomics focuses on how work affects workers, and human factors emphasize designs that reduce the potential for human error. (CDC, 1991).

Herman Miller in 2003 defined ergonomics as "the science of ergonomics is how to fit the physical environment and the job to the worker's capabilities or limitations as well as to the tasks performed"(Herman Miller, 2003-A).

In this study, the definition of Herman Miller is adopted to address the common ergonomical hazards among workers and employees of the health care workers.

When the job is associated with such health hazards, it may cause occupational diseases that may become one of the multiple causes of other diseases or may aggravate existing illnesses of non-occupational origin. Health workers have become an issue that is

gaining an increase importance for study and research because of the many risks they are exposed to. Such risks (physical, chemical, biological, ergonomic, and psychosocial) in an overt or concealed way affect the professionals who deliver health services.

Ergonomical risk factors

These risk factors are the main cause for ergonomical disorders which lead to musculoskeletal manifestations.

- Lifting, bending.
- Pushing and pulling
- Awkward postures
- Standing
- Forceful exertions
- Static exertions
- Contact stress
- Repetitive motions
- Lighting and environmental factors.

In the last decades, there has been a decline in the occupational diseases and accidents among industrial societies due to great attention and awareness for such diseases, on the other hand it is noticed that occupational diseases and accidents have risen among health care workers according to the international statistics (BLS, 1994).

The problems of occupational musculoskeletal disorders as one of the major occupational disorders have gradually been acknowledged all over the world (Hagberg M et al 1993).

1.3 Geography and Demography

History and political context

Most of the Arab region falls under occupation of both England and France after the 1st world war (1917). Palestine in particular stayed under the Great Britain's mandate to the year of war and migration in (1948). After the resolution of the United Nation Security Council in (1949), the Palestinian land has been divided into two parts and nations, Palestinians and Jews. But in the same year the Israeli army occupied most of the historical Palestinian lands until the year 1967 where the war has resulted in occupying the whole of Palestine and some other Arab lands, with the exception of the Israeli occupation for GS and Sinai from November 1956 to March 1957. But Since 1993 and as a result of Oslo agreement between Palestine Liberation Organization (PLO) and Israel, the Palestinian Authority took over the responsibility of most of the life services including health services in GS & WB. The Palestinian Authority starts to take place of Gaza & WB hoping that this will be the initial step for establishment of the Palestinian state, but the second Uprising (Al-Aqssa Intifada) spread on all occupied territories at the end of September 2000. The Israeli Government has practiced all types and shapes of violence against the Palestinians who defend their occupied lands for freedom and self-determination, these situations affect both the employment and working status and livening standards of the whole population. (MOH, 2004-[a])

Geography

Palestine has an important geographic and strategic location; it is located at the southwestern part of Asia at the Eastern coast of the Mediterranean Sea in the Middle East. Syria and Jordan from the East, Lebanon from the North, the Gulf of El Aqaba from the South and, Egypt and the Mediterranean Sea on the west, border historical area of Palestine. The total area is 27000 Km^2, while the Palestinian territories occupy only 6257 Km^2 , of them 5879 Km^2 in the west of the Jordan river., and 378 Km^2 in the Gaza Strip (GS) with 50 Km long and 5-12 kilometers wide (UNEP, 2003) (Annex 1)

Gaza Strip is administratively divided into five governorates; North, Gaza, Mid zone, ,The MOH in its 2004 annual report calculated the population density in the Gaza Strip as 3806 persons per one square km, taking into consideration that approximately 40% of the total land is still occupied by Israel (MOH, 2004-b).

Demography

The mid year (2004) total population in GS is 1,406,423 out of them 630,615 are males and 592,976 are females as was estimated by Palestinian Central Bureau of Statistics. The population of the GS forms about 36.6% of the total population in Palestine, while male to female ratio is 102.49:100. (PCBS, 2004).

In the Population pyramid the age group 15-60 years (the working age) represents about 49.6%, the annual growth rate of GS was 2.8%, and life expectancy at birth was 70. 7 years for males and 73.8 for females. The average Crude Birth Rate (CBR) was

30.8/1000; Crude death Rate (CDR) was 3.2/1000. The women at bearing age (15-49) years are 45.2% of the total female number in Palestinian territories (PT), and in GS they form 15.8% of all females. Total Fertility rate (TFR) was 4.7/1000, and maternal mortality rate (MMR) was 21.3/100000 women. The infant mortality rate (IMR) was 24/1000 births, and the Adult illiteracy rate is 9%. (MOH 2004-c) (Annex 2).

Dependency ratio is calculated as the number of persons below fifteen years of age and above sixty-five per 100 persons. In 2004 the dependency ratio in Palestine was 97.0 while in Gaza strip it was 107.8% and in West Bank was 91.3%. The dependency ratio in Palestine is the highest among all other neighboring countries but this was not reflecting the actual economic dependency in Palestine because not every body enrolled in the work force age (15-64 years) is actually earning, as in the case of student, housewife and the unemployed. (PCBS, 2004-b)

The Ministry of Education and Higher Education is given responsibility for education at all levels. It is responsible for pre school and school education (grades 1-12 years) and higher education (universities, and collages), and other research institutions. There are three types of schools: governmental, private, and UNRWA. In the year 2003/4, the number of kindergartens was 2956, of them 2254 in West Bank and 702 in Gaza Strip. Governmental schools were 1580 and 2 Governmental kindergartens, 272 UNRWA (177 in Gaza, and 95 in West Bank), there are 257 private schools, and 845 kindergartens. In Palestine, There are 12 universities (5 in Gaza and 7 in West Bank) (MOEHE.2002)

Agricultural land occupies about 170km2, which is close to 50% of the total area of Gaza strip. Agriculture is the largest single sector in the economy where it contributes about 32% of the total economic production. This sector employs approximately half of the active labor force (Approximately 50000 employees) (E Q A, 2002)

Housing density varies from 1-6 housing units / donum near the city center, 1-3 housing units / donum in the suburbs, in camp 9 housing units / donum and in rural area 0.5 house units/ donum. (EQA, 2002).

1.4 Socio-economic status

MOH, in 2004 reported that the Gaza Strip is considered as a poor area and one of the lowest incomes in the Middle East area. The majority of income comes from salary of employees and security persons, while the agriculture products share by a reasonable portion in the economy. Labors inside the green line become very low and its share in the economy is so minimal due to recurrent siege and curfew of the Palestinian areas. The restrictions on private commercial import and export for agriculture and industrial sectors because of these situations make the economy unstable. Palestinian people mostly depend on Israel's different daily life events as the only choice, which contribute in the close relationship in many fields like marketing, working in different activities and availability of many raw materials. In addition to the bad effects of political conflict which worsens the economy and increases financial burden. The unstable economic condition, the limited income and the scarcity of work opportunity lead to a drop in the standard of living, but this situation improved with the coming of the Palestinian authority and sooner the condition dropped again to the worse level. During the second

Intifada (Al Aqssa) the economic condition deteriorated more and more to reach the lowest level, where the income for the person reached to under 2$/ day, which is lower than the annual income of 1.484,5 US $ before the Intifada 2000. In the same report it is shown that the socio-economic situation deteriorated due to reoccupation of the whole Palestinian territories which resulted in stress inheritance in the life of the Palestinian people particularly in Gaza Strip which is characterized by small geographic boundaries, high unemployment rate (31%) and travel restriction. The stressful events place people in a relatively higher level of stress than any other areas. (MOH, 2004-d)

Poor persons and families always tend to have larger family size than the non-poor do, they are less educated, and most of them are unemployed. The continuation of the crisis has worsened the economic situation and the standard of living. The World Bank estimated the poverty level as 38-51% and the PCBS as 58% of the Palestinian population living below the poverty line, where the percentage of the population under poverty line (<1$) in Gaza is 29.6%, and 18.4% in the West Bank (PCBS 2004-[a]).

1.5 Environmental situation

The environmental health status in Gaza strip is suffering due to the lack of basic information required for sustainable development. Absence of clear environmental polices add to the magnitude of the problem; the microenvironment at work undergoes the same shortage in information and devices for measurement of the work environment. The major Environmental health problems in Palestine resemble those in the Middle East region including water quality, waste water disposal, solid waste management, pesticide misuse, food hygiene and safety, air pollution, desertification

and urbanization. All of the above environmental health problems may affect directly or indirectly the health state of the workers dealing with different work fields. (E Q A, 2002)

In the publication of EQA, Palestinian Development Plan, they consider infrastructure development and natural resources management as the first priority while water, wastewater, environment, solid waste, and energy are regarded as priority sub sectors. They demonstrate a clear policy commitment to improve environmental protection and resource management. (SPEAP, 2004)

1.6 Legislation

Palestinian labor law (No.7, 2000) includes legislations for labors but not the entire workforce in different sectors of the country. The law was followed by the executive acts in 2003, which guard and regulate the work rules and rights including the medical examinations to the workers governed by the labor law. (PLL, No7 2000).

In Palestine, the Public health law number 20 in the year 2004 (order 32) states that the work environment and safety measures at work must be laid out and inspected by the MOH and other related organization. (Alwaqaa Al Phalestiniah 2004).

Palestinian workforce (over 15years of age) represents 54.4% of the general population. Part of them work in the industrial zones around the green line, and very few of them work inside the green line. The governmental employees represent the greatest portion of the working people, (unemployment rate is 36.8% in GS). The governmental

employees are the main source of income, and all of the governmental employees are governed by the civil service law of the General employees bureau, (PCBS, 2004-b)

1.7 Health services

Health sector is an important field of interest for all concerned people. Mainly the Ministry of Health of the Palestinian National Authority (PNA) provides health services in Gaza Strip, United Nation Relief and Work Agency provides health services for Palestinian Refugees only (UNRWA), Non-Governmental Organizations (NGOs) and the private sector provide low cost or free health services. During al- Aqssa Intifada (Sept. 2000 - April 2005), the health services situation has become under pressure due to the Israeli aggression that causes an increase of the number of injured people which affect negatively the introduction of any new health service, like the occupational health service. Israeli occupational army is preventing the medical care access for sick and injured people by restricting their movement to hospital and preventing the medical teams from reaching them, which restrict the preventive activities including all categories (MOH, 2004-a). (Annex 3)

Access to Health Services

The results of the survey which was conducted during 4th quarter of 2004, indicate that 53.6% of the households have access problems to health services because of military checkpoints, where 52.5% have access problems due to the Israeli closure, 44.2% have access problems because of the high cost of medical treatment, and 10.7% of

households have access problems because of the settlement expansion and the annexation wall (PCBS, 2005)

Primary Health Care

In the Gaza Strip (GS), the Primary Health Care (PHC) centers provide both curative and preventive services. Most of these centers can provide minor emergency services to the residences in their surrounding including work and road traffic accidents, and treat any other work or occupational disease without any specific differentiation or registration to such diseases. The Primary Health Care (PHC) is considered the backbone of any health system since the basic level of care is provided equally to every one. It addresses the most common problems in the community by providing preventing and curative services to maximize health and well-being. The Primary Health Care (PHC) is composed of 10 departments that operate under the responsibility of the director general of PHC directorate, which includes, Women health, School health, Mental health, Child health, Community health, Nutrition, Health Education and Promotion, Preventive including Occupational health, Vaccination and Epidemiology, Dental health, and laboratories. In the Gaza Strip, there are 103 PHC centers distributed allover the 5 districts. Out of those centers, 54 are governmental and operated by the MOH, and 49 are non-governmental (17 operated by UNRWA and 31 by different NGO's). (MOH, 2004-a).

Secondary care

In Palestine, there are 78 hospitals (23 Governmental, 31 Nongovernmental, 23 private, and one UNRWA). In Gaza Strip, there are seven hospitals in addition to one rehabilitation center. Three of the seven hospitals are general hospital, and one of them is a regional hospital. The four specialize hospitals are; two pediatric hospitals (El Nasser and El Durra), one psychiatric hospital, and one ophthalmic hospital. The Shifa hospital is the main governmental hospital located in Gaza City; it includes general and specialized departments. In the Mid-Zone, Al Aqssa hospital was established in 2001 urgently to face the catastrophic situation imposed by the Israeli military activities and Al Najar hospital in Rafah in addition to Kamal Edwan hospital in Gabalia as well. In Khan-younis city MOH opened the European Gaza hospital to provide general and specialized health services (MOH 2004-a).

Health insurance

Most of the health services are covered by the governmental health insurance, while children under three years of age, most of the preventive services, school health, antenatal care for pregnant women and some of the secondary care services are free of charge. The Governmental health insurance share is 56.6% of all types of health insurance, Workers participation in the health insurance revenue is so minimal, and it is distributed as so: 4.9%% form Israeli workers and 11.3% from self employed groups, other special insurance companies cover the insured workers if injured, their coverage includes treatment and compensation according to their health state, under the

supervision of the ministry of labor, but the majority of Palestinian health insurance is covered by compulsory insurance via governmental employees revenue (MOH 2004-a).

By reviewing the occupational services provided in the GS, it is found that the ministry of labor is the only sector established and provides some specific occupational health services (OHS) in Palestine. The service is provided through the worker inspection department, health education for safety and protection and through other programs for expected hazards to each job. These programs include those for specific tasks and persons such as, workplace evaluation regarding safety and protection, registration of work injuries mainly due to mechanical causes among workers, and work environment correction. There are special committees for occupational safety in the governorates, municipalities, ministry of industry, ministry of labor, and ministry of health. (MOL 2004). (Annex 3).

1.8 Work force and employment

The work force (> 15) years old are about 49.6 % of the total Palestinian population, where 40.4% of them are laborers. From all population there are 68.2% employed, 25.6 % unemployed, and 6.2% underemployment (not fully employed). Particularly in Gaza Strip the work force (> 15)years old is about 47.2% of the total population, of them in labor 37.6% and the percentage of employed persons is 67.2% while the unemployed is 29.2%, and the underemployment is 3.6% (PCBS, 2004-b).

During the Intifada the Palestinian workers have lost their places of work inside Israel, even the workers inside the Palestinian area have lost their work due to the cessation of

many industrial sites, and the sweeping away of agricultural lands. During Intifada 33 % of the private sector, jobs had been lost (54.000 of 164.000) in GS (World Bank, 2003).

At the beginning of the Intifada, the unemployment has increased from 10% in 2000 to 27% in 2002 after peaking at 36% in the third quarter of 2002, and declined to 31% in the 4th quarter of 2004 (PCBS, 2004-b).

The private sector has absorbed the full force of the employment crisis, and the public sector employment had increased by 17% during the period up to end of 2002 (World Bank, 2003) .

1.9 Research problem

The occupational health lessons learned during the Industrial Revolution should be borne in mind in order to plan for the occupational health in Palestine to avoid such problems. In Palestine there is no data in the annual report of the Ministry of health related to any specific occupational health services (OHS) (MOH, 2004-a).

The data in the report of MOH shows that OH services are integrated in the general health services. There is no data or registration system for the jobs practiced in Palestine and related occupational health problems as well. There are few records for Occupational health accidents and some other services mentioned in the Palestinian labor annual non-published reports. Currently one of the major occupational health problems is the ergonomical hazards, which result in musculoskeletal complaints due to

work conditions. Most of international organizations that are dealing with workers and work conditions have already established some ergonomical guidelines and legislations. These ergonomical hazards have not been tackled in Palestine or dealt with as occupational health hazards.

This study investigates the extent of the problem of ergonomics among the health care workers in the Gaza Strip (MOH, 2004-a).

1.10 Justification of study

As occupational diseases resemble those of the non-occupational except in latent period, and there are hundreds of different jobs, even most of the people are not sufficiently aware of ergonomical hazards and other OH hazards, many people are exposed to an occupational hazard, which is sometimes fatal. The Health care industry has one of the most frequent work related diseases and work accidents due to lack of awareness and dominance of curative thinking neglecting the preventive rules (BLS,1994).

On the professional level as the researcher is working at the OH department in the MOH Gaza for more than 5 years, it was observed that many cases of musculoskeletal complaints among some of the employees of the MOH have no clear causes and most of the cases are referred to non-occupational causes. It has been noted that there is an increase of work fatigue and exhaustion in conjunction with the use of new technologies and equipments.

The results of the study will be presented to the planners and decision-makers who have to be provided with authentic data on the actual health status.

The information on the occupational health in Palestine is very limited which is negatively reflected on the occupational health services. This work will highlight ergonomical hazards among the health workers and initiate database for occupational health to facilitate the follow up process and measure the progress achieved and also to compare the level of success with the regional and international standards. Implementing this research will increase the attention and care to the ergonomics.

This study is the first attempt to address ergonomical problems using scientific method In Palestine, and it is performed to explore OHS (occupational health services) in the MOH and the employee's potential ergonomic hazards in order to persuade policy makers and planners to integrate all OH services in the Health system.

1.11 Objectives

General objective

To explore the extent of the ergonomical hazards among the employees of the Ministry of health in the Gaza Strip.

Specific objective

1. To describe the ergonomical conditions for the employees of the MOH in the Gaza Strip.
2. To evaluate the knowledge and practice of the employees of MOH in the Gaza Strip regarding ergonomics.

3. To identify the associated risk factors for the ergonomical disorders among the employees of the MOH in the Gaza Strip.
4. To reveal the occupational medical interventions provided to the employees exposed to or suffer from ergonomically disorders.
5. To evaluate the safety regulations provided to the employees of the MOH in the Gaza Strip.
6. To suggest recommendations for safety and health concerning ergonomical hazards.

1.12 Research questions

- What is the occupational health situation among the health care workers concerning ergonomics in the Gaza Strip?
- Are the health care workers aware and sufficiently knowledgeable of ergonomical hazards?
- What are the causes for ergonomical disorders among health care workers?
- Is there any medical intervention provided to ergonomically affect health care workers?
- Are the HCW satisfied with their work equipment and environment?

Chapter two

Literature review

Chapter 2. Literature review

In this chapter, the literature for different risk factors and ergonomical disorders will be displayed explaining the impact of many factors on the employees including, organization, work places, and health system, which play together an important role in the occurrence of ergonomical disorders.

2.1 WHO Classification of Occupational risks (1997)

Biological risks

Live organisms, usually microscopic that pose serious threats can cause biological risks. Many types of living organisms causing the biological hazards for the health providers due to their dealing with the infected persons and recently the attention has been directed towards Tuberculosis, rubella, cytomegalovirus (CMV), AIDS and hepatitis B . The epidemics of acquired immunodeficiency virus (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 treatment of patients and handling of contaminated fluids. Hepatitis B is the most frequent among occupational infectious diseases, and the probability of acquiring it accidentally is three times greater than AIDS. Needle prick injuries are the most common injuries in the health care sector. Nursing staff, particularly nursing students are at the highest risk from needle-prick incidents. The prevention of transmission of HIV through a needle-prick injury is very important, particularly in high HIV prevalence areas.

Chemical risks

Chemical risks play an important health hazard among health workers, since they can absorb chemical substances when they deal with chemicals or use them. Some of the chemical substances are irritating to the skin and respiratory tract and can cause allergy. Some other chemical such as ethylene oxide, formaldehyde, hexachlorophene, are known mutagens, teratogenic and human carcinogens. Latex, acrylic and epoxy chemicals used in orthopedics dentistry, and laboratory are occupational allergic agents. In spite of the large number of chemical hazards, it is so limited among healthcare workers; but still the lack of awareness to such hazards may threaten their life.

Physical risks

The most common among health workers are ionizing radiation, noise exposure, temperature, and electricity. Ionizing radiation includes X-rays and radioactive elements from the departments of radiology, radiation therapy, hormonal laboratories, clinical and dental laboratories, and operation rooms. Dentists, maximum facial surgeons, surgeons of orthopedics, traumatologists and otorhinolaryngiologists, and bacteriologists (centrifuge) are the most exposed persons to noise. Such hazards cannot be neglected and must be put under focus to reduce their exposure to hazards. People exposed to heat and cold include operation's theatre staff, boiler-room workers, laboratory technicians as well as service and maintenance personnel. Poor building design and maintenance can cause indoor air quality problems. Special attention to the ventilation of the building is needed to prevent the "sick building syndrome". This is also particularly important in specific areas such as laboratories and operation theatres

where there is a specific need to suppress, minimize or control hazardous gases, dusts, and fumes.

Ergonomical risks

The modernizations of the industry and work facilities result in using new technological equipments and devices. Even the new modification of work environment may affect the worker's health causing many health hazards, mainly ergonomical hazards. The most frequent injury among health care workers is musculoskeletal associated with patient handling; followed by injuries related to material handling. The lifting of patients is a major problem for nurses where they are at great risk of musculoskeletal injuries. Back injury is the most common and most costly type of injury faced by HCWs. The reason for the great number of musculoskeletal injuries is the frequent lifting of patients where the nurses in particular are required to do, and that is not always physically possible "the National Institute for Occupational Safety and Health (NIOSH) guidance on weight lifting gives 55 pounds (25Kg) as a safe level for the average person". In the health care setting, patients are difficult to lift since they are not stable and can be very uncooperative. In addition, the weight of adult patients is over the 55-pound safe lifting range. Injuries due to awkward work postures, such as the prolonged standing, bending or kneeling prevail among dentists, otorhinolarengiologists, surgeons and especially micro surgeons, obstetricians, gynecologists and other HCWs, such as operating room staff, cleaners and hospital laundry workers. The availability of mechanical lifts and other devices for moving patients, for instance from their beds to wheelchairs, and ergonomically designed workstations have greatly improved the comfort of the working postures in many medical practices and procedures. Nevertheless, unpredictable

demands and high workload, as well as economic constraints, limit the introduction of these techniques to the workplaces in the health care sector in certain countries. The ergonomical hazards are manifested in weary and injuries due to many ergonomical risk factors, which include overloads or incorrect positions in the work. Raising patients is a demanding task for nurses and they present a relatively high rate of backaches, neurological symptoms, and aches and pains due to strains.

Psychosocial risks

Many factors classified under this category, may be due to the physical work environment, characteristics of the tasks, schedule organization, technological changes, rigid hierarchical structure, and human and inter professional relationships.(WHO, 1997).

2.2 Stress

Job stress is one of the occupational hazards and it is defined as the harmful physical and emotional response of the worker, when the requirements of the job do not match his/her capabilities, resources, or needs. The main causes include heavy workload, conflicting or uncertain job responsibilities, and job insecurity. It is well known that health care personnel, nurses, have experienced stress in particular, for many years. Dealing with the very sick and dying persons can be a real problem for trainees. Long working hours, a high level of responsibilities and shift work are part of the life of many hospital workers. Junior doctors and nurses are more likely to face these stressful situations. Although normal levels of stress will not cause a disability, it is possible that

prolonged exposure to a high level of stress will result in substantial adverse long-term health effects. Such health effects can be anxiety, aggressiveness, apathy, boredom, irritability, depression, exhaustion, or behavioral effects such as accident proneness, smoking, drug taking, alcohol abuse, excess eating or restlessness. (NIOSH, 1999)

2.3 Violence

Violence at work is common among workers who are in contact with people in distress. Frustration and anger arising out of illness and pain, problems of ageing, psychiatric disorders, alcohol and substance abuse can affect people's behavior and make them verbally and physically aggressive. HCWs are at special risk of workplace violence. Health service staff working in emergency care units and in psychiatric hospitals are at high risk of violence. Female HCWs are particularly vulnerable to violence at work. Occupational health science is one of the most important sciences in the health industry that deals with the main valuable resource in the country; i.e. the human resources. The characteristics of the occupational diseases are special because their manifestations and awareness signs always come late, so the health damage is mostly induced suddenly. This fact leads us to the study of this important side of our investment in the human resources.

In a report of International Labor Organization (ILO, 2003), Shengli Niu mentioned that there were 35 million health care workers (HCW) worldwide in 2002. This number is worth for caring of and finding the most safe work environment in order to decrease the hazards they are facing in doing their work. (Shengli Niu 2003)

In most of the countries including Palestine, there is an increase in the use of computers and other advance technology as essential tools of work, for example, in USA half of the workforce (120 million) is now spending sometime during the workday at a computer keyboard (BLS, 1994).

As the rapid expansion for computer, technology to all sectors of the healthcare service is going on, the number of users and health hazards continue to increase. Occupational diseases arise always due to application of the work; where severity and intensity of such diseases depend on the complexity of the work and the substances used in that work. Therefore, the health of the worker's life is linked to the industrialization status of the country. Canada as one of the most industrialized countries uses more technology and computers in the work places, which lead to the appearance of health hazards, associated with the use of such devices .The more concern to prevent and treat these hazards enable the Canadians to find solutions for ergonomical hazards.

The Canadian center for research and statistics noted that increase use of computers in the workplace has caused a corresponding rise in health concerns directly related to their use. They noticed that workstation design and proper work practices can help to address these concerns. They say also that, ergonomic hazards refer to workplace conditions that pose the risk of injury to the musculoskeletal system of the worker. Examples of musculoskeletal injuries include repetitive strain injuries, general muscle strain, discomfort, tennis elbow, carpal tunnel syndrome, and eye and vision problems. According to Canadian center for occupational health and safety ergonomic hazards, include forceful movements, vibration, temperature extremes, and awkward postures

that arise from improper work methods and improperly designed workstations, tools, and equipment. (CCOHS, 2002).

2.4 Back pain

The importance of the ergonomics is gaining more and more attention in the whole world. It has a negative reflection on the economy and plays an important role in the completely productive process. Many associations and organizations have studied the HCWs conditions and ergonomical hazards affecting them. The website spine-health mentioned that the ergonomical hazard of the nurses and back pain in the workplace is one of the most common work-related injuries. In case of ergonomic principals' applied and the workplace properly studied, it can help to prevent or reduce work-related back pain, back injury and maintain a healthy back.

According to the site (spine-health 2004), the goal of an ergonomic program is "to adapt the workplace to a specific worker" and that depends on the job description, required tasks and physical make up of the employee performing those tasks.

The site classifies the possible causes for back pain as:

- Non-accidental injury, where pain arises as a result of normal activities and requirements of the task, poor body mechanics, or prolonged activity and fatigue as major contributors to these injuries.
- Accidental injury results when an unexpected event triggers injury during the task, a load that slips or shifts as it is being lifted, and a slip, fall or hitting your head on a cabinet door. These accidents can affect the neck, back and other joints with resulting muscle strain or tearing of soft tissue in the back.

The report grades the risk according to the physical demand and requirement of repetitive lifting. Nurses and many healthcare workers are at greatest risk for both non-accidental and accidental back injury. They have back problems because patients are of different stature and weight with varying needs. Often, they need help changing position, rising from a chair and walking. Other employees, who are sitting most of the day and work at a computer or working devices, they are at high risk for non-accidental back injury. Office ergonomics or computer ergonomics can help to minimize the risk of repetitive injury result of carpal tunnel syndrome, or any other related injury and the risks associated with prolonged sitting, such as neck strain, lower back pain and leg pain. (Spine-health, 2004)

According to the NIOSH, the occupational back injury is the second leading occupational injury in the United States among health care personnel; and nurses have the highest rate of back pain, with an annual prevalence of 40-50% and a lifetime prevalence of 35-80% (Edlich RF et.al. 2004).

John t. Bielecki, 2002 stated that, among nurses there is an age-related increase in the incidence of low back pain. He mentioned in his report that according to the US Bureau of Labor Statistics, the healthcare workers occupy six of the top ten occupations at highest risk for back injuries; he enumerated the factors associated with LBP (low back pain) as follows:

- Factors Associated with Work-Related Low Back Pain.
- Previous workers' compensation claim for low back pain.
- Psychophysical demands.
- Psychosocial stresses.

- Biomechanical demands.
- Physical conditioning.

He mentioned also that some other factors like inadequate staff perform the needed tasks in hurry, and factors for LBP presence of stressful situations are important. (John t. Bielecki 2002).

Mrs. Susan Wilburn, 2001 stated that low back injuries are the leading occupational health problem affecting healthcare workers increasing in particular among nurses and nurses' assistants. Hospitals and nursing homes are the top two workplaces for days away from work due to back injuries. The primary risk factor for low back disorders among nursing personnel is lifting and transferring of patients. She mentioned in the research applied in the University of Wisconsin, on 1996 at the Institute of Medicine Report addressed by Nurse Staffing in Hospitals and Nursing Homes that 38% of nurses complaining from back injuries. She stated also that the rate of occupational injury and illness to healthcare workers surpassed all other industries combined in 1991 while the rate of injury to all workers has declined since 1991, in the same time the rate of injuries to healthcare workers has continued to climb. She said that now it is more dangerous to work in a hospital than in construction and more dangerous to work in a nursing home than in a mine. One of the most important hazards to the healthcare workers is (MSDs). Other jobs at risk for musculoskeletal injury include transport workers, housekeeping and environmental services (Susan Wilburn, 2001-a).

Paula Kriner, 2000 stated that, back injuries and other repetitive stress and muscle disorders are among the most common injuries affecting hospital workers, from janitors and laundry machine operators to radiology technicians and physical therapists. People

who work with patients every day including nursing assistants, orderlies, and patient attendants are twice as likely to suffer these types of injuries as the average worker. (Paula Kriner 2000)

Bureau of Labor Statistics, 1999, as the main reference association for statistics, mainly the work injuries, stated that the occupational back injuries were the major problem. In the year 1998, with this order of intensity as follows, nursing assistants, orderlies, attendants, and registered nurses. (BLS, 1999)

American federation employee's agency mentioned in their publication that nurses and nurse's aides are considered from the highest back injury rate than any occupation, as their back injuries accounting for 43% of all nursing home injuries (AFE, 1997).

Bert Sadleir stated that hospital staff particularly nurses are prone to back injury from the need to lift and roll immobilized or disabled patients for toilet, washing, dressing and pressure care. Hospitals are now required to give training on back care to all new staff. This training, combined with the use of wards persons to assist nurses and the use of hydraulic lifting devices, has decreased the risk of back injury considerably (Bert Sadleir, 1997).

Susan Terry and others show that low back injury has been a particular problem for women working in the health care industry, Work-related back injuries have been shown to account for 53.3% of all work related injury claims, particularly nursing assistants being at high risk of injury, The costs of work related back injury in nursing

homes of USA alone have been estimated conservatively to be in excess of 6 million dollars (Susan Terry 1997).

Hildebrandt describes back pain in the working population and evaluating prevalence rates in Dutch trades and professions depending on the reanalyze of three health surveys in the Dutch working population, hence he concluded that high prevalence rates of back pain are found in particular in non-sedentary professions like Workers in the construction industry and supervisory production workers, plumbers, drivers and cleaners, it reaches up to 41%.. (Hildebrandt 1995)

2.5 Musculoskeletal Disorder

Majid Ezzati, et al estimated in his report presented via WHO that, there are 2.9 billion workers across the globe exposed to hazardous risks at their workplaces, while the health care workers make up only 0.6% of the global population. Owing primarily to lack of data in developing countries, important occupational risks for some cancers are omitted, in addition to reproductive disorders, dermatitis, infectious diseases, ischemic heart disease, musculoskeletal disorders (MSDs) of the upper extremities, and other conditions such as workplace stress. All of the mentioned occupational risks affecting HCW if not recorded, it will reduce the percentage of the registered cases. As they stated that the sources of data to delineate categories of exposed workers included economic databases and publications of the International Labor Organization (ILO) and the World Bank and the published scientific literature. In their study depending on reviewing and meta analysis of literatures and studies, they stated that the occupational risk factors accounted for an estimated 37% of back pain, 16% of hearing loss, 13% of

chronic obstructive pulmonary disease (COPD), 11% of asthma, 8% of injuries, 9% of lung cancer and 2% of leukemia. They evaluate the risk of back pain and hearing loss to have in common the fact that they do not directly produce premature mortality, but they cause substantial disability and have multiple consequences for the individual and society, particularly for workers suffering the outcomes at an early age. (Majid E. et al, 2004)

John Henshaw mentioned in OSHA guidelines that MSDs include conditions such as low back pain, sciatica, rotator cuff injuries, epicondylitis, and carpal tunnel syndrome (John H. 2003).

Herman Miller incorporation which deals with the conditions of the health care workers mentioned in their report depend on labor statistics and OSHA reports that they found each year 1.8 million U.S. workers experience work-related musculoskeletal disorders (MSDs) caused by overexertion or repetitive motion ,injuries known as Carpal tunnel syndrome (CTS), and the annual cost for those disorders reach 45 Billion Dollar they found also that the possible cause for their complain and expensive cost, is ageing, sedentary work and lifestyles, type of work as Computer work, work Stress, and decreased diversity of workforce. (Herman M. 2003-b).

Lipscomb and others found that preventing of musculoskeletal disorders requires system-level approaches to scheduling that reduce the time of exposure to demanding work conditions and promote healthful work-rest patterns (Lipscomb J. et al.2002).

Marc Oliver stated in his research applied in the University of Maryland that Musculoskeletal Disorders are the major cause of injury/illness in the American workplace mainly health care industry and the effect of using an intervention in the healthcare industry as a case example, to reduce low back injury in direct care providers at a long term care nursing facility. (Marc O. 2001).

Comparison of MSDs in different industries reveals as Craig Shepherd Stated that injuries in healthcare with the average injury rates of 8.5% for hospitals and 13.2% for nursing and personal care facilities, while those of general industry at 6.3%. She said that according to Bureau of Labor Statistics, there are high number of musculoskeletal injuries, specifically sprains and strains among nursing aides, registered nurses, and orderlies. The vast majority of these incidents involved the back. (Craig Sh. 2001).

In the testimony of ASL, 2000, it was published by Rachael Weinstein that each year, approximately 1.8 million American workers from 16 Million suffer from MSDs, about one-third of which are serious enough to require time away from work. According to the Bureau of Labor Statistics USA, in 1998 there were nearly 90,000 MSDs with days away from work in the health care sector. In addition, more than 15% of MSDs in private industry occurred in the health care sector, largely in hospitals and nursing homes. She said also that health care workers particularly front line workers have the highest exposure to MSD risks. They exposed to overexertion rates four times higher than all of private industry. She mentioned that the effectiveness of certain ergonomics programs in health care facilities suggested reduction in injuries to the health care workers resulting from manual lifting and transferring of patients. The evidence argues

strongly that ergonomics programs can reduce MSDs and yield cost savings for employers. (Rachael W. 2000-a).

Guy Fragala stated that: "Many organizations are realizing that the high rate of musculoskeletal disorders experienced by workers in the healthcare industry remains a major problem". (Guy F. 2000).

In the BLS, they mentioned that work-related musculoskeletal disorders (MSDs) currently account for one-third of all occupational injuries and illnesses reported to the Bureau of Labor Statistics (BLS) by employers every year. These disorders thus constitute the largest job-related injury and illness problem in the United States today (BLS 2000).

Audrey Nelson and Nancy N. Menzel stated in their analysis of Manual Handling Workload Model under responsibility of U.S. Department of Labor on 1999 that Health Services has the fourth highest incidence of Lost Workdays due to Musculoskeletal Disorders (MSDs), prevalence rate of 13.847 / 1000, and most of the MSDs occurred in health care population are back injuries, also they mentioned that The National Institute for Occupational Safety and Health (NIOSH) has included low back disorders on their National Occupational Research Agenda due to its importance and high prevalence rate **(** Audrey N, and Nancy N, 2001).

Many studies reviewed and summarized by USA labor statistics on workers condition and sick leave of the workstation workers, shows that median days away from work for Carpal tunnel syndrome was (27Days) and occupational hazards increased by working

time increasing and the prevalence of RSI affects up to 35% (USA labor statistics 1994).

Knave et al. Shows in his research describing office employee's work conditions for those VDT operators to have more eye discomfort and possibly more musculoskeletal discomfort in the shoulders, neck, and back than the referents. The VDT group also reported more skin disorders. In addition, women reported consistently more disorders than men, regardless of whether or not they were employed in VDT work, and the results also indicated that total daily work hours and time spent looking at the VDT screen were related to the degree of discomfort. (Knave et al. 1985).

2.6 Neck and shoulder

Eileen Mason and Stephanie Dukes mentioned in the survey of cytotechnologists in Washington that More than 85% of respondents reported some musculoskeletal discomfort. Among the symptoms presented are headache, neck pain and stiffness, pain of the lower and upper back, and upper-extremity discomfort (Eileen M, and Stephanie D, 2003).

Ekberg and others stated that the symptoms in the neck and shoulder area are signals not only of ergonomic deficiencies in the work situation, but in particular of work organizational conditions. (Ekberg et al. 1995)

2.7 Knowledge and practice

University of California enumerated in their press that the risk factors for ergonomic disorders as, Forceful exertions, Repetitive motions, Awkward postures, Static postures, Compression or contact stress, Lighting, Vibration, Noise, and Cold temperatures. They stated that injuries due to these risk factors could be prevented by adapting knowledge and understanding risk factors and practicing basic ergonomic principles, which is the first defense against possible injury and lost productivity. (UCSD, 2004.).

In the Survey conducted on 1983 by Grandjean to measure the awareness of the employees towards ergonomics he concluded that monitor positioning was a prime factor in assuring a computer operator's comfort according to the knowledge of the employees (Harry C 2002).

Alireza et al. in the survey applied in Shiraz University of Medical Sciences, Iran stated that 16.3% of the laboratory hospital workers had a high level of knowledge about ergonomics and 83.7% of them knew little of it, and regarding musculoskeletal complain their result showed that the worse the working conditions, the more lost working days and musculoskeletal complaints. (Alireza et al 2002)

Narelle S, et al. stated in their study of the use of ergonomics information in a heavy engineering design process that the engineers and designers had poor knowledge of both the formal design processes in use in their company and how to apply ergonomics principles. The installed designs revealed several serious ergonomic problems that could impact on the operator's ability to work efficiently and safely. (Narelle et al. 2000)

2.8 Applying ergonomical program

J W Collins et al. stated in his evaluation of a "best practices" musculoskeletal injury prevention program in nursing homes that The "best practices" prevention program significantly reduced injuries for full time and part time nurses in all age groups, all lengths of experience in all study sites.(J W Collins et al. 2004)

Bureau of Labor Statistics USA stated that employees in nursing and personal care facilities suffer over 200,000 work-related injuries and illnesses each year. Studies also show that with a well-thought-out ergonomics program in place, these injuries can be drastically reduced, including how the proper programs and equipment can prevent injury. Exposure to injury from ergonomic stress points during the handling, transferring, and repositioning of patients offers the greatest risk potential. (EORM 2003).

2.9 Intervention polices

A G E M de Boer et al. (2004) show the result of an intervention program for the employees in a large company result in decrease of retirement rate and the total average number of sick leave days in comparison with the other period in the same company without program application, almost employees had better work ability, less burnout, and better quality of life. One of the used intervention programs is an action plan which focuses on some aspects should be changed and on the necessary adaptations including changes in the work tasks, using extra tools and aids, other working hours, and improvement in work relationship in order to enable the employee to remain working

J W Collins et, al. (2004) mentioned in their report evaluating the best practice to the musculoskeletal injury prevention program in nursing homes. It is consists of mechanical lifts and repositioning aids, a zero lift policy, and employee training on lift usage. The result shows a significant reduction in resident handling injury incidence, workers' compensation costs, and lost workday injuries. Restricted workday rates are used as main outcome measures.

Nelson, A. (2004) informed in his research that he had implemented various types of interventions in an attempt to reduce high-risk patient handling tasks. These interventions are; engineering controls which include some changes in the work environment, layout, tools, or equipment used on the job, or changing the way a job is done to avoid work-related musculoskeletal hazards, another direction of change is the administrative controls which are management-dictated work practices and policies that reduce or prevent exposures to ergonomic risk factors. Administrative control strategies include:

(a) Modification of job rules and procedures (scheduling more rest breaks).

(b) Job rotation or modified duties or length of shift.

(c) Training of workers to recognize ergonomic risk factors so they can adopt stress reduction techniques while performing their work tasks. The last point of intervention is behavioral or work practice controls that involve training of staff in body mechanics, or other joint protection principles.

Eugene E. 2001 defines an ergonomic intervention as a planned systematic process designed to prevent injuries from occurring or to manage most effectively existing injuries. These interventions include ergonomic evaluation, individual and group

training, developing injury and illness prevention programs, modifying workstations and job duties, and case management services. All of these intervention programs resulted in the reduction of absenteeism, minimizing complication; facilitating rehabilitation, early return to work, and in the reduction of employer costs related to time loss and costs associated with disabilities and illnesses.

As mentioned in National Academies Press, 2001, the primary prevention occurs when the intervention is undertaken before members of the population at risk have acquired a condition of concern, for example, educational programs to reduce the number of new cases (incidence) of low back pain. The secondary prevention occurs when the intervention is undertaken after individuals have experienced the condition of concern.

TJ Murray, OC, 1994, stated that an important key to prevention is early intervention in the process. This not only means early intervention in the development of chronic pain, but attention to how acute pain is treated so that it does not lead so often to chronic pain, and the further steps are based on a careful assessment of the problem at that point, based on rehabilitation concepts. He showed that employees who had early intervention were 8 times less likely to become chronic pain patients; insisted on early return to function and work despite pain, showed good prognosis and better treatment outcomes.

A.D.LaMontagne et al. stated after using source-focused intervention that more sustained or intense management focused intervention would significantly improve exposure prevention.

The American Association of Occupational Health Nurses (AAOHN) mentioned in the fact sheet published in its web some topics related to the intervention polices. They provide special practice for the health providers and workers, which focus on the promotion and restoration of their health, prevention of illness and injury and protection from work related and environmental hazards through health promotion, legal and regulatory compliance, Worker and workplace hazard detection and training on how to avoid them and how to early interfere to minimize the complication and hasten the return to work.

Anthony D. LaMontagne tends to address regulatory or legislative more than voluntary policies and occupational safety more often than occupational health policy interventions.

In response to the high number of recordable injuries in cold storage warehousing occupational health solution, initiate early intervention for all injuries. Thus, OHS conducted a review of the policies and recommendations to provide Staff Development and Training aimed at strengthening supervisor understanding and implementation of these policies.

2.10 Cost of Musculoskeletal Disorders

Dr James W Collins stated In the research published in the British Medical Journal that the cost of musculoskeletal injury decreased if awareness and information about safety and introducing new technologies in patient manipulation, so awareness and training is strongly needed to be provided for healthcare workers. (BMJ 2004)

2.11 Overexertion injuries

Lynda E et al stated in their book about health care workers, denoting to the report of Bureau of Labor Statistics USA (2000) that the incident rate for overexertion injuries in nursing and long term care facilities is 4 times higher than the national average for any other industry in the U.S.(Lynda E et al. 2004)

2.12 Psychosocial work conditions

Ekberg et al. reported in the study performed to evaluate how individual characteristics, as well as ergonomic, organizational and psychosocial factors in the work situation among Sweden working population are associated with early symptoms in the neck and shoulder area particularly females, their results suggest that symptoms are signals not only of ergonomic deficiencies in the work situation, but in particular of work organizational conditions. (Ekberg et al. 1995)

Ekberg and others mentioned that work organization and psychosocial work conditions are important determinants for disease in the neck and shoulders among workers in different jobs. (Ekberg et al. 1994)

2.13 Working hours and visual problems

Dr H-R Guo mentioned in the survey applied to compare back pain complain for different jobs and the relation with working hours that the prevalence of back pain increased as the number of working hours spent on repeated strenuous physical

activities or repeated bending, twisting, or reaching increased, it is distributed on different jobs to show that nursing aids resemble one of the most complaint as follows; the estimated overall prevalence of repeated activities back pain was 8.9% among male workers and 5.9% among female workers. "Carpenters" had the highest prevalence (19.2%) and most cases (338 000) among the major occupations of men, and "nursing aides, orderlies, and attendants" had the highest prevalence (15.2%) and most cases (217 000) among the major occupations of women (H-R Guo 2002).

NIOSH mentioned that, "many studies shown that at least 25% of all VDU experience visual problems because of their performing to work, the percentage of workers suffering visual problems increases in proportion to the number of hours worked at the VDU". (NIOSH 1995)

London hazard center, surveyed the people working in London at VDU work for hazards to health, who are working more than six hours a day at the VDU and found that up to 91% experience health problems and visual problems particularly it was higher among those doing repetitive keyboard and screen work, such as data entry, than among VDU workers doing less intensive work. They mentioned also in their literature that, another study found that poor screen legibility caused increased rates of eye discomfort (London hazard center 1993).

Australian Government recommended a standard daily maximum working time of five hours for VDU work (VDT News 1992).

Health and Safety Executive society (HSE) in the (United Kingdom) UK emphasizing on the importance and effects of ergonomics at work that "eye and other health problems associated with VDUs working fields are not caused by the VDUs themselves, but from the way in which they are used which is Ergonomics". (HSE 1992).

NIOSH determined in their Standards that the maximum safe period for working on VDTs is 4 Hours daily, above that the incidence of injury begins to increase (Rossignol et al. 1987 and NIOSH 1990).

Ishikawa stated in his surveying of London working population at VDU that, work involving the use of VDUs produce considerably more eye strain than almost all other type of non-VDU work, and there is a study shows that VDU workers suffer 16 times more than non-VDU work (Ishikawa 1990).

Sheedy mentioned after surveying of 150 VDU operators in California that the among 150 VDU operators who used VDUs for an average of six hours a day over four year 2/3 of them had difficulty focusing their eyes. Sheedy reported that it was possible that VDUs might be causing some breakdown in the eye focusing mechanism (Sheedy, 1989).

2.14 Work stress, Size of writing, and Age effect

In the NIOSH publication, Job stress has been defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the

capabilities, resources, or needs of the worker. Job stress can lead to poor health and even injury.

According to the NIOSH view, exposure to stressful working conditions (called job stressors) can have a direct influence on worker safety and health, and job stress results from the interaction of the worker and the conditions of work, differences in individual characteristics such as personality and coping style are most important in predicting whether certain job conditions will result in stress-in other words, what is stressful for one person may not be a problem for someone else. Individual and other situational factors can intervene to strengthen or weaken this influence, such factors include the following:

- Balance between work and family or personal life.
- A support network of friends and coworkers.
- A relaxed and positive outlook

Although the importance of individual differences cannot be ignored, scientific evidence suggests that certain working conditions are stressful to most people.

They enumerate in NIOSH the early Warning Signs of Job Stress as:

- Headache.
- Sleep disturbances.
- Difficulty in concentration.
- Short temper.
- Upset stomach.
- Job dissatisfaction.
- Low morale.

(.NIOSH publication 1999).

VDT news web site summarize Several studies including a USA survey of 100 employees conducted over a three-year period, and show that many factors include heavy workload, work pressure and lack of support by supervisors are important predictors of stress. However, these factors can change over time, and in the USA study, employees interviewed during the third year said that job security and clear task definition were the most important factors contributing to stress (VDT News, 1993).

In the Canadian survey of 79 data entry operators Pickett and Lees found that 85 % experienced work-related stress and there was a very strong association between reported occupational stress and physical health complaints (Pickett and Lees 1991).

Tanaka et al, describe blood pressure and stress levels of VDU users to be increased when viewing small characters (of 4.8 x 2.6 mm) compared to viewing larger characters (5.6 x 4.8 mm) and this effect increased with the age of the user (Hiromitsu T et al 1989).

2.15 Specific guidelines

OSHA report in their comprehensive plan 2002 for eliminating manual lifting of residents that they will consider a specific plan to reduce ergonomic injuries through established specific guidelines to reduce ergonomic-related injuries and would be developed for nursing homes (Bill Wright, 2003).

2.16 Work design and performance

JienSup Kim and Divakara Kedlaya stated in their article about American worker population providing information of the specific questions to ask when first meeting an injured worker and during the continued follow-up that individuals who recently have had poor evaluations of their work performance have a higher incidence of work-related injuries and properly designing the work and the work environment can prevent injuries. They stated also that employers who have implemented ergonomic programs have had great success in avoiding work-related musculoskeletal injuries, keeping workers on the job, and boosting productivity and workplace morale, and the supervisor who ignores work restrictions and assigns workers to tasks that continue to exacerbate their symptoms can be a barrier to recovery. LBP is common in the general population and Lifetime prevalence of LBP has been estimated at nearly 70% for industrialized countries (JienSup Kim 2004).

Grundy et al, describe in the recent optometrist's guide 1990 that intensive close work such as that performed by VDU operators is frequently associated with the worsening of myopia, and the shorter the distance from the screen, the greater the risk of developing shortsightedness (Grundy et al 1991).

2.17 General Work Environments

In the University of Wisconsin-Milwaukee, they determined the work environment (light, noise, temperature and humidity) for video display terminal (VDT) stations and who uses paper documents is 300-400 lux (30-40 foot-candles). However, if paper

documents are not used, the level of illumination should be 200 lux (20 foot-candles) or lower. Taking into consideration orientation to work hazards and angle of the screen, controlling natural and artificial light sources, effective use of task lighting, and adjusting the screen's brightness and contrast controls are the surest ways to minimize glare and reduce eye fatigue. The ambient sound levels should not be higher than 55 decibels (dBA). And the Temperature and humidity should be within comfortable ranges. A relative humidity level between 40 and 60% is generally desirable for most workers in office environments. (UWM, 2002)

Werner et al, prove that workers over 50 years of age require twice the light levels of young adults for comfortable work. (Werner et al, 1990)

The AOA (American optometric Association) in the article of "The Effects of Video Display Terminal Use on Eye Health and Vision" determined that lighting levels to be between 200 and 700 lux (approximately 20 to 70 foot candles) measured at the workstation are recommended. More than 500 lux will usually be needed only to read poor quality documents. This additional lighting may be accomplished through the use of specific task lighting (AOA 1998-[a]). (Annex 4 a, b, c, d, e, f, g, h, i, j, k, l)

2.18 Eyestrain

Rick Alan in surveying office workers stated that among office workers, eyestrain was the primary complaint. And in the study of National Institute for Occupational Health and Safety they stated that eyestrain and other vision-related physical problems (blurred

vision, headaches, back and neck pain) are more common among office workers than carpal tunnel syndrome (Rick Alan 2005).

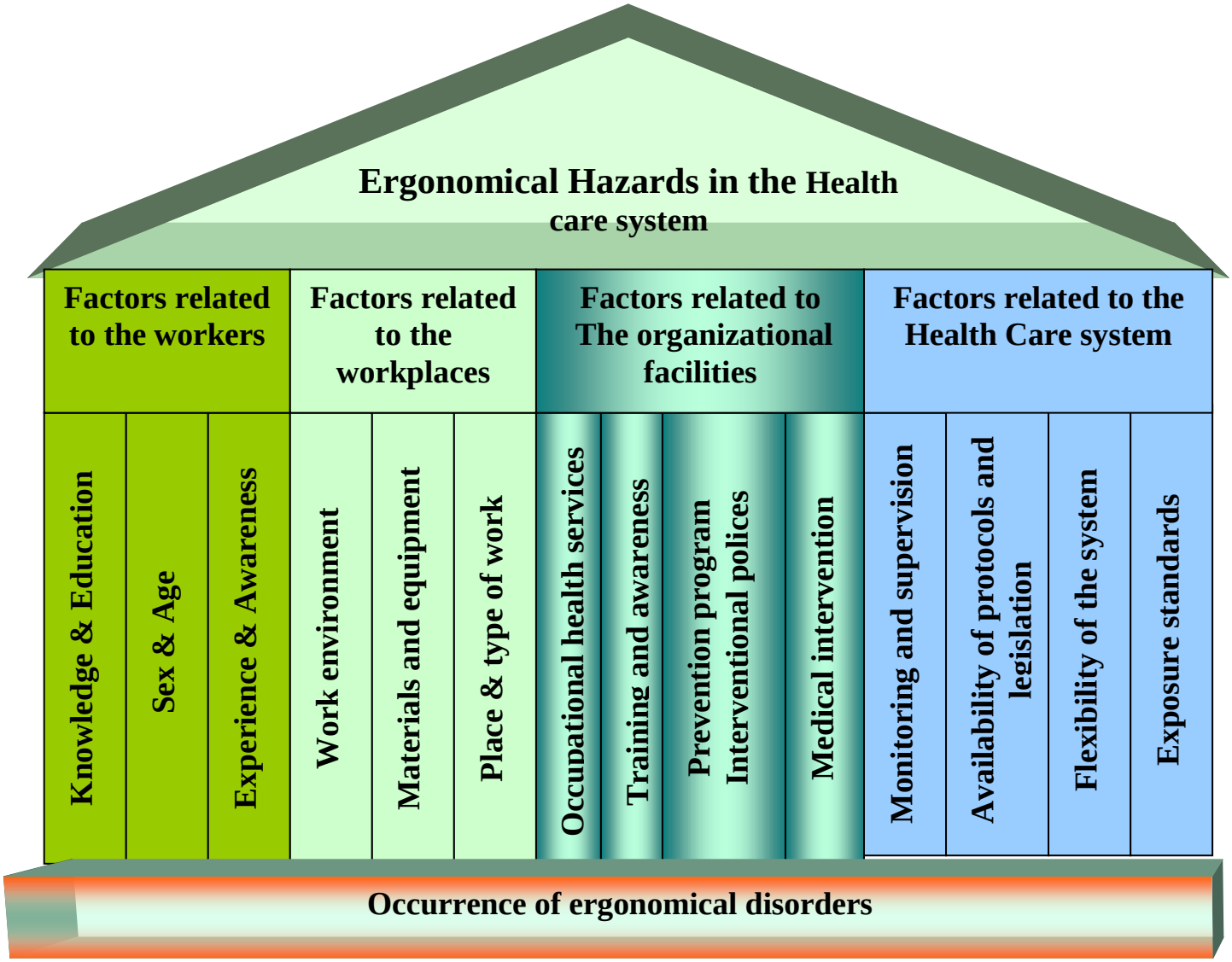
The AOA (American optometric Association) perform a national survey, and found that more than 14% of their patients present with eye or vision-related symptoms resulting from VDT work. The most common symptoms are eyestrain, headaches, blurred vision and neck or shoulder pain. Uncorrected vision conditions, poor VDT design and workplace ergonomics and a highly demanding visual task can all contribute to the development of visual symptoms and complaints. Older workers particularly may find adjusting to these working requirements difficult (AOA 1998b).

Chapter three

Conceptual framework

Chapter 3. Conceptual framework

3.1 Conceptual framework Diagram



The above conceptual framework is used to support, guide, and direct the research process to make research findings more meaningful and applicable.

The above diagram denotes that the occurrence of Ergonomical disorders depends on many factors, which may be related to the workers themselves, the socioeconomic

factors, their knowledge and training on ergonomics and to the way of applying their work. Even the workplace itself can play a very important role in determining the cause and occurrence of ergonomical disorder and how to prevent the ergonomical hazards. The workplace is affected by many factors, such as work environment, material, equipment used, the place design, furniture, and the work performed. Other factors related to the organization and facilities like the presence and the quality of occupational health services, continuous education and training programs, and the possibility of direct medical interventions.

Other factors that are related to the health care system of the country include the team and procedure for monitoring and supervision, availability of protocols and legislation, flexibility of the system to react and consider the different work activities and possible expansion of the occupational health services, and the adoption of a national occupational health standard based on scientific research.

3.2 Theories for ergonomical hazards

WHO in it's classification of risk factors refer the occurrence of ergonomical disorders which represented by musculoskeletal pain, in particular back pain to the use of the new technological equipments and devices.

National Institute for Occupational Safety and Health (NIOSH) mentioned in it's guidelines that the average safe weight to be lift is not more than 25Kg which is not considered in the MOH organizations in Gaza Strip.

The website spine-health stated that application of ergonomical principals can help to prevent or reduce work-related back pain, and back injury.

Mrs. Susan Wilburn stated that the primary risk factor for low back disorders among nursing personnel is lifting and transferring of patients.

Marc Oliver stated that Musculoskeletal Disorders are the major cause of injury/illness in the American workplace mainly health care industry.

University of California enumerated the risk factors for ergonomic disorders as, Forceful exertions, Repetitive motions, Awkward postures, Static postures, Compression or contact stress, Lighting, Vibration, Noise, and Cold temperatures, and adapting knowledge can prevent these risk factors.

Dr H-R Guo mentioned that the prevalence of back pain increased as the number of working hours spent on repeated strenuous physical activities or repeated bending, twisting, or reaching increased.

Health and Safety Executive society (HSE) stated that eye and other health problems associated with VDUs working fields are not caused by the VDUs themselves, but from the way in which they are used which is Ergonomics.

Standards of NIOSH show that the maximum safe period for working on VDTs is 4 Hours daily.

NIOSH enumerates the warning Signs for Job Stress as: Headache, Sleep disturbances, difficulty in concentration, Short temper, Upset stomach, Job dissatisfaction, and Low morale.

3.3 Interventional polices

Many interventional procedures were adapted to reduce ergonomical hazards among HCW, these interventions shown in J W Collins et, al. (2004) who concentrate on mechanical lifts and repositioning aids.

Nelson, A. 2004. Who adopted Engineering controls, and Administrative control.

Eugene E. 2001. who use many interventional methods include ergonomic evaluation, individual and group training, developing injury and illness prevention programs, modifying workstations and job duties, and case management services.

AAOHN who focus on promotion and restoration of worker's health, prevention of illness and injury and protection from work related and environmental hazards through health promotion, legal and regulatory compliance, worker and workplace hazard detection and training on how to avoid those hazards and how to early interfere to minimize the complications and work absenteeism.

Chapter four

Methodology

Chapter 4. Methodology

4.1 Study Design

This study is a descriptive analytical cross sectional study designed to examine and describe the different work situations and ergonomical hazards associated with work conditions in Gaza Strip. This design has been selected because it is simple, time saving, less expensive, and useful for descriptive and evaluative purposes in addition to assess the cause and effect at the same point of time (Burn and Grove, 1997). This design also gives some insights into the possible association among variables (Cogon, 1993).

Furthermore, cross–sectional studies are relatively quick and economic processes to conduct where the researcher's time and resources are limited (Polit and Hungler, 1999).

4.2 Study population

The number of employees (4169) which represents the total number of employees in PHC and Hospitals sectors in the MOH, Gaza-Strip. The target population of this study is the employees of the Primary Health Care, which constitute about (1281) employees, and the employees of the Hospitals (2888) employees.

4.3 Sample size

To determine the sample size with confidence limits(CI) 95% it is computed using the formula of Hoggy and Tanis taking in consideration a 4% maximum error of the estimation with proportion P-value=5% (Hoggy & Tanis 1997).

Using the above mentioned, the computed sample size was 350 from the total number (4169) of the employees of the Ministry of health in the Gaza Strip. The researcher selection increases than the decided number, as the fraction below eleven was completed. So the total number reaches 383 employees in the study. In which 19 of them not responded. As, the actual responding sample in the study was 364 with response rate 95%. Proportional sample were selected according to the number of health workers in each department of the different directorates in the MOH. (Annex 5)

4.4 Sampling

The researcher used systematic random sampling method to determine individuals for the research, so the healthcare workers were distributed into four categories (medical, nurse, paramedical, and administrative). The number needed for each category, drawn as every 12th after the first random one according to the formula of dividing the total study population by the determined sample size, which has been selected from all governmental PHC centers and all hospitals in Gaza Strip (Annex 6 a, b.)

The detailed sample is shown as follows: In North Gaza, the drawn sample was 15 employees from 5 PHC centers (4 nurses, 6 physicians and pharmacists, 4 administrative and 1 paramedical). The drawn sample was 11 employees from Kamal

Edwan hospital (3 nurses, 4 physicians and pharmacists, 2 administrative and 2 paramedical).

In Gaza City, the drawn sample was 50 employees from 17 PHC centers (11 nurses, 21 physicians and pharmacists, 12 administrative and 6 paramedical). The drawn sample was 152 employees from 5 hospitals (51 nurses, 45 physicians and pharmacists, 40 administrative and 16 paramedical).

In Mid-Zone, the drawn sample was19 employees from 7 PHC centers (5 nurses, 6 physicians and pharmacists, 6 administrative and 2 paramedical). The drawn sample was 15 employees from Al-Aqsa hospital (4 nurses, 6 physicians and pharmacists, 3 administrative and 2 paramedical).

In Khan-Younis, the drawn sample was 20 employees from 8 PHC centers (5 nurses, 6 physicians and pharmacists, 7 administrative and 2 paramedical). The drawn sample was 78 employees from 2 hospitals (27 nurses, 20 physicians and pharmacists, 23 administrative and 8 paramedical).

In Rafah, the drawn sample was 13 employees from 3 PHC centers (4 nurses, 3 physicians and pharmacists, 4 administrative and 2 paramedical). The drawn sample was 10 employees from Abu Yousef Al-Najar hospital (3 nurses, 3 physicians and pharmacists, 2 administrative and 2 paramedical).

4.5 Study setting

The study was carried out in the selected work places, which are Governmental hospitals and PHC centers in the Gaza strip.

Data has been collected from the selected cases individually at their workplace during working hours.

4.6 Eligibility Criteria

Inclusion criteria

Employees having an official job number from General Personnel Council and working for more than one year in PHC or Hospitals in the Gaza-Strip.

Exclusion criteria

Temporary contract and non-formally workers.

Disabled persons

4.7 Instruments

Two instruments were used in this study.

The first instrument was face to face interview through close-ended structured questionnaire, where leading questions have been avoided, the questionnaire has been

modified to be more simple and short, where difficult or unclear questions have been explained. (Annex 7, 8)

The second instrument was checklist where the different work situation and environment at the places of work are measured near the workers setting. (Annex 9, 10)

The readings have been taken in different times to cover the environmental changes due to day light and working loads and classified according to reference of NIOSH Pocket Guide for ventilation, and University of Wisconsin-Milwaukee for noise, temperature, and light.

4.8 Questionnaire design

The questionnaire has been divided into five sections as follow; background data including personal data, the age group divided according to expected age of starting work up to the retirement age. Work environment data structured to the limits of serving the evaluation of worker's comments on their work conditions, knowledge and practice questions, employee's awareness to explore their knowledge, and questions to measure exposure of the employees to ergonomical risk factors to find out most of the ergonomical hazards. Performance questions will reflect the state of the stress of the employees. Finally the measurement check list for work conditions and micro environment filled by the researcher which include, light intensity, noise, temperature, ventilation, and safety measures at work.

The questionnaire form has been examined for content validity with the help of health experts, then prepared, organized, and serially numbered to ensure the availability of all forms and minimize sample errors.

4.9 Content Validity

Content validity index (CVI), objectives of the study, operational definitions and the questionnaire were handed to Ten local experts from different backgrounds including researchers, public health practitioners, administrator, engineers from ministry of labor and environmental authority who are chosen to evaluate the questionnaire, The researcher adopted the content validity index (CVI) developed by Waltz and Bausell (1981) as a tool to determine the validity of the items included in the questionnaire. Experts rated the content of each item using a 4 point rating scale. The following scale was adopted: 1= not relevant item and should be omitted; 2= not relevant unless major changes are introduced; 3= relevant but needs minor modifications; 4= very relevant and succinct (Waltz and Bausell, 1981; Burns and Groves 1997).

The experts rated the content relevance of each item and as a result, some items were added, modified or deleted. (Annex 11)

4.10 Pilot study

To measure the validity and applicability of the questionnaire and the clearness of the questions, the elaborated questionnaire was tested in the preliminary survey. To fulfill this survey, 28 employees (they form 8% of the sample) were chosen using convenient

sample from different sectors of the MOH. Data were analyzed and in accordance with the results of preliminary survey, the final correction of research instruments was made to make the questions more clear and the time to fill the questionnaire shorter. These questionnaires were excluded and not considered in the final research results.

4.11 Ethical Considerations

After agreement of Helsinki committee and MOH agreement, on the start of the study the researcher has care of the Privacy and confidentiality of the employees during data collection. Non-respondent cases have been excluded and the absent cases had been replaced by the next or the previous one in the list. Convenient time for the selected employees has been considered by fixing an advance appointment for the visits. The informed consent has been distributed before feeling the questioner. Micro environmental measurements had been measured in different times without interrupting the work. (Annex 12, 13, 14, and 15)

4.12 Limitation

- The recurrent and sometime persistence blockage of the internal borders and roads in the GS prevent the researcher from reaching the needed places to fill the questionnaire or to measure the microenvironment in the work place.
- Official information about the employee's names and employment numbers from the MOH was so limited.
- Shortage of financial supports and the high costs increased the time of data collection.

- Socio-political situations formed a major obstacle to the researcher forcing him to repeat the same visit many times.
- Recall information, needs more than one visit to the same place and to the same interviewed person.
- Limited cooperation of some workers to the researcher during answering the questions.
- Non-acceptance of some employees to answer all of the questions due to the un expected consequences of work conditions.

4.13 Data Collection

The researcher and other four well trained colleagues worked together to collect the information by interviewing the selected persons.

Data has been collected through interview filled questionnaire and some workplace environmental measurements such as, light, ventilation, temperature, safety measures, and noise. The data collection carried out from February 2004 to November 2004.

4.14 Data management and statistical analysis

All questionnaires were completed by interview and the worksite evaluation was performed by observation. Data collected was entered and analyzed using the statistical package for social science SPSS 11. The data acquired by inquiries were transferred into the electronic form of (SPSS), and through the statistical assessment to increase the extent of generalization.

Chapter five

Results

Chapter 5. Results

In this chapter, the results of the study will be displayed and some of the illustrating tables and figures will be added to make the results more clear and understandable. The total number of the study population is 364 cases and their descriptive result shows

5.1 Statistical tests used to analyze and display data

Frequency analysis.

Cross tabulations Chi Square test

T test One way ANOVA

Independent sample T test

5.2 Socio-demographic data

The table shows collection of different socio-demographic characters of the sample as shown in (table 1)

Table (1) Socio demographic characters.

Age group /years	Frequency	Percent
20-24	9	2.5
25-29	49	13.5
30-34	66	18.1
35-39	64	17.6
40-44	59	16.2
45-49	43	11.8
50-54	48	13.2
55-59	24	6.6
60+	2	.5
Gender		
Male	272	74.7
Female	92	25.3
Residence		
City	249	68.4
Camp	72	19.8
Village	43	11.8
Marital status		
Married	336	92.3
Un married	28	7.7
Educational level		
Illiterate	1	.3
Secondary education	46	12.6
Diploma	114	31.3
Graduate	203	55.8

Age

The researcher divides age group to show the higher percentage of the age group which lies between 25-54 years (90.4%). Minimum age was 21yrs; maximum age was 62

years, and mean age of 39.6 years (SD ± 9.52). This indicates that the vast majority of the study population is middle aged as shown in (table 2).

Table (2) Distribution of the Study Population by age groups.

Age /year	Frequency	Percent
≤ 24	329	2.5%
> 25-54	49	90.4%
≥ 55	24	7.1%

Genders

The results show that males represent (74.7%) of the study population and females 25.3% which nearly reflects the sex percentage of the target population as shown in (figure 1).

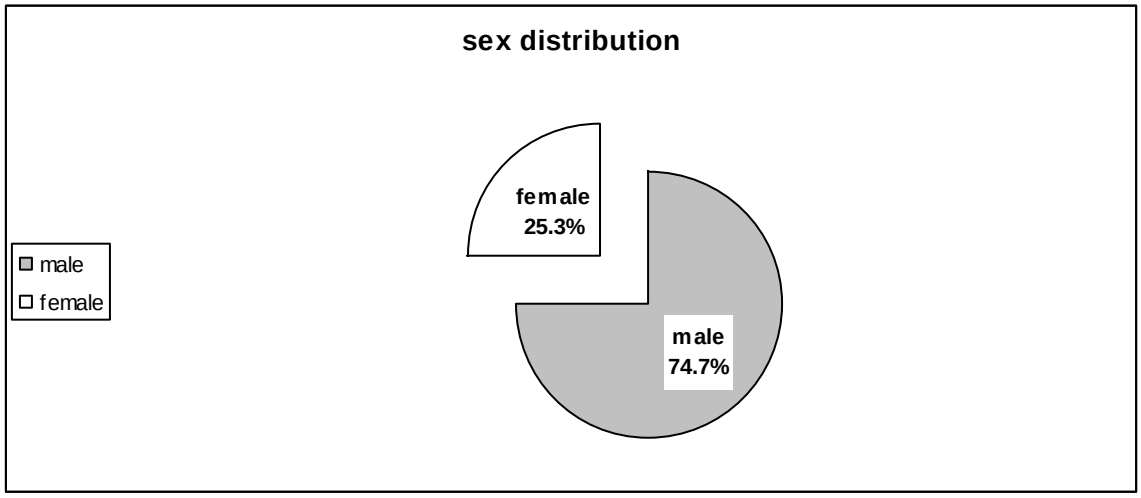


Figure (1) Sex Distribution of Study Population.

Residences

Cities represent the large portion (68.4%) followed by camps (19.8%) and villages (11.8%) as shown in (table 3).

Table (3) Distribution of the Study Population by Residence.

place	Frequency	Percent
city	249	68.4
camp	72	19.8
village	43	11.8

Marital status

The results show that 92.3% of the population is married, as shown in (figure 2)

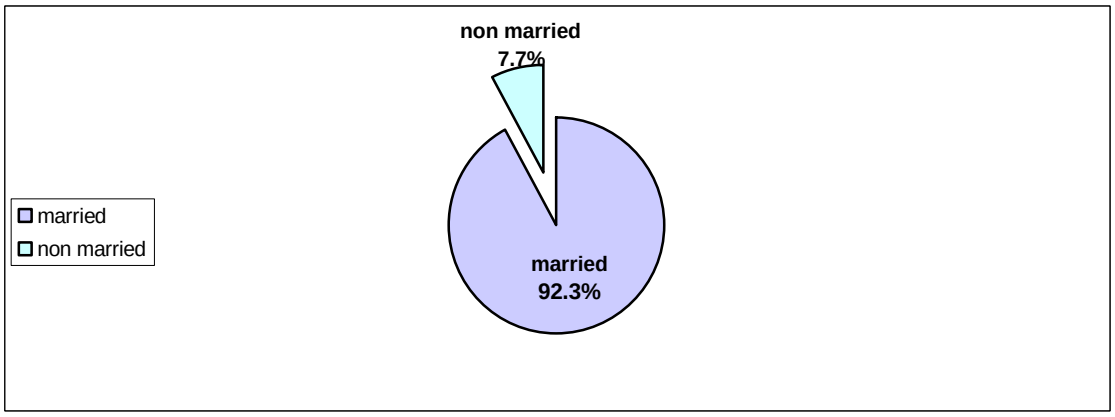


Figure (2) Marital Status of the Study Population.

Education level

The results show that more than half of the study population are of Graduate educational level 55.8%, and Diploma are 31.3%, where both form 87% of the sample, Secondary education forms 12.6%, and the illiterate forms only 0.3%. This high percentage of educational population will affect the awareness towards ergonomic risk factors. The years of education are shown also in the (table 4)

Table (4) Educational level and years of education.

Degree of education	Years of education	Frequency	Percent
Illiterate	≤ 6Ys	1	.3
Secondary education	≤ 12Ys	46	12.6
Diploma	≤ 14Ys	114	31.3
Graduate	≥17Ys	203	55.8

5.3 Distribution according nature of the work

The study population is divided into; medical which includes (physicians, dentists, and pharmacists) they cover 33.5% from the study population, while nurses which analyzed in separate category due to there special work nature and work task, they cover 31.3%, administrator , they include laborers cover 25.5%, and paramedical professions, they include (X Ray technicians, laboratory workers, physiotherapist, and other assistant medical professions), they form 9.6% as shown in (figure 3)

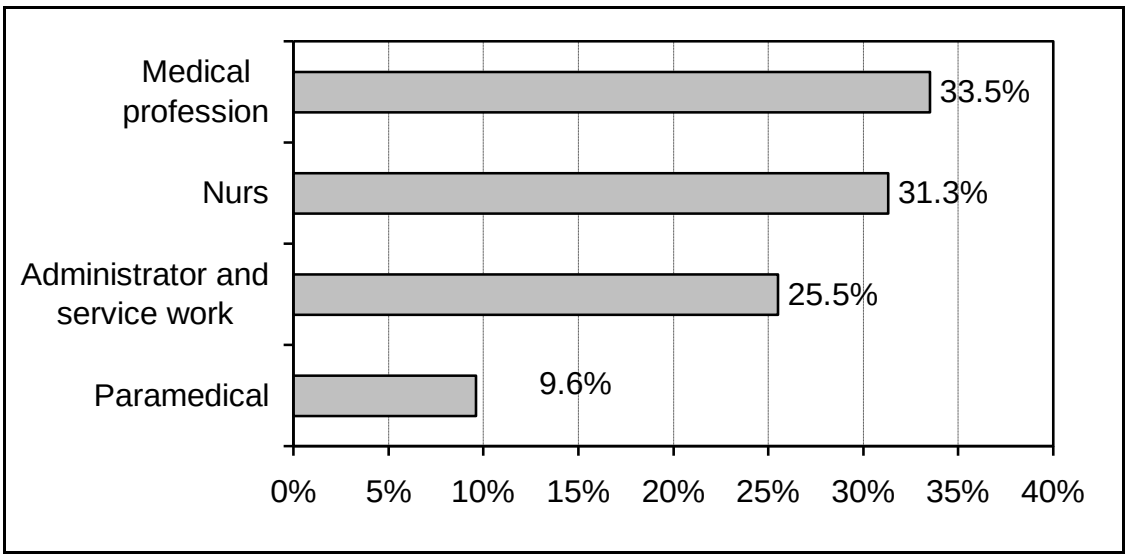


Figure (3) Nature of work.

5.4 Work place distribution

Work place was not the determinant for the study sample that the sample distributed according to the nature of the work, so the result displayed in the (table 5) shows the accidental distribution of the sample by work place and number of employees in each place.

Table (5) Distributed of the sample by Work Place.

Work place	Frequency	Percent
Reception	21	5.8
Operation room	25	6.9
Surgery department	26	7.1
Gynecology department	31	8.5
Medical department	21	5.8
Pediatric department	23	6.3
Radiology department	18	4.9
Dental department	8	2.2
Laboratory	15	4.1
Outpatient clinic	21	5.8
PHC clinic	67	18.4
Physiotherapy	16	4.4
Administrative	63	17.3
ICU and anesthesia	3	0.8
pharmacy	6	1.6

5.5 Smoking status

Most of the study population is non-smokers they represent about 69.85%, while 30.2% are regular smokers. From the smokers there are 65.5% smoking during their duty as shown in the (figure 4) and (table 6)

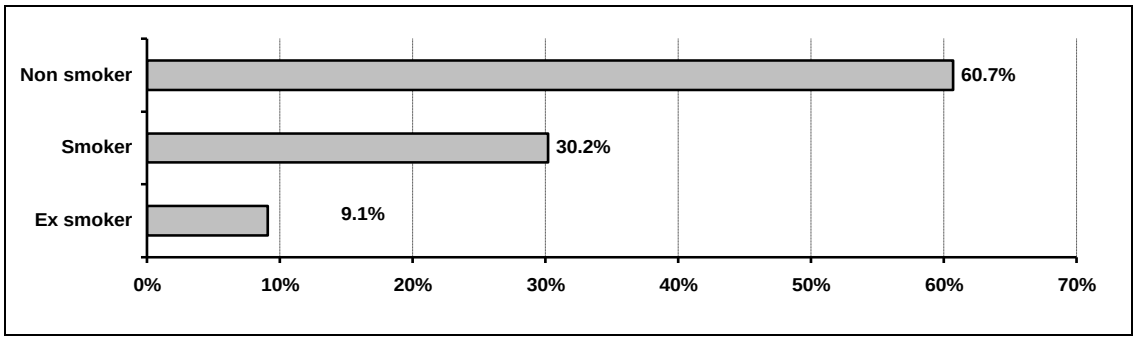


Figure (4) Smoking status.

Table (6) Smoking during work.

Smokers during work	Frequency	Percent
Yes	72	65.5
No	38	34.5

5.6 Sport practicing

The result shows that 66.8% from the study population are not practicing any regular sport activities, while 33.2% are practicing sport as shown in (figure 5)

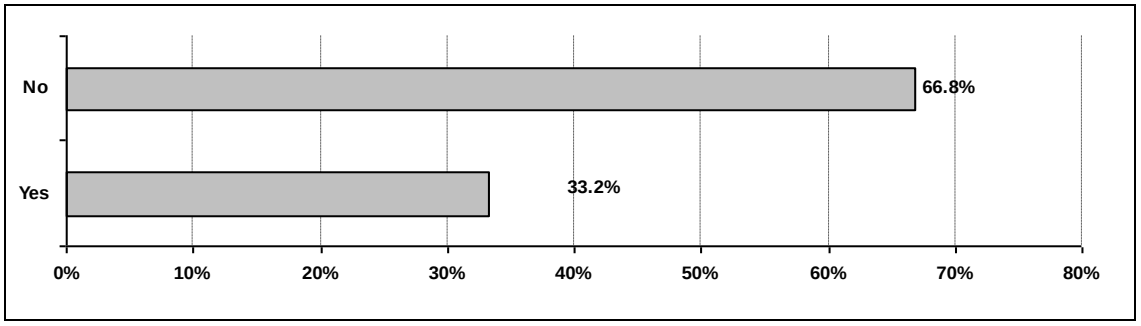


Figure (5) Sport practice.

5.7 Chronic diseases

The result shows that 89.8% of the study population is health, while 10.2% having chronic diseases; the main two diseases were hypertension and Diabetes mellitus. as shown in (figure 6) and (table 7) .

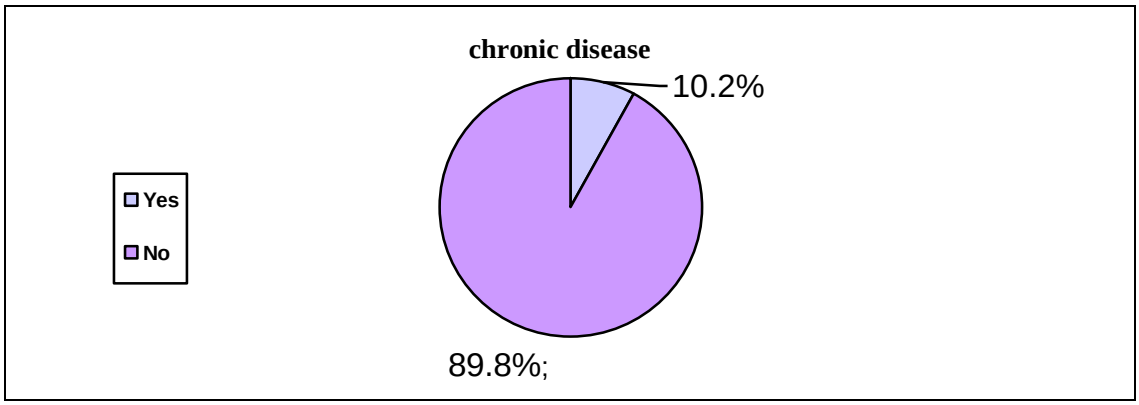


Figure (6) chronic diseases.

Table (7) Type of chronic diseased.

Type of chronic diseased	Frequency	Percent
Hypertension Hpt.	14	37.8
Diabetes mellitus D.M	11	29.7
Disk	2	5.4
No response	4	10.8
Allergy	1	2.7
Bronchial Asthma	1	2.7
Backache	1	2.7
Deep venous thrombosis	1	2.7
Heart disease	1	2.7
Hpt+D.M	1	2.7

5.8 Other work fields

The results shows that the employees who never had any other work before starting their present work represent 69.5, while those who had previous work represent 30.5% as shown in the (figure 7).

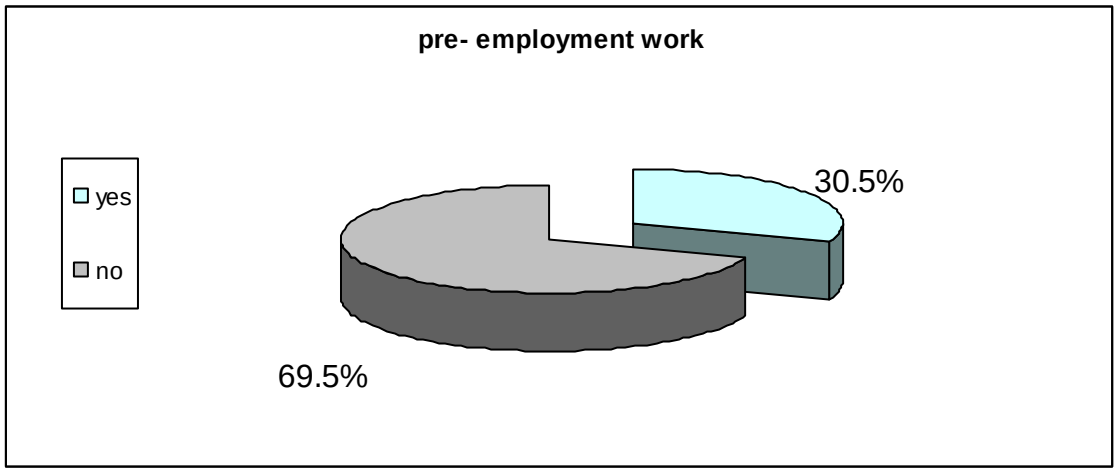


Figure (7) pre-employment work.

5.9 Work equipment

A large proportion of the study population (67.6%) needs to use certain tool or equipment in their work. Among all VDTs, users were 18.1% and medical equipment users were 56.6% while some of them use both VDTs and medical equipment as shown in (table 8)

Table (8) Devices used at work and percentage for each type.

Work need equipment	Frequency	Percent
yes	246	67.6
no	118	32.4
Type of needed equipment		
VDT from total	66	18.1%
Medical from total	206	56.6%

5.10 Suitability of work furniture and devices

The result shows that 59.9% of the study population has suitable work furniture and devices, while 40.1% complaints of unsuitable work furniture and devices, the rest of the table shows the details for unsuitability where the percentage is counted from the total number (furniture and devices) as shown in (table 9)

Table (9) Suitability of furniture and devices.

Suitability	Frequency	Percent
Yes	218	59.9
No	146	40.1
What is not suitable		
Furniture	112	51.4%
Device	82	37.6%

5.11 Display of safety measures guidelines at work

The results show that 57.7% of the study population has written or some type of safety guidelines at work taken in consideration that some places have more than one type; of the measures they are shown in the (table 10).

Table (10) Availability and display of safety instructions.

Safety measure	Frequency	Percent
Yes	210	57.7
No	154	42.3
Type of display		
Instruction	113	53.8%
Brochures	25	11.9%
Protocols	72	34.3%

5.12 Suitability of the work place and work devices to the safety

The results show that 44.2% of the study population has suitable and safe work place and work devices, while 55.8% has no safety at work. Of those 51.6% have no safety furniture, 58.2% have no safe lighting system and glare protection, 50.8% have noisy work environment, 58.8% have no safe devices, 42.3% have no safe ventilation system and temperature adjustment at work place, and 59.3% have more crowd ness at work place, taking in consideration that all these percentage calculated from the whole number have safety or not as shown in (table 11)

Table (11) Suitability of microenvironment at work.

Suitable place and device	Frequency	Percent
Yes	161	44.2%
No	203	55.8%
If furniture not suitable		
Yes	94	25.8%
No	188	51.6%
If light and glare not suitable		
Yes	70	19.2%
No	212	58.2%
If noise not suitable		
Yes	97	26.6%
No	185	50.8%
If work device not suitable		
Yes	67	18.4%
No	214	58.8%
If ventilation not suitable		
Yes	128	35.2%
No	154	42.3%
If No. of occupants not suitable		
Yes	65	17.9%
No	216	59.3%

5.13 Availability of uniform and bath facility

The vast majority of the study population (72.8%) shows that they have special uniform, and regarding bath facility 72.5% of the study population have no bath facility at work as shown in (figure 8, 9)

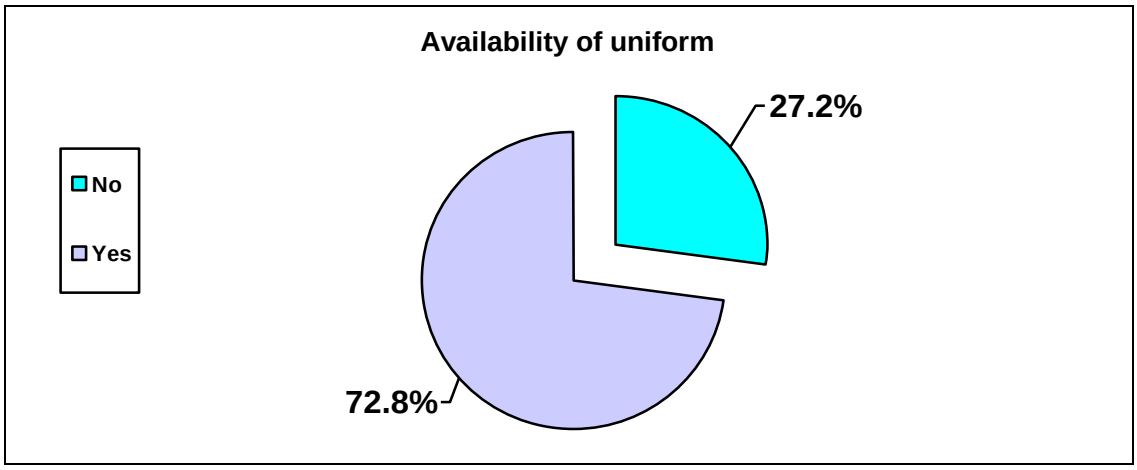


Figure (8) Availability of uniform.

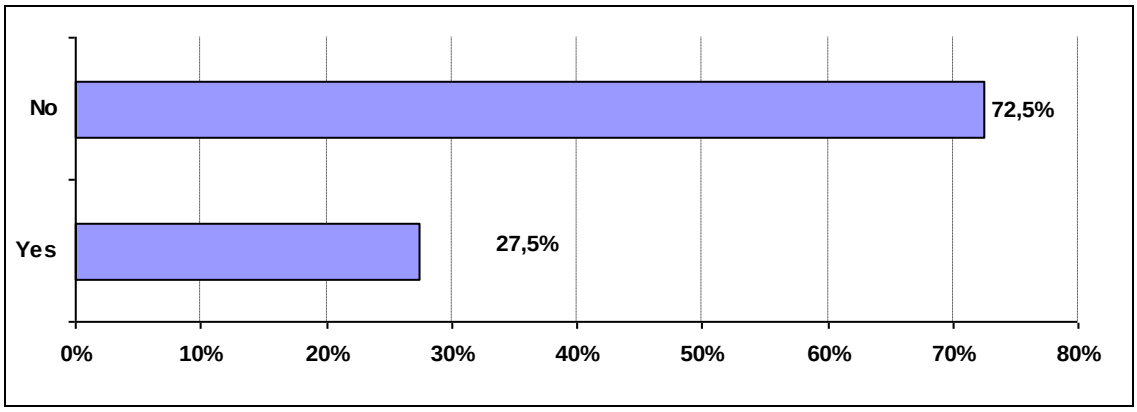


Figure (9) Bath facilities at work.

5.14 Information about safety and occupational health services

The results show that 77.2% of the study population have enough knowledge about the safety and occupational health services, in the other hand 9.9% did not know about such services, and 12.9% did not have any interesting in such services as shown in (table 12)

Table (12) Knowledge for Occupational Health Services and its availability.

Knowledge about OH safety and services	Frequency	Percent
Yes	281	77.2
No	36	9.9
Not interested	47	12.9
Availability of specific OH services		
Yes	132	36.3
No	154	42.3
Not interested	78	21.4

5.15 Knowledge of job hazard and how to avoid this hazard.

The results show that 93.1% of the study population knows their job hazards and 86.3% of the sample knows how to avoid such hazards, while only 72% of the study population knows their legal rights, as shown in the (table 13).

Table (13) Information about job hazards and legal rights.

Knowledge of job hazards	Frequency	Percent
Yes	339	93.1
No	25	6.9
Knowledge of how to avoid hazards		
Yes	313	86
No	51	14
Knowledge of Legal rights		
Yes	262	72.0
No	102	28.0

5.16 Training for work and application of the training.

The results show that only 54.4% of the study population received previous training on their job or work devices, in the other hand there are 84.3% of them apply this training

in their work, where 11.1% did not apply such training, and 4.6% applies such training sometimes, as shown in (table 14).

Table (14) Training for work, devices, and its application.

Training for work	Frequency	Percent
Yes	198	54.4
No	166	45.6
Application of training		
Yes	167	84.3
No	22	11.1
Sometimes	9	4.6

5.17 Ergonomical knowledge and application of safety measures.

The results show that 62.1% of the study population knows and applies proper sitting on the chair, it show that who are able to adjust their work environment represent 34.9% of the study population, and 43.7% can adjust their working device to suite the work tasks, but only 38.2% can adjust light and glare in their work place to the limit of prevention ergonomical hazards caused by improper adjustment to the illumination in the work place, results show also that only 38.5% of the study population apply work diversity, in spite of its application did not need any training. It shows also that 48.6% of the study population observes the safety measures at work, and 42.6% of them take work breaks, while only 12.4% who do not know the right standard, and 12.9%, who do not apply any of the safety measures. This low percentage for shortage of knowledge how to adjust work environment and devices is due to the special concern of this field and specific information and training needed to perform this task, the results is displayed in (table 15).

Table (15) Commitment for the Safety Measures at Work.

Proper sitting on chair during work	Frequency	Percent
Yes	226	62.1
No	138	37.9
Adjust micro-environment		
Yes	127	34.9
No	237	65.1
Adjust work instrument		
Yes	159	43.7
No	205	56.3
Adjust light and glare		
Yes	139	38.2
No	225	61.8
Apply work diversity		
Yes	140	38.5
No	224	61.5
Commitment to safety measures		
Yes	177	48.6
No	187	51.4
Taking work breaks		
Yes	155	42.6
No	209	57.4
Do not know right standards		
Yes	45	12.4
No	319	87.6
Do not apply any measure		
Yes	47	12.9
No	317	78.1

5.18 knowledge of ergonomics.

The results show that 49.7% of the study population knows what ergonomic science means, while 50.3% did not know, this question explains the employees relation with their work environment and their education toward ergonomics as shown in (figure 10)

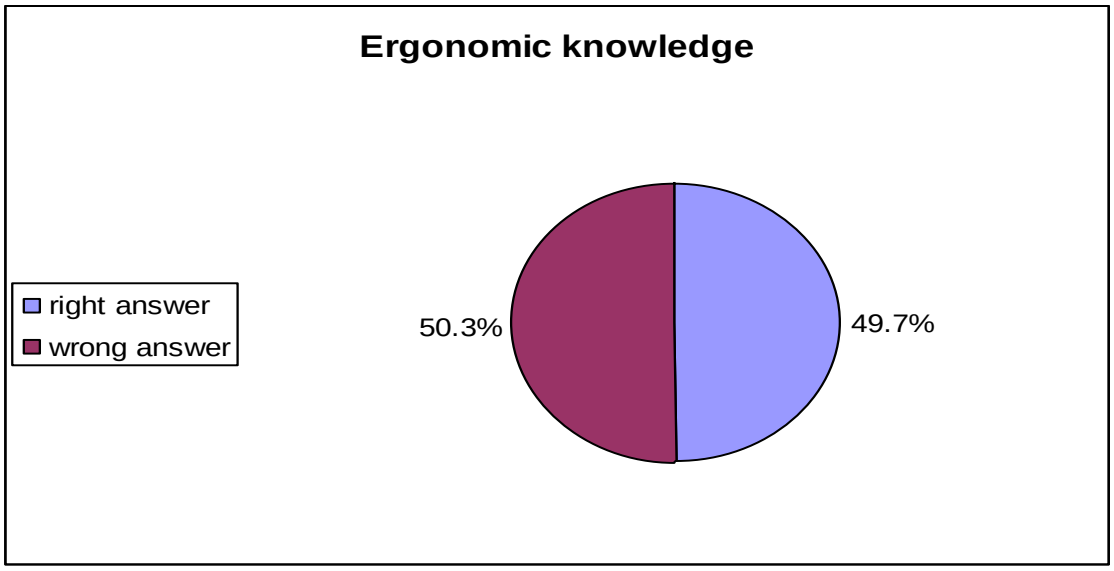


Figure (10) Knowledge of Ergonomical Science.

5.19 Knowledge for need and value of work breaks.

The results show that 66.8% of the study population think of necessity for taking work breaks, but only 29.5% of the study population knows the proper value of these breaks, while 21.3% give the wrong value, and 49.2% says that they have no idea for the value of work breaks, this show that the employees do not pay good attention to the details of the specific safety program it is displayed in (table 16).

Table (16) Knowledge for Ergonomical work breaks.

Agree for work breaks	Frequency	Percent
Yes	243	66.8
No	121	33.2
The value of the breaks		
No idea	120	49.2
Right	72	29.5
Wrong	52	21.3

5.20 The knowledge of light intensity.

The results show that most of the study population 66.8%, do not know the proper value of light intensity for different tasks during work, and 29.6% answer with wrong values, while only 3.6% of them give the right answer, this show that work population do not care of any small detail needed for any program as shown in (table 17).

Table (17) Knowledge of light at work.

Answer for light intensity	Frequency	Percent
Do not know	243	66.8
Wrong	108	29.6
Right	13	3.6

5.21 Extra work of employees and its nature

The results show that only 20.9% of the study population have other work than the official work, of them 61.4% working in the same field, 24.3% working in non physical work, 12.9% working physical work, and 1.4% working other work, this result confirm that any muscular complain will arise actually from practicing work it is shown in (table 18)

Table (18) Presence of extra work and its type.

Working other work	Frequency	Percent
Yes	76	20.9
No	288	79.1
Type of work		
Same field	48	62.3
Physical work	10	13
Mental work	18	23.4
other	1	1.3

5.22 Post work tiredness, exhaustion, and its relation to work.

The results show that 58.2% suffer from post work tiredness and exhaustion, of them 69.3% due to their work, and 23.6% due to other cause, and 7.1% is not at all due to the work, as shown in (table 19)

Table (19) Post work tiredness, exhaustion, and its cause.

Post work tiredness and exhaustion	Frequency	Percent
Yes	212	58.2
No	152	41.8
Is work the cause		
Yes	147	69.3
Other	50	23.6
No	15	7.1

5.23 Sleep disturbances.

The results show that 41.2% of the study population has sleep disturbances, of them 64.5% due to their work, 23.9% duo to other causes, 11.6% their work is not the cause of sleep disturbances, take inconsideration that some of them has more than one cause as shown in (table 20).

Table (20) Sleep Disturbances of the Employees and the Cause.

Sleep disturbance	Frequency	Percent
Yes	152	41.8
No	212	58.2
Is work cause for		
Work yes	100	65.8
Work no	15	9.9
Other cause	37	24.3

5.24 Muscle and joint pain.

The results show that 49.7% has muscle and joint pain in their work; of them 56.9% due to the work, while 23.8% due to other cause, and 19.3% due to other cause than the work. The results also show that 79.8% of the complaining employees from muscle and joint pain have recurrence of sleep disturbances or muscle and joint pain in the same site, the result is shown in (table 21).

Table (21) muscle and joint during work and their cause.

Muscles and joint pain	Frequency	Percent
Yes	181	49.7
No	183	50.3
Work Is the cause		
Yes	103	56.9
No	35	19.3
Other cause	43	23.8
Recurrence of symptoms		
	146	79.8
No	37	20.2

5.25 Persistence of the symptoms to the second day.

The results show that only 36% from the employees who have symptoms, their complaint persists to the second day, the cause was in 45% tiredness and exhaustion, 35.9% sleep disturbances, and 53.4% muscular and joint pain it is shown in detail in (table 22).

Table (22) Persistence of symptoms to the second day and the cause.

Persistence to second day	Frequency	Percent
Yes	131	36
No	233	64
Is it tiredness		
Yes	59	45
No	72	55
Is it sleep disturbances		
Yes	47	35.9
No	84	64.1
Is it Muscular pain		
Yes	70	53.4
No	61	46.6

5.26 Results of various muscular symptoms.

Head and neck complain.

Head and neck symptoms represented as pain and ache of neck muscles; the result shows that 16.8% from the study population had Pain in head and neck, 9.9% has stiffness in their muscles, 2.2% has muscles twinge, 3% has muscles numbness, and 0.5% has swelling in muscles of head and neck, as shown in (table 23).

Table (23) Different symptoms for head and neck.

Pain in head and neck	Frequency	Percent
Yes	61	16.8
No	303	83.2
Head and neck stiffness		
Yes	36	9.9
No	328	90.1
Head and neck twinge		
Yes	8	2.2
No	356	97.8
Head and neck numbness		
Yes	11	3.0
No	353	97.0
head and neck muscle swelling		
Yes	2	.5
No	362	99.5

Shoulder complaint.

The symptoms of both shoulders show that 12.9% of the study population have pain and ache, 10.2 has stiffness, 2.7% has twinge, 1.9% has numbness, and 0.3% has shoulder muscle swelling as shown in (table 24).

Table (24) symptoms of shoulders.

Pain and ache shoulder	Frequency	Percent
Yes	47	12.9
No	317	87.1
Shoulder muscle stiffness		
Yes	37	10.2
No	327	89.8
Shoulder muscle twinge		
Yes	10	2.7

No	354	97.3
Shoulder muscle numbness		
Yes	7	1.9
No	357	98.1
Shoulder muscle swelling		
Yes	1	.3
No	363	99.7

Back complaints.

Back pain among the study population as the result shows was 20.3%, back muscle stiffness 13.5%, back muscle twinge 2.5%, while back muscle numbness was 1.9%, and back muscles swelling was only 0.8% as shown in (table 25).

Table (25) back muscles symptoms.

Back pain and ache	**Frequency**	**Percent**
Yes	74	20.3
No	290	79.7
Back muscle stiffness		
Yes	49	13.5
No	315	86.5
Back muscle twinge		
Yes	9	2.5
No	355	97.5
Back muscle numbness		
Yes	7	1.9
No	357	98.1
Back muscle swelling		
Yes	3	.8
No	361	99.2

Upper limb complaint.

Pain and ache in the Upper limb of the study population was 7.4%, stiffness was 2.2%, twinge 2.2%, while numbness was 4.1%, and swelling was 0.5% as shown in (table 26).

Table (26) upper limbs symptoms.

Upper limb pain and ache	**Frequency**	**Percent**
Yes	27	7.4
No	337	92.6
Upper limb stiffness		
Yes	8	2.2
No	356	97.8
Upper limb twinge		
Yes	8	2.2
No	356	97.8
Upper limb numbness		
Yes	15	4.1
No	349	95.9
Upper limb muscle swelling		
Yes	2	.5
No	362	99.5

Lower limbs complaints.

In the study population 14.8% complained of pain and ache in the Lower limbs, 4.9% feels stiffness, lower limb twinge was 4.9%, numbness was 7.1%, and lower limb swelling was 2.2%, as shown in (table 27).

Table (27) lower limb symptoms.

Pain or ache	Frequency	Percent
Yes	54	14.8
No	310	85.2
Lower limb stiffness		
Yes	18	4.9
No	346	95.1
Lower limb twinge		
Yes	18	4.9
No	346	95.1
Lower limb numbness		
Yes	26	7.1
No	338	92.9
If lower limb muscle swelling		
Yes	8	2.2
No	356	97.8

Pelvic complain.

Pelvic pain and ach among the study population was 7.7%, stiffness 2.5%, muscle twinge 2.2%, while 1.1% complain of pelvic muscle numbness, and none of them has muscle swelling, as shown in (table 28).

Table (28) pelvis symptoms.

Pain or ache	Frequency	Percent
Yes	28	7.7
No	336	92.3
Pelvic stiffness		
Yes	9	2.5
No	355	97.5
pelvis twinge		
Yes	8	2.2

No	356	97.8
pelvis numbness		
Yes	4	1.1
No	360	98.9
pelvis muscle swelling		
No	364	100.0

5.27 Eye complaints and days persistent.

Employee's complaint of eye symptoms represents 26.4%, of them 11.5% their symptoms persist to the next day, as shown in (table 29).

Table (29) Eye symptoms and its persistence to the next day.

Eye complaints	**Frequency**	**Percent**
Yes	96	26.4
No	268	73.6
Complaints persisted to next day		
Yes	42	11.5
No	322	88.5

5.28 Sick leave and its cause.

The results show that 62.4% of the study population had sick leaves last year, 90.9% of the causes was non occupational, while occupational disease and injury constituted 8.6%, and other causes were so small 0.5% as shown in (figure 11, 12).

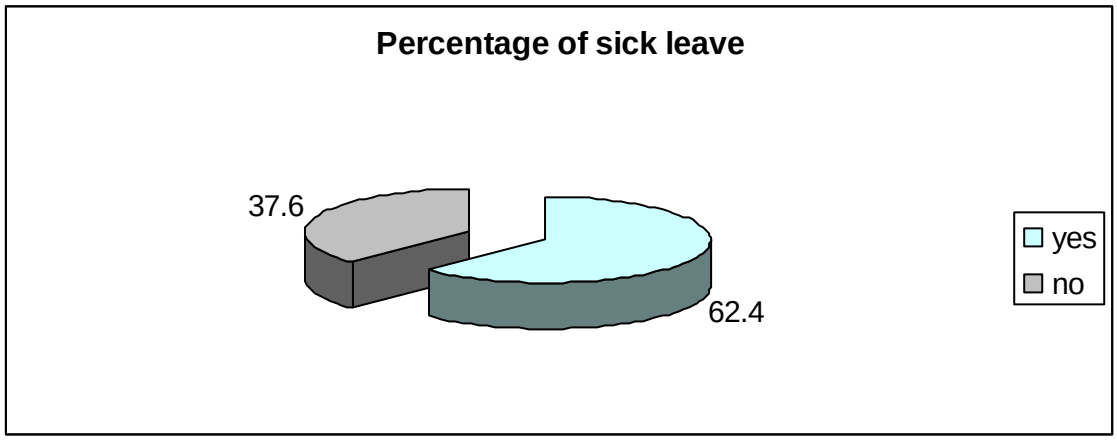


Figure (11) The percentage of sick leaves.

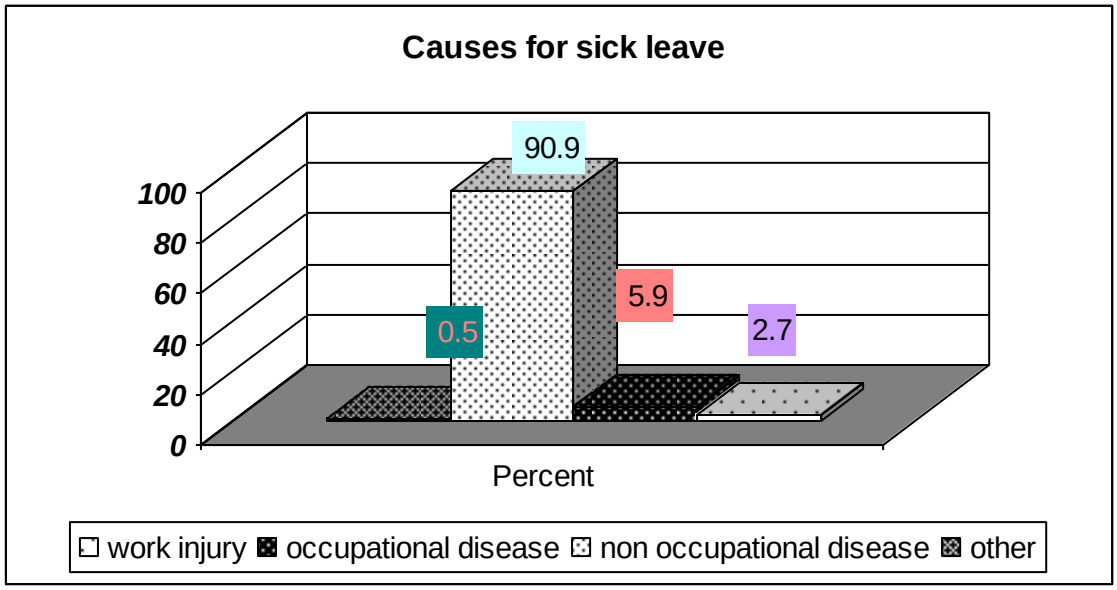


Figure (12) Causes of sick leaves.

5.29 Detailed Causes for the sick leave.

The results show that from the occupational complaints, muscular-skeletal complaints were the highest percent 38.2%, work accident was 20%, circulatory complaints was 16.4%, respiratory complaints 14.5%, eye complaints 5.5%, and other causes 3.6% as shown in (figure 13).

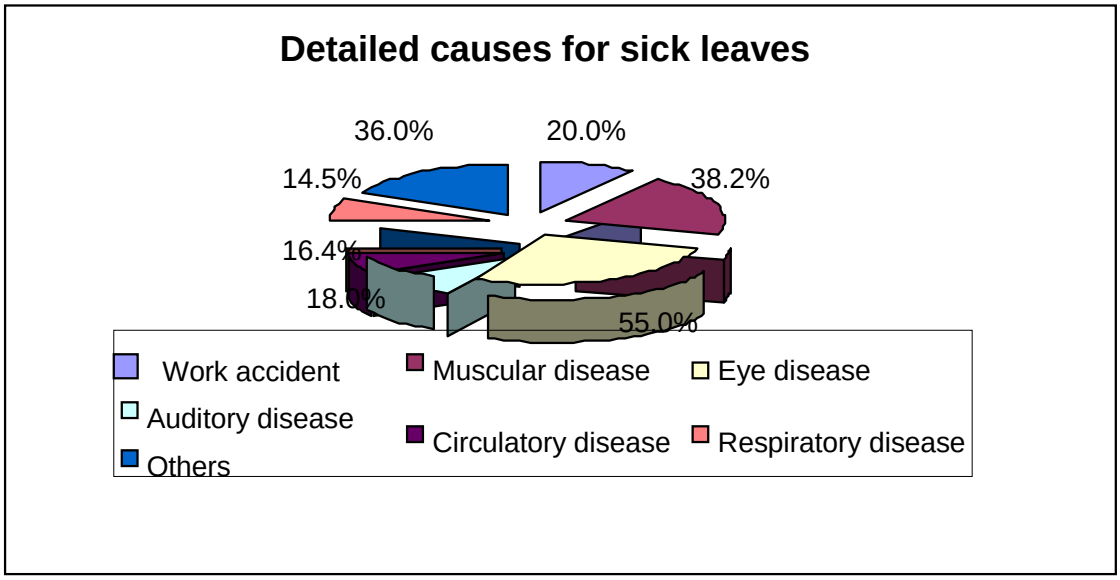


Figure (13) Detailed causes of the sick leaves.

5.30 Medical intervention post injury.

The medical intervention done post injury or disease to the employees exposed to work hazards shows that 37.3% have first aid at the work place, and specific treatment offered to the affected employees was 37.3%, while 25.5% has no measure at all done, and only 9.6% received post injury rehabilitation as shown in (figure 14, 15).

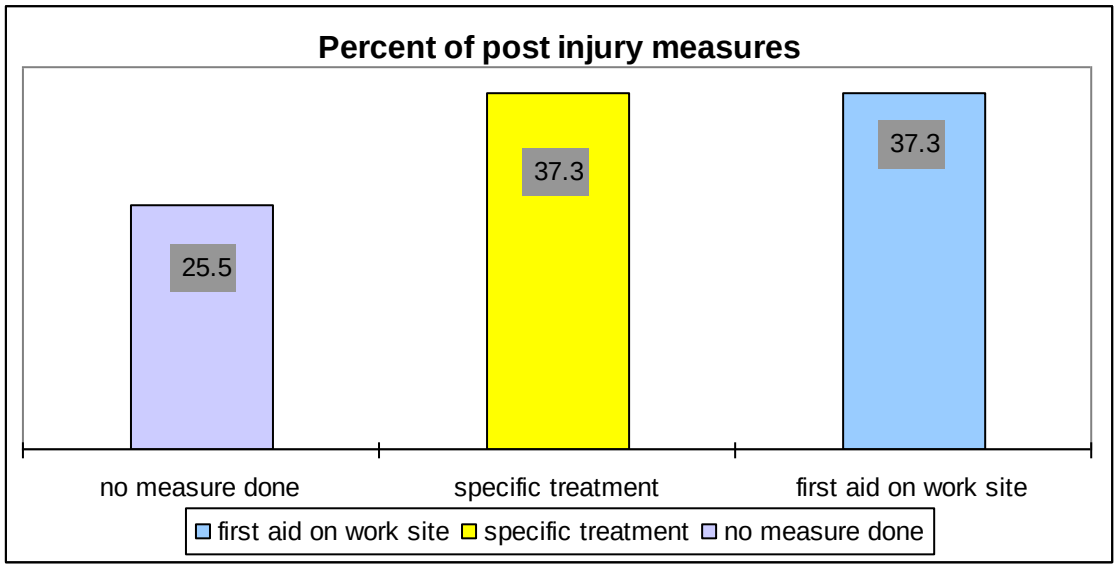


Figure (14) post injury measures.

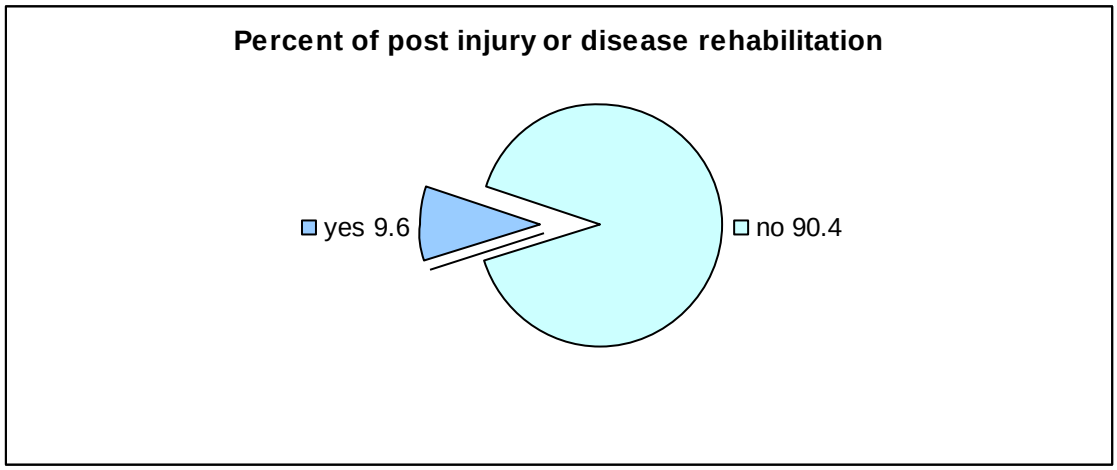


Figure (15) post injury rehabilitation.

5.31 Suitability of work to the qualification.

The results show that most of the study population 78% work in the same specialty and 22% do not work as shown in (figure 16)

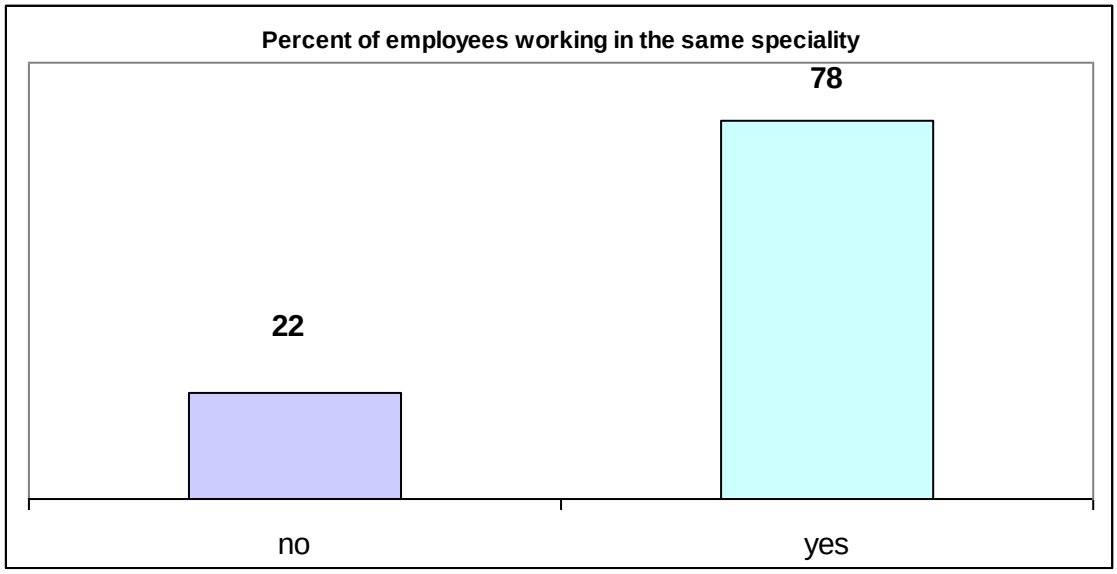


Figure (16) working in the same specialty.

5.32 Work tasks and ability.

The results show that 33% of the study population are assigned to work tasks more than their ability, results show also that 69.5% of the employees the causes was due to the limited resources (human and logistics), 23.3% due lack of experience, and 14.2% due to limited time of work, as shown in (figure 17, 18)

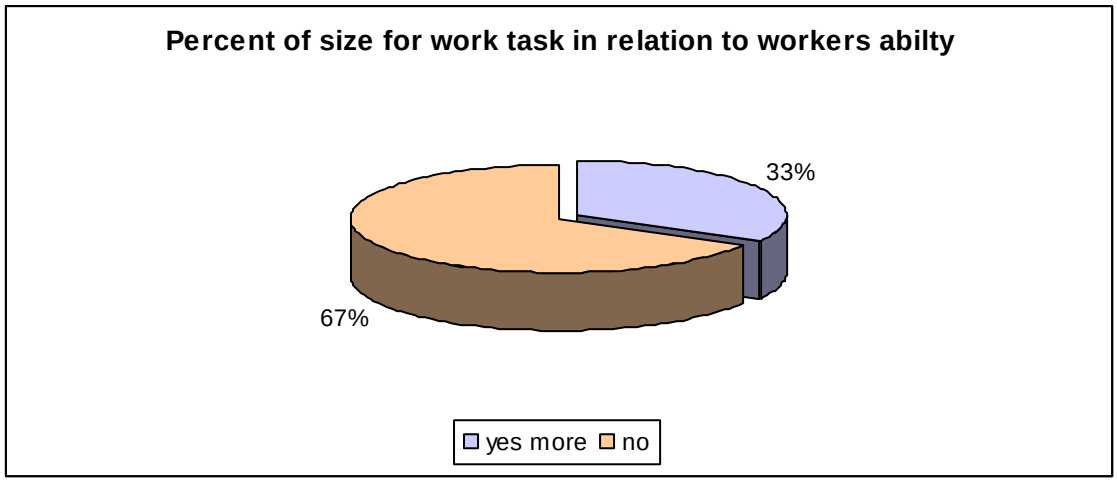


Figure (17) work task in relation to ability.

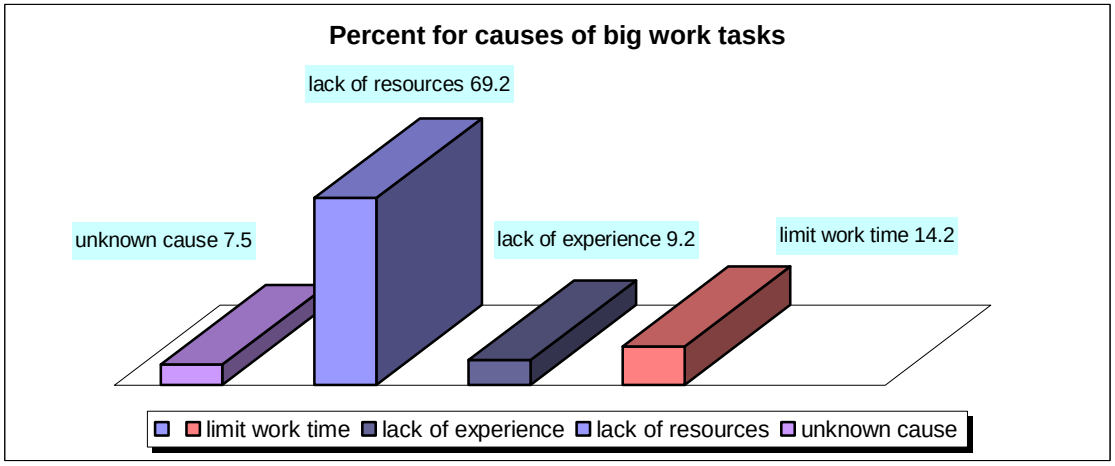


Figure (18) Causes of unsuitability of work tasks to workers.

5.33 Workers satisfaction of their work

The results show that workers partial satisfaction to their work and work tasks was 47.8%, while who has complete satisfaction 39.8%, and who are not satisfied was 12.4% as shown in (table 30).

Table (30) Worker's satisfaction for work and work tasks.

Work and task satisfaction	Frequency	Percent
Completely satisfied	145	39.8
Somehow satisfied	174	47.8
Not satisfied	45	12.4

5.34 Wellness to change work.

The results show that only 28.3% of the study population wish to change their work, of them 44.7% wish to transfer to other directorate, 30.1% want to shift to other work inside their departments, 21.4% want to go to other section in the same directorate, and 3.9% only want to shift to other ministry as shown in the (table 31).

Table (31) Workers wellness to change work and place.

Wish to change work	Frequency	Percent
Yes	103	28.3
No	261	71.7
Suggested place for change		
Inside department	31	30.1
Other department	22	21.4
Other general directorate	46	44.7
Outside ministry	4	3.9

5.35 Delayed to work.

The results show that 14.3% of the study population came late to work, of them 73.1% has no control on their lateness, while 13.5% comes late due to lack of penalties, the same percentage are late due to loss of harmony at work as shown in (table 32).

Table (32) Delayed to work and cause.

late for work	Frequency	Percent
Yes	52	14.3
No	312	85.7
Cause for late		
Uncontrolled cause	38	73.1
No penalties	7	13.5
No work harmony	7	13.5

5.36 Dropping performance.

The results show that 8.8% of the study population intend to lower their performance, of them 34.4% said that they intend to do that due to lack of incentive, 25% due to lack of equity at work, 15.6% due to loss of harmony, 12.5% due to fear of work result, and 6.3% due to lack of training, or no welling to work, some of the employees have more than one cause as shown in the (table 33).

Table (33) Employees performance status.

Intend to lower performance	Frequency	Percent
Yes	32	8.8
No	332	91.2
Cause to lower performance		
Lack of incentives	11	34.4
No equity at work	8	25.0
Lack of harmony	5	15.6
Fear of work result	4	12.5
No welling of work	2	6.3
Lack of training and experience	2	6.3

5.37 Feeling of tension and anxiety.

The results show that 20.6% of the study population feel tension and anxiety all the time during the work, 57.4% sometimes, and 22% did not feel any thing, while after work only 12.6% feel anxious all the time, 46.2% sometime, and 41.2% did not feel any time, as shown in (figure 19)

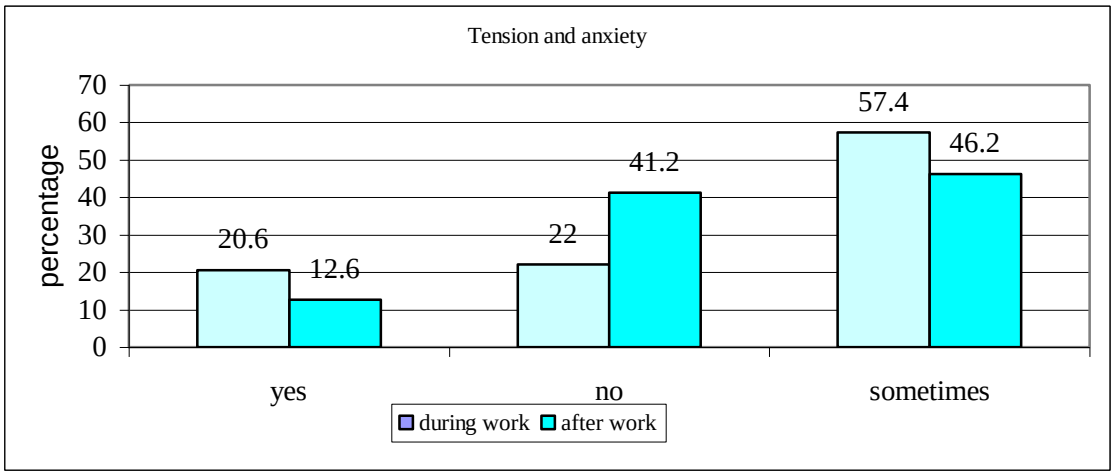


Figure (19) Feeling of tension and anxiety during and after work.

5.38 Needs to improve current system.

The result shows that 47.3% wish to change work system strongly, 48.1% some how, and 4.7% do not want to change at all as shown in (figure 20).

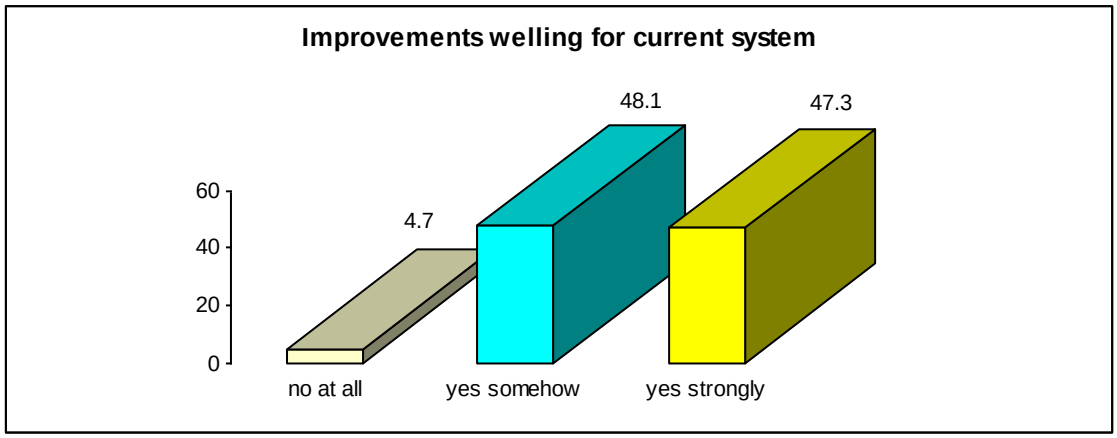


Figure (20) The employees wishing to change the current system.

5.39 Environmental measurements.

The environmental measurement in the work place for light intensity suitable for place and work task, ventilation measured by CO2 concentration in the work place, noise measured in different work times and places near the work station, temperature taken in different places of the work (winter time), and safety measures evaluated according to environmental factors, work practicing, and availability of facilities to make the work more safe and easy.

The devices used for environmental measurements were calibrated according to the international work environmental standards.

The results of environmental measurements show that light was good and acceptable in 87.4% of the work places, medium in 11%, while it was poor in only 1.6%.

The ventilation, which depends on CO2 concentration in the work place, was good in 66.5%, medium in 29.1%, and poor in 4.4%.

Noise measurements show that 53.3% workplaces were good, 40.9% were medium, and 5.8% were poor.

Temperature measurements show that 64% of the workplaces were good, 31.6% were medium and only 4.4% were poor.

Safety measures at the workplaces were good in 56%, medium in 30.2% of the workplaces, and poor in 13.7% of the workplaces, as shown in (figure 21).

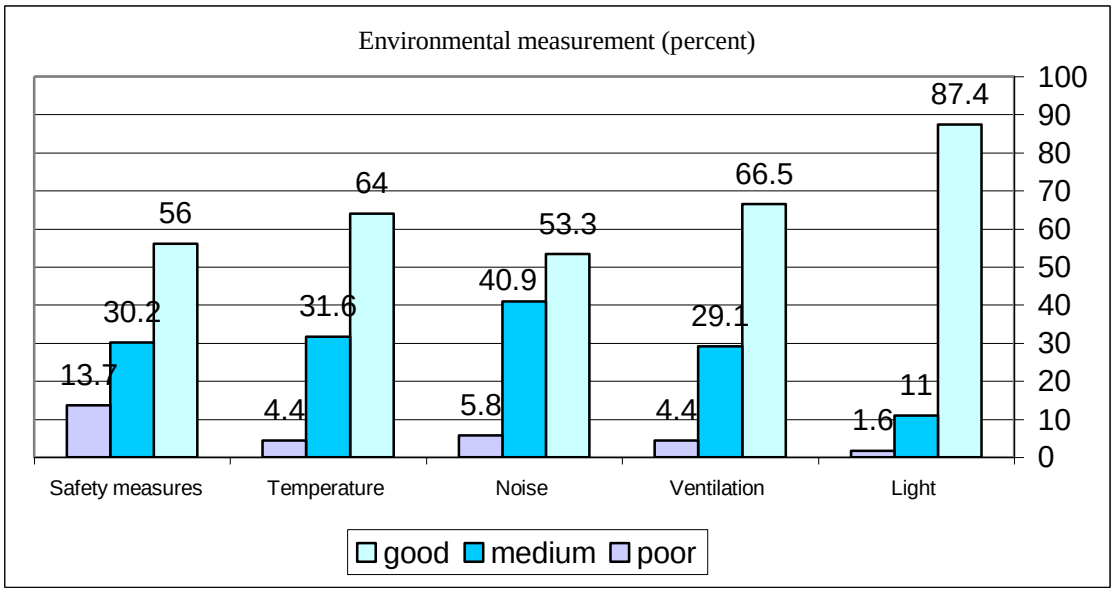


Figure (21) The environmental measurement at work places.

5.40 Analysis of continuous variables.

Analysis of continuous variables shows that minimal age of the study population was 21yrs and the maximum age was 62yrs with mean age (39.62±9.52), work experience shows the minimal value of one year and the maximal value of 37years in whole working life, with mean years (12.98±8.46), extra mental working years shows that minimal value was one year, and maximal value was 30 years in whole working life

with mean years (7.89±7.16), extra muscular working years shows that minimal value was one year, and maximal value was 26 years in whole working life with mean years (8.2±5.77), extra working hours shows minimal value of one hour and maximal value of 40 hours weekly with mean hours of (6.2±7.26), the symptoms of the muscular complaining persistence shows that minimal days was one day and maximal days was 60days with mean days of (5.21±9.07), and taking sick leave shows that minimal days a year was zero and maximal days a year was 60 days with mean of (7.03±8.33) as shown in (table 34).

Table (34) Values of the continuous variables in the study.

Variable	N	Min	Max	Mean	S. Deviation
Age by year	364	21	62	39.62	9.520
Experience\ years	364	1	37	12.98	8.463
mental work\ years	64	1	30	7.89	7.161
muscular work\ years	65	1	26	8.20	5.772
extra work hours	139	1	40	6.28	7.269
symptoms persists\ days	85	1	60	5.21	9.075
how many days sick leave	190	0	60	7.03	8.329

5.41 Analysis of computed variables

Different variables in the same category added together by the way of computing process forming new variables in order to find the relation between the independent variables (sex, educational level, nature of work, and place of work).

First computed variable (awareness to ergonomical standards).

The relation between awareness and educational level

There was strong positive statistical relation between educational level and awareness, using T test One way ANOVA which shows that f =2.935 and P value (0.002) which is statistical function less than 0.01, this means that educational level affects strongly the awareness to hazards.

The relation between awareness and sex

There was no statistical relation between the two sexes regarding awareness using independent sample T test, which shows that T value(-0.170) and P value (0.539) which means that male and female have the same level of awareness.

The relation between awareness and nature of work

There was no statistical relation between natures of work and awareness to hazards using T test One way ANOVA which shows that P value was (0.222), it is more than $\alpha = 0.05$, that means, all professions have the same level of awareness to hazards.

The relation between awareness and place of work

There was no statistical relation between place of work and awareness to hazards using T test one way ANOVA which shows that P value was (0.107) and F (1.622).

The above computed awareness variable shows that the only affecting level of awareness among the different categories and places is educational level taking in consideration that some places needs more attention to hazards, which means that we have to concentrate toward education and training of the employees to avoid that hazards.

Second computed variable (application of ergonomical standards).

The relation between application of ergonomical standards and place of work

There was strong statistical relation between place of work and application of ergonomical standard at work, using T test one way ANOVA, P value= 0.007 less than 0.01, f =2.086 ≥.

The relation between application of ergonomical standards and independent variables (smoking, educational level, and nature of work).

There was no relation between any of the independent variables (smoking, educational level, and nature of work) with application of ergonomical standard at work, using T test one-way ANOVA $\alpha > 0.05$.

The relation between application of ergonomical standards and sex

There was no relation between the mean of two sexes regarding the application of safety measures at work, using independent T Test P value was 0.373 l which is more than 0.05.

This result shows that there are no relations between the computed variable (application to the ergonomical standards) and all independent variables except place of work denoted that this type of occupational hazard not yet taken the actual intention in the culture of the health care workers and the statistical relation with work place (P value = 0.007), it is due to the present danger in the work place..

Third computed variable was complains of muscular pain.

The relation between muscular pain and sex

There was strong relation between muscle pain, the sex using Independent T Test that P value was perfect 0.000, and F was 26.601 in the positive direction, which is compatible with the nature and physiology of the female in relation with the same work tasks they are entrusted with.

The relation between muscular pain and independent variables

Analysis of the computed variable (muscular pain) and (age , nature of work, and place of work), using T Test one way ANOVA, shows that there was no differences between

their means, hence there is no statistical relations found between them, that P value was more than 0.05 for all variables.

The relation between muscular pain and presence of chronic diseases

There was no relation between muscular pain and the presence of chronic diseases as Independent T Test shows, P value was 0.414 and F was 0.668.

Forth computed variable was performance which reflects both skills for work and psychosocial status of the employees.

The relation between performance and independent variables

Analysis for the performance using T Test one way ANOVA shows that there were no statistical relation between (performance) and (educational level, nature of work, place of work, and age) that the P value for all variables was > 0.05 which is not significant

The relation between performance and sex

Sex has no statistical relationship with performance, using Independent T Test that P value was (0.075) > 0.05 and F was 3.194.

This variable (Performance) did not show any relation with the independent variables, may be due to religious factors and acceptance of different work situations, it is also may be due to Intifada Al-Aqsa and the high value of work for the injured and sick population which hide any special suffering.

Summary of results are shown in table (35).

Table (35) Statistical relationship of different computed variables.

Item	Relation	Type of relation	P-value	Comment
Awareness to	Educational level	Strong statistical	0.002	T test One way
Application of	Place of work	Strong statistical	0.007	T test one way
Muscular pain	Gender	Strong statistical	0.000	Independent T
Performance	educational level,	no statistical		T Test one way

5.42 The relation between different work situations and Independent variables

The relation between different work situations regarding dependent variables (safe ergonomics, work conditions, complain of the workers, satisfaction for work, health status, and presence of occupational health services) depends on other independent variables like (Age, Sex, and Educational level).

Age. It affects the presence and severity of the different muscular symptoms.

Sex. Which affects muscular complain and application of safety measures at work.

Educational level. It affects the knowledge and practice for safety measure at work and the ability to adjust work environment.

5.43 Relation between dependent and independent variables.

Different cross tab relations are shown in table (36)

Table (36) relations between dependent and independent variables.

Item	**Relation**	**Type of relation**	**P-value**	**Test**
Muscle and joint pain	Sex	Strong statistical	0.00	Chi square
Back pain	Sex	Positive statistical	0.02	Chi square
Cause for back pain	Sex	statistical	0.018	Chi square
Back pain	Nature of work	Strong statistical	0.00	Chi square
Pain in shoulder	Nature of work	Strong statistical	0.000	Chi square
Pain in back	Nature of work	Strong statistical	0.000	Chi square
Pain in Lower limb	Nature of work	Weak statistical	0.064	Chi square
Ergonomical	Educational level	Strong statistical	0.002	Chi square
Availability of	Work place	Weak statistical	0.075	Chi square
Knowledge of job	Work place	Weak statistical	0.084	Chi square
Information on safety	Nature of work	Strong statistical	0.009	Chi square
Ventilation	Work place	weak statistical	0.065	Chi square
Noise status	Work place	Strong statistical	0.002	Chi square

Relation between sex and muscular pain

Cross tabulation between sex and muscular pain shows that females has more complain than males as their percentage was 38% from all females whose answer this question which are complaining of muscles and joint pain, while males who are complaining were only 13% as shown in the (figure 22).

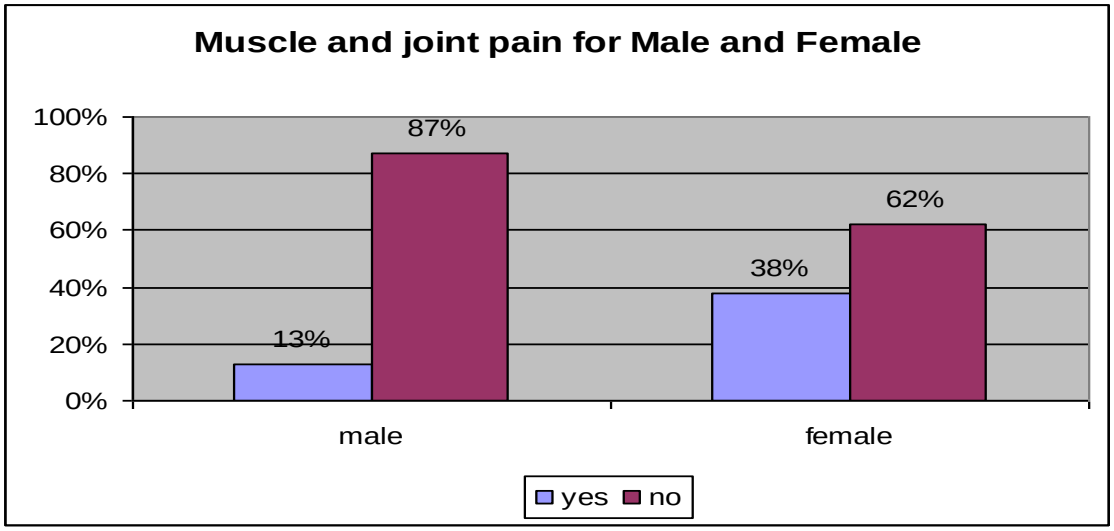


Figure (22) Relation between sex and Muscular pain.

Relation between back pain cross tabulation with sex

In specific, back pain cross tabulation with sex shows that females are more affected by back pain (31.5%) than males (16.5%) as shown in the (figure 23).

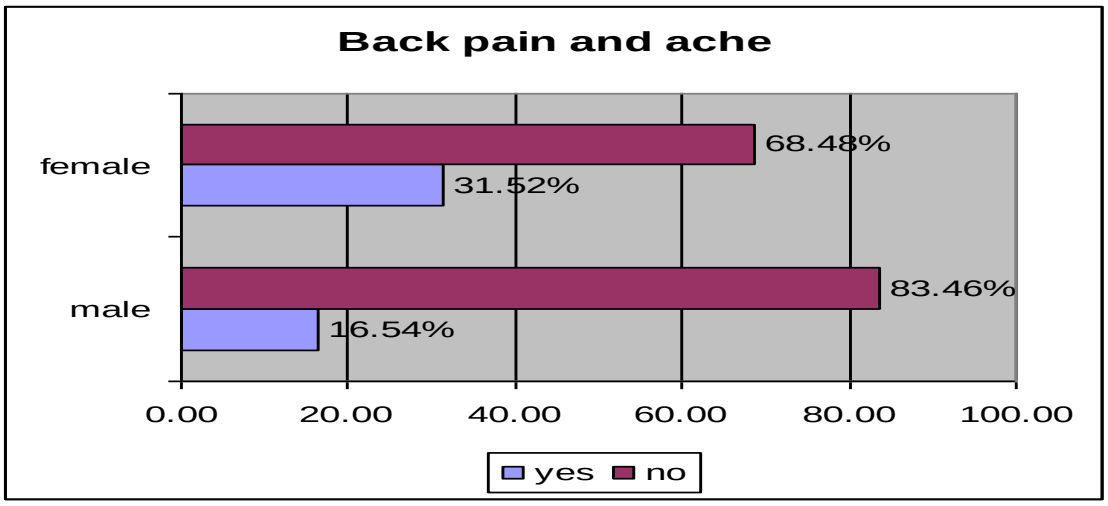


Figure (23) Back pain and gender.

Cause for muscular pain among sex

Cross tabulation between sexes and cause for muscular pain shows that females are complaining more than males due to muscular and joint pain and back pain and ache as shown in (figure 24).

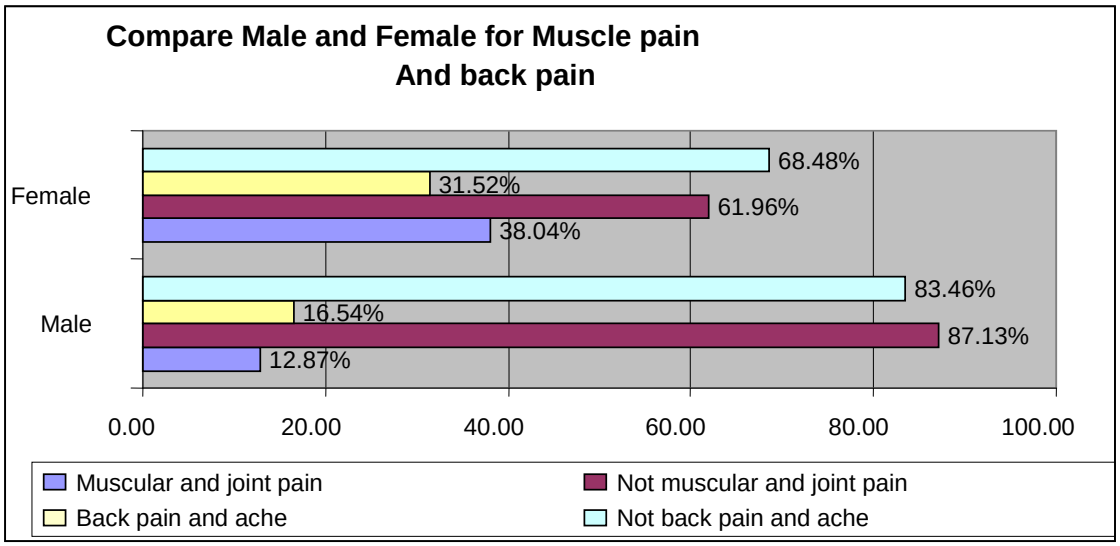


Figure (24) comparison between sexes regarding cause of muscular pain.

Relation between work place and back pain

Cross tabulation between work place and back pain shows that ICU workers, Radiology, and Operation Room are the highest to complain of back pain due to size and type of work they performed as shown in (figure 25).

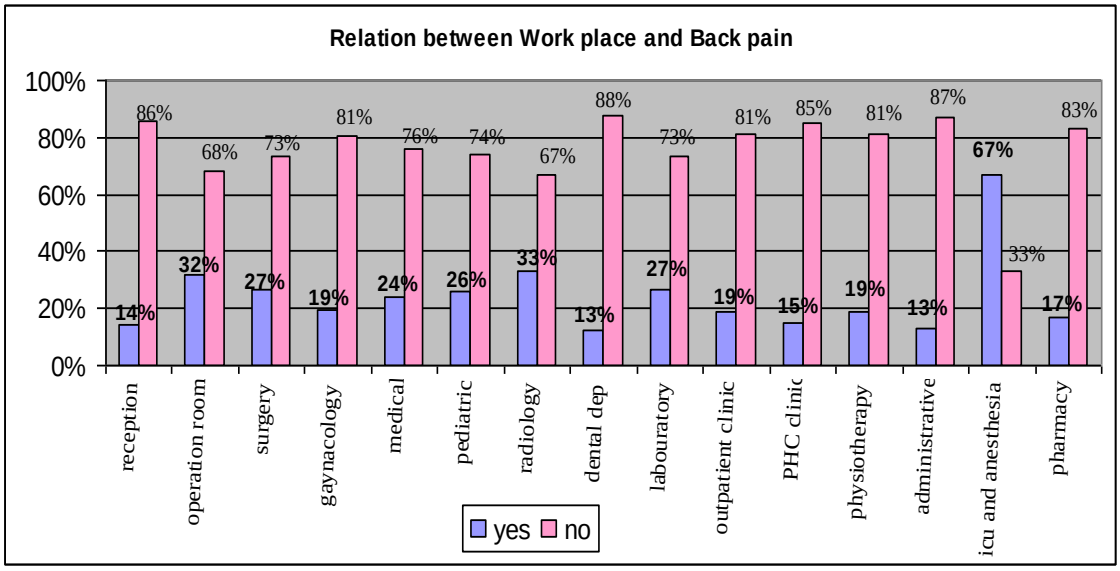


Figure (25) Back pain in different work places.

Relation between nature of work and back pain.

Cross tabulation between nature of work and back pain shows that Nurses and Paramedical (32%, 29% respectively) are the most complaints of back pain due to their nature of work as shown in (figure 26).

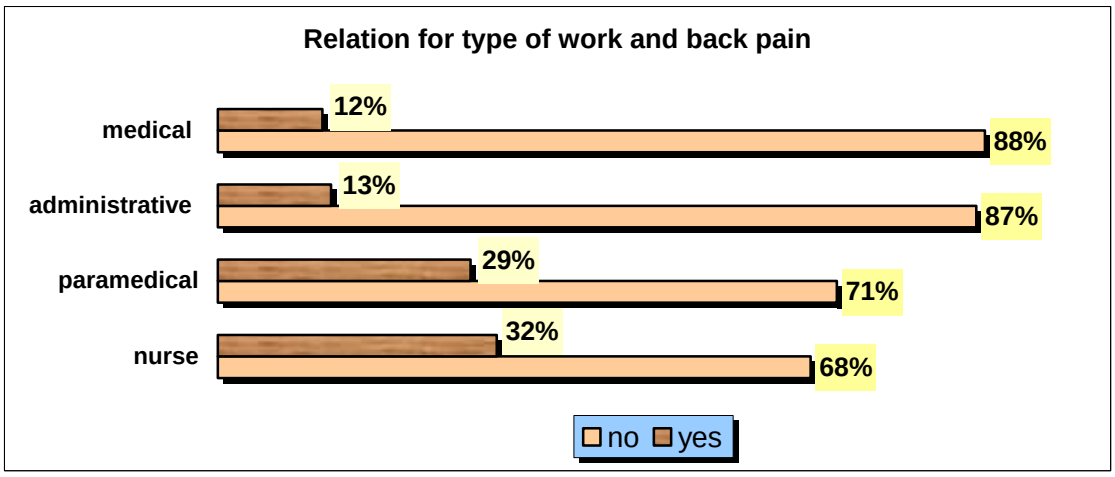


Figure (26) Relation between back pain and nature of work.

Main complain in different professions

Cross tabulation between nature of work and main complaint shows that muscular pain is the highest and main complaint for all types of work of HCW as shown in (figure 27).

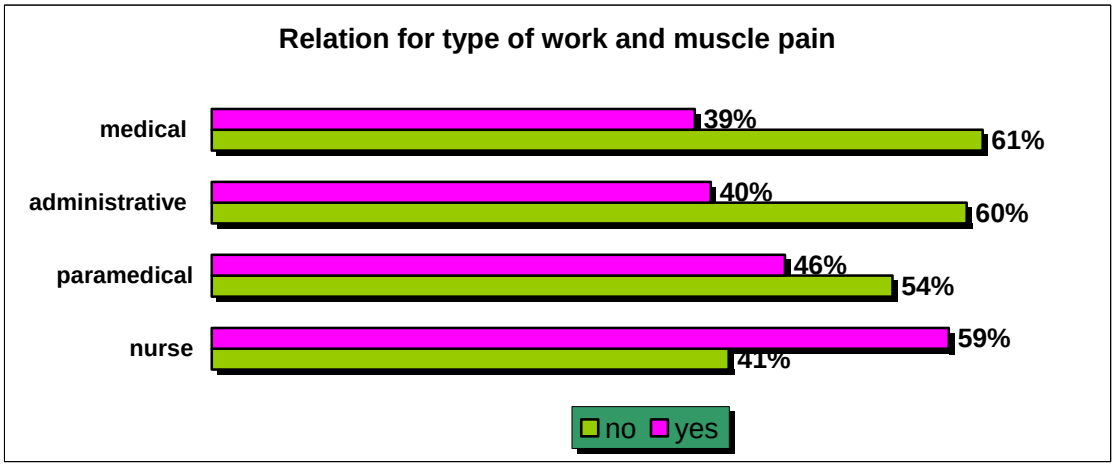


Figure (27) Shows the main complain of HCW.

Pain of upper limb among professions.

Cross tabulation between nature of work and complain of upper limb pain shows that Nurses and Paramedical (11%, 9% respectively) are the most affected, but all professions have low percentage of complain as shown in (figure 28).

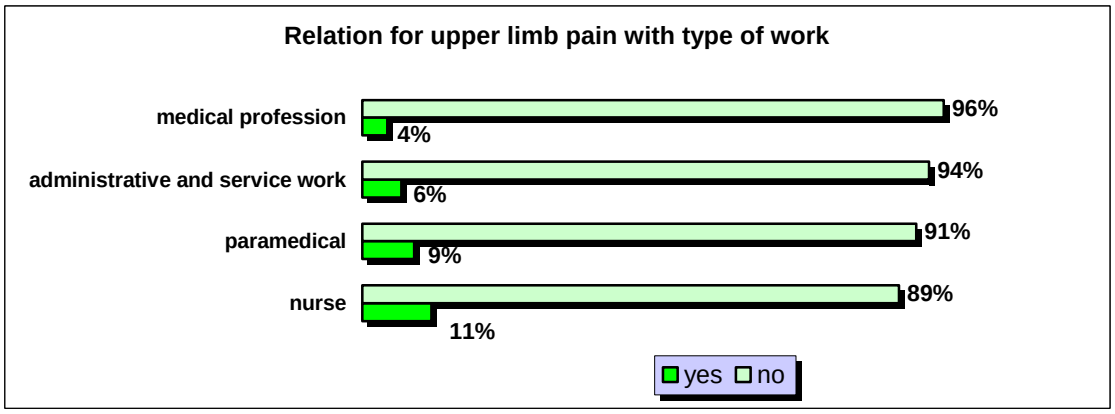


Figure (28) Relation between upper limb pain and nature of work.

Relation between place of work and eye complain

Cross tabulation between place of work and eye complain shows that medical, laboratory, gynecology, anesthesia, and administrative (43%, 40%, 39%, 33%, and 32% respectively) are the most eyes affected due to their work as shown in (figure 29).

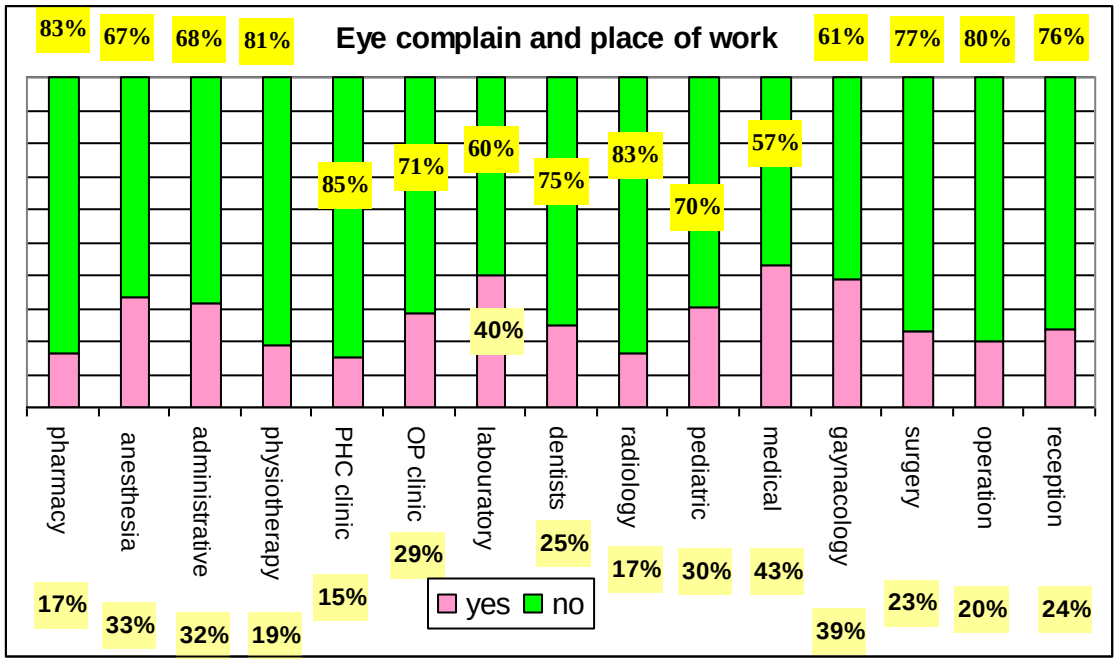


Figure (29) Relation between eyes complains and place of work.

Relation between eyes complaint and nature of work.

Cross tabulation between nature of work and eye complain shows that nurses and paramedical, administrative, and medical respectively are the most eye affected as their profession as shown in (figure 30).

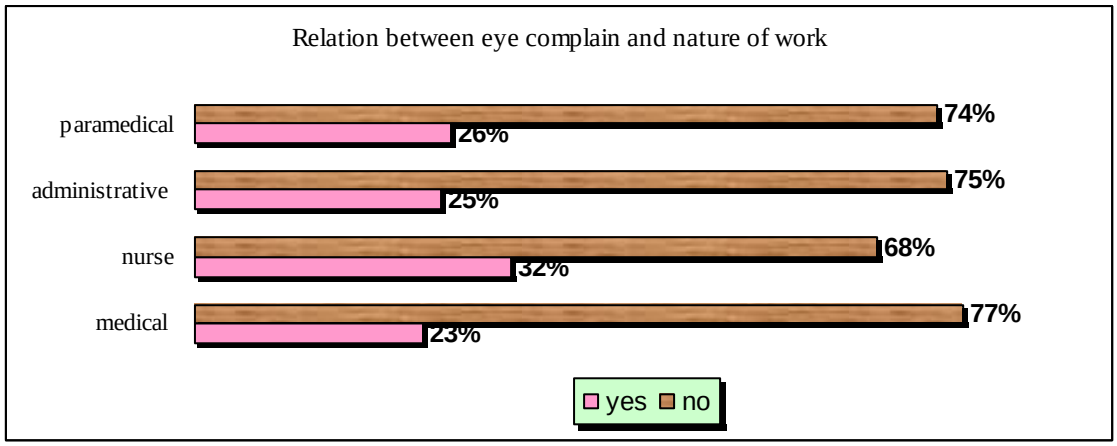


Figure (30) Relation between eyes complains and professions.

Relation between work place and equipment.

Cross tabulation between work place and equipment needed shows that most of work places need equipment for their work, which exposing their users to hazards of exposure and needed for training to proper use and hazard avoidance as shown in (figure 31)

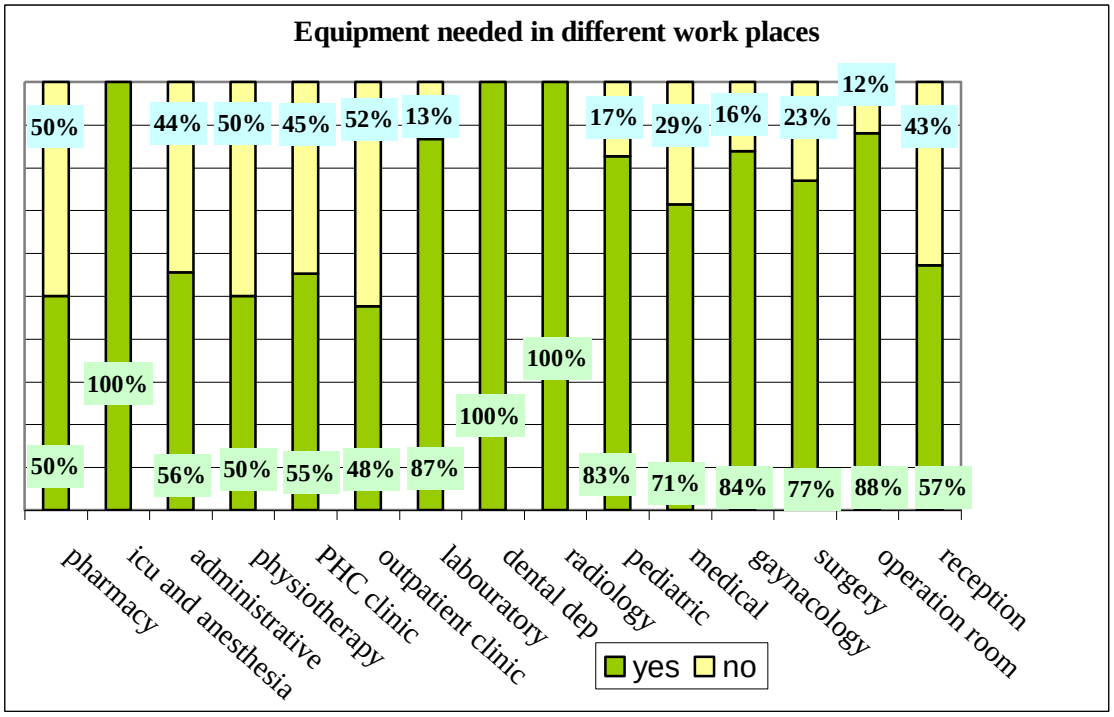


Figure (31) work places and equipment needed.

Relation between nature of work and the need for equipment

Cross tabulation between nature of work and need for equipment shows that administrative, are the lowest need equipment 38% and the highest for VDT 41% for their work as shown in (figure 32, 33).

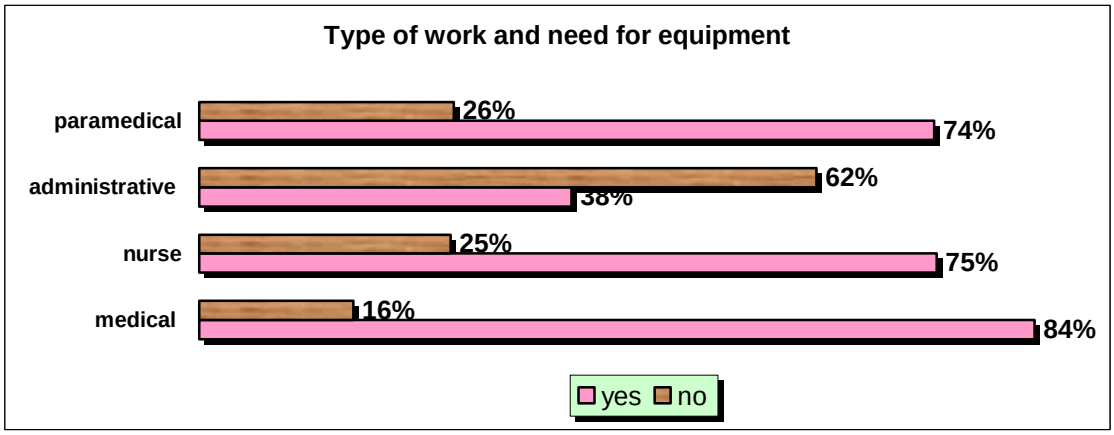


Figure (32) Relation between equipment needed and profession.

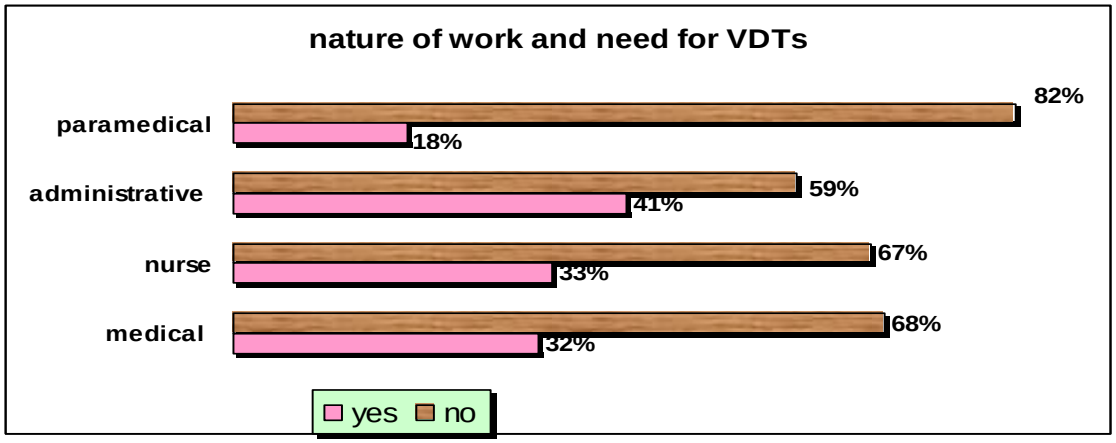


Figure 33 Relation between VDT needed to work and profession.

Relation between work place and VDT

Cross tabulation between work place and VDT needed to work shows that pharmacy, administrative, PHC (67%, 59%, 41% respectively) are the most needed to use VDT for

their work, which expose them more to hazards of exposure which require special training for proper use and hazard avoidance as shown in (figure 34).

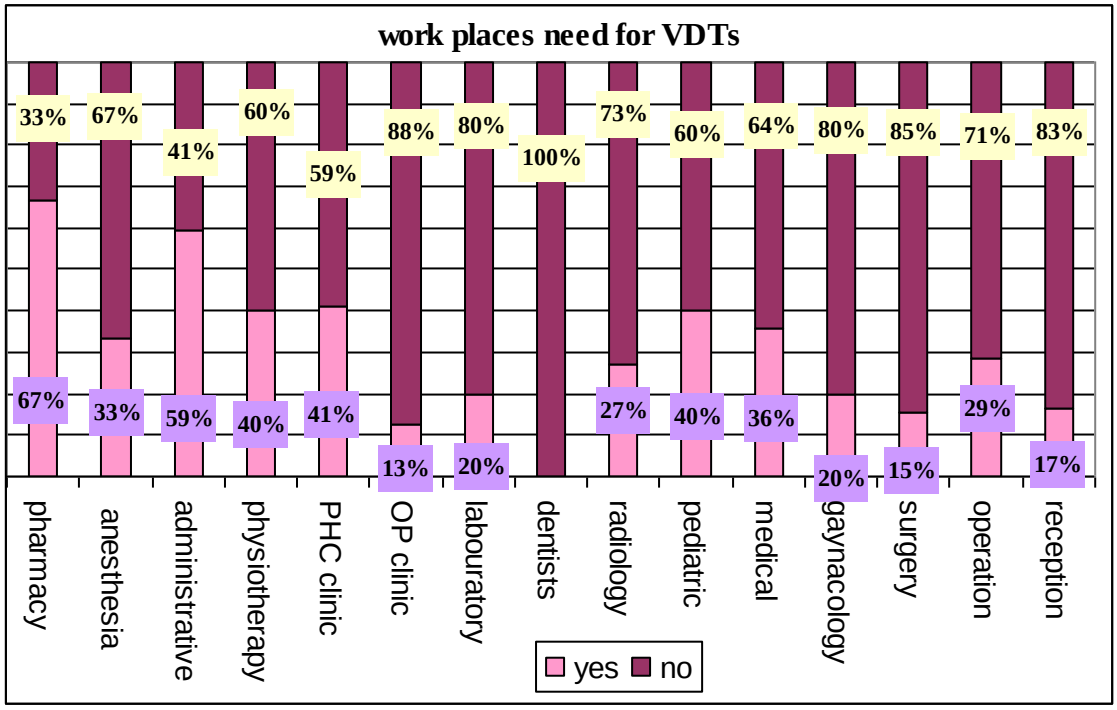


Figure (34) work places and VDT for their work.

Relation between work place and medical equipment

Cross tabulation between work place and medical equipment needed to work shows that most of work places need medical equipment for their work as shown in (figure 35).

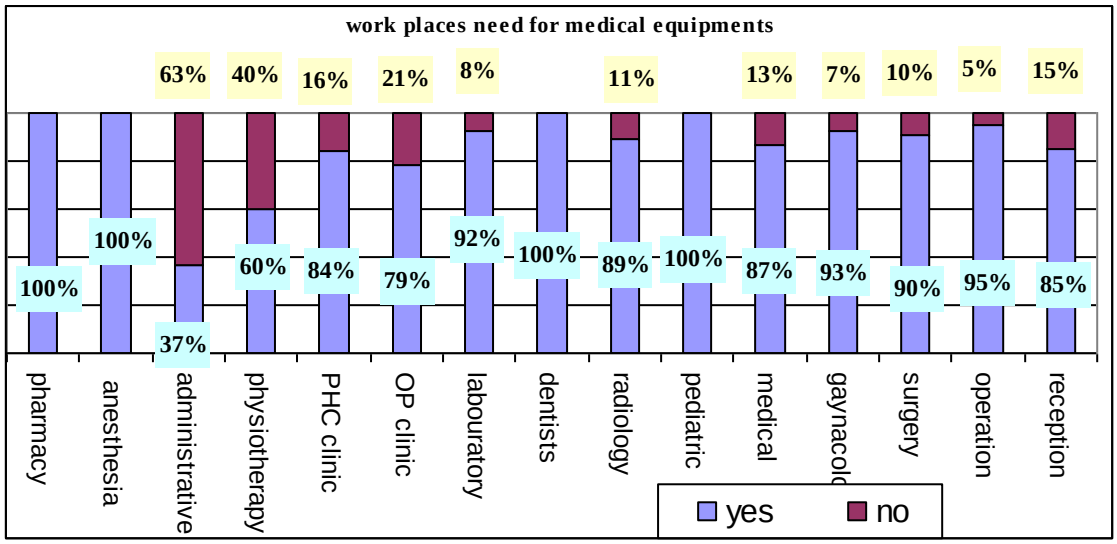


Figure (35) work places and need of medical equipments.

Relation between work place and safety measure

Cross tabulation between work place and safety measure at work shows that the worse was laboratory, surgery, medical, pharmacy dental, out patient clinic gynecology, and reception respectively as shown in (figure 36).

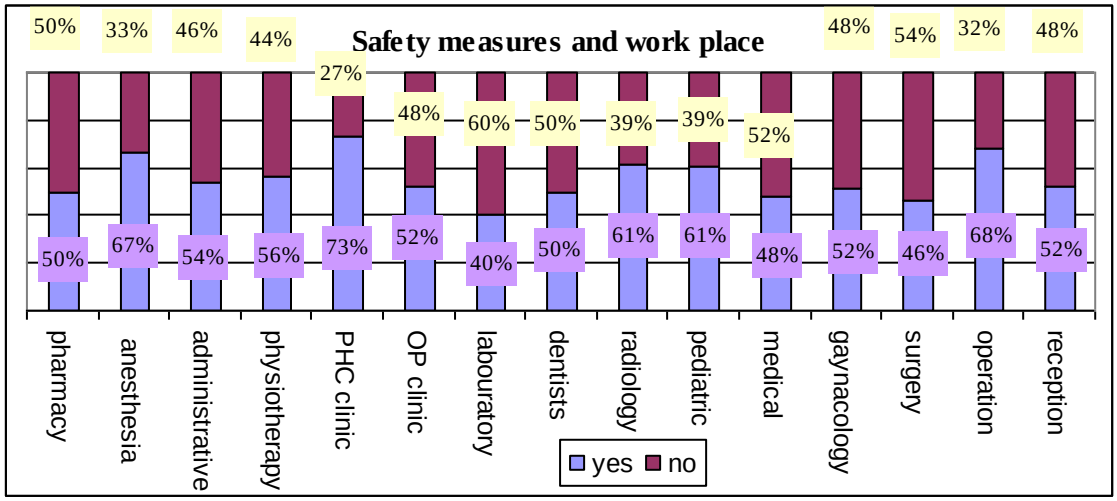


Figure (36) the work places status of safety measures.

Relation between educational level and ergonomical knowledge

The result of Chi square statistical test shows that there is strong statistical relation between educational level and Ergonomical knowledge, as P value was .002, which harmonized with the expected result, (figure 37) shows the relation.

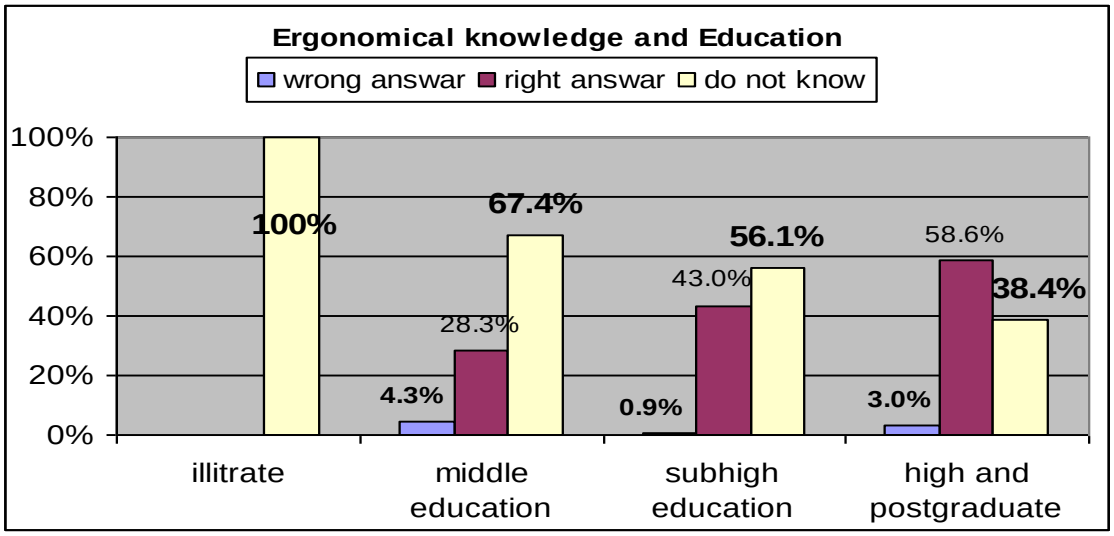


Figure (37) Relation between educational level and ergonomical knowledge.

Relation between work place and information on safety and OHS.

Cross tabulation between work place and information on safety and occupational health services shows that most of them knows about safety and OHS, but only physiotherapy, administrative, and laboratory knows less than the others as shown in (figure 38).

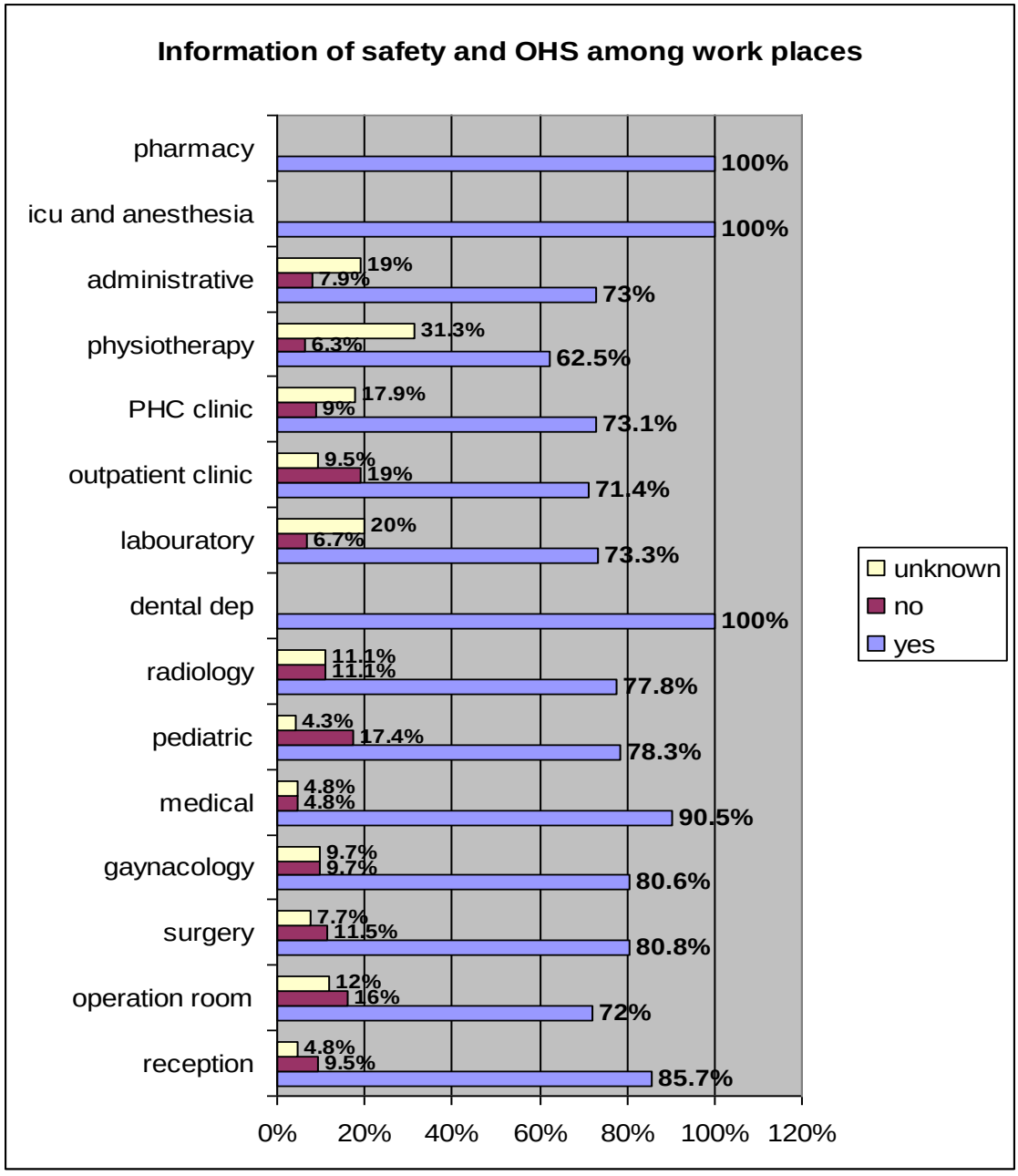


Figure (38) the state of safety and OHS in work places.

Availability of occupational health services in work places

Cross tabulation between work place and availability of occupational health services shows that almost all of the workplaces have those services, but with different degrees as shown in (figure 39)

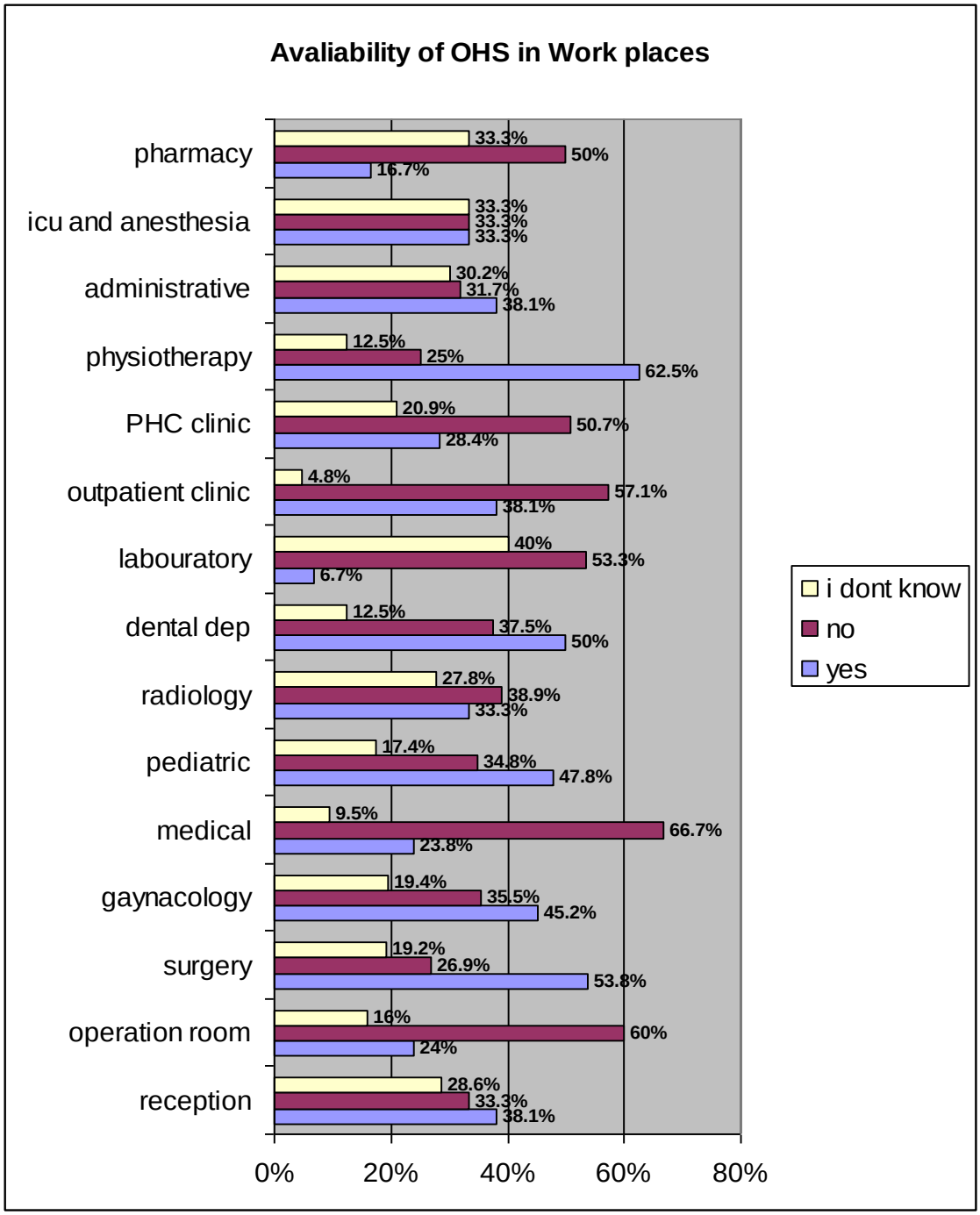


Figure (39) The work places and availability of OHS.

Relation between work places and knowledge of job hazard

Cross tabulation between work place and knowledge of job hazard shows that almost all of the workplaces have the knowledge as shown in (figure 40).

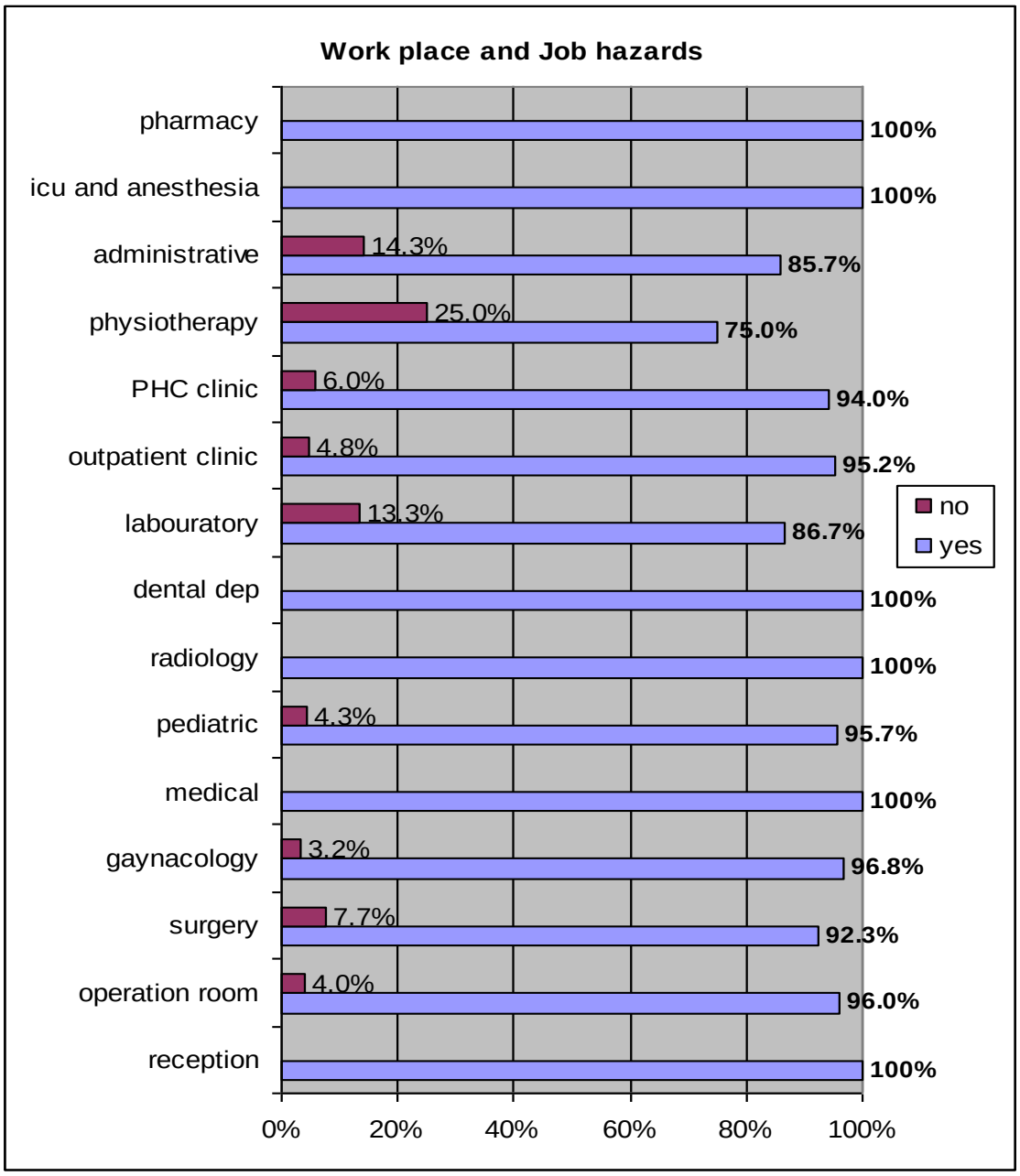


Figure (40) The work places and knowledge of job hazard.

Knowledge of job hazards

Knowledge of job hazards shows that almost all professions are the same to know their job hazards except administrative where 82% of them have the knowledge.

Relation between information on safety and OHS among professions

Cross tabulation between information of safety and OHS among professions shows that almost all of them have the knowledge as shown in (figure 41).

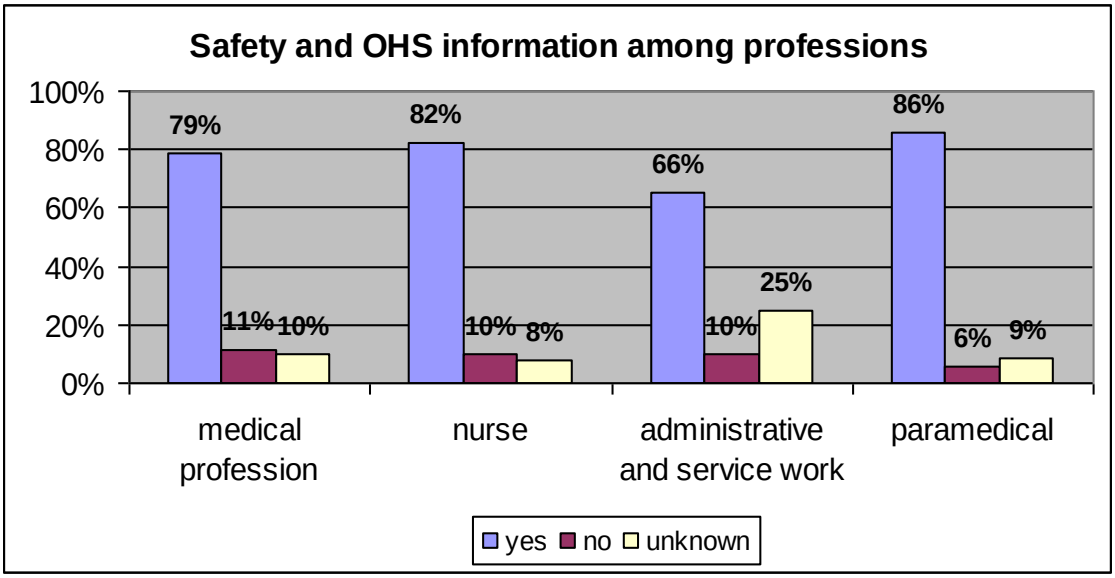


Figure (41) Information of safety and OHS among professions.

Availability of safety and OHS among professions

Cross tabulation between availability of safety and OHS among professions shows that they have some of the services as shown in (figure 42).

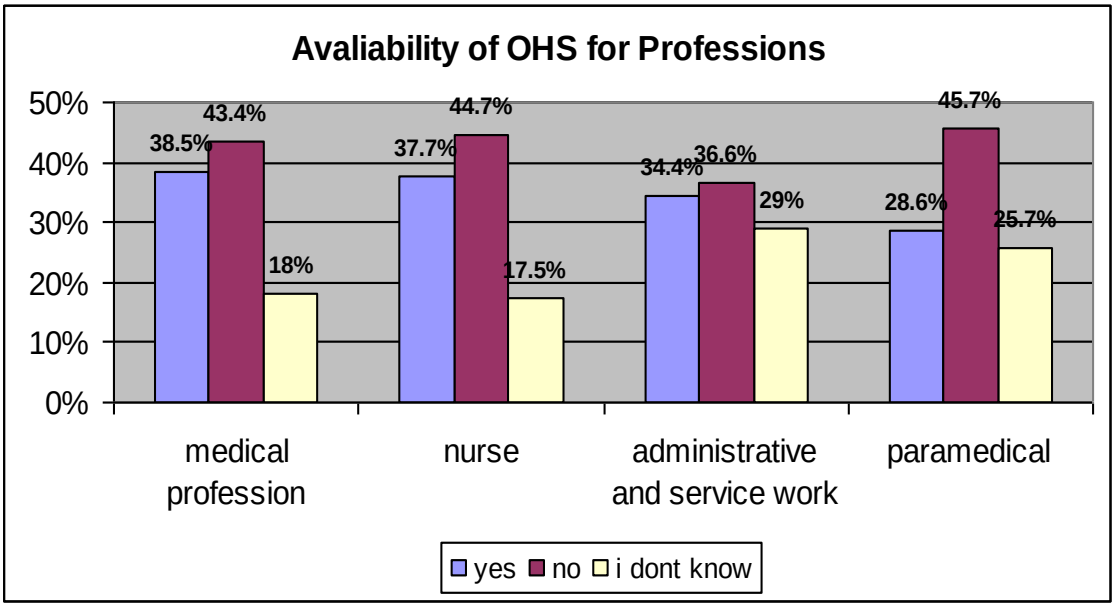


Figure (42) Availability of safety and OHS among professions.

Relation between work place and safety measure

Cross tabulation between work place and safety measure at work shows that almost all of the workplaces (operation room 52%, surgery 50%, medical department 47.6%, dental department 37.5%, gynecology 35.5%, reception 33.3%, and laboratory 33.3%) have medium range and the places (ICU and anesthesia 33.3%, surgery 23.1%, gynecology 19.4%, and reception 19%) have poor safety measures as shown in (figure 43).

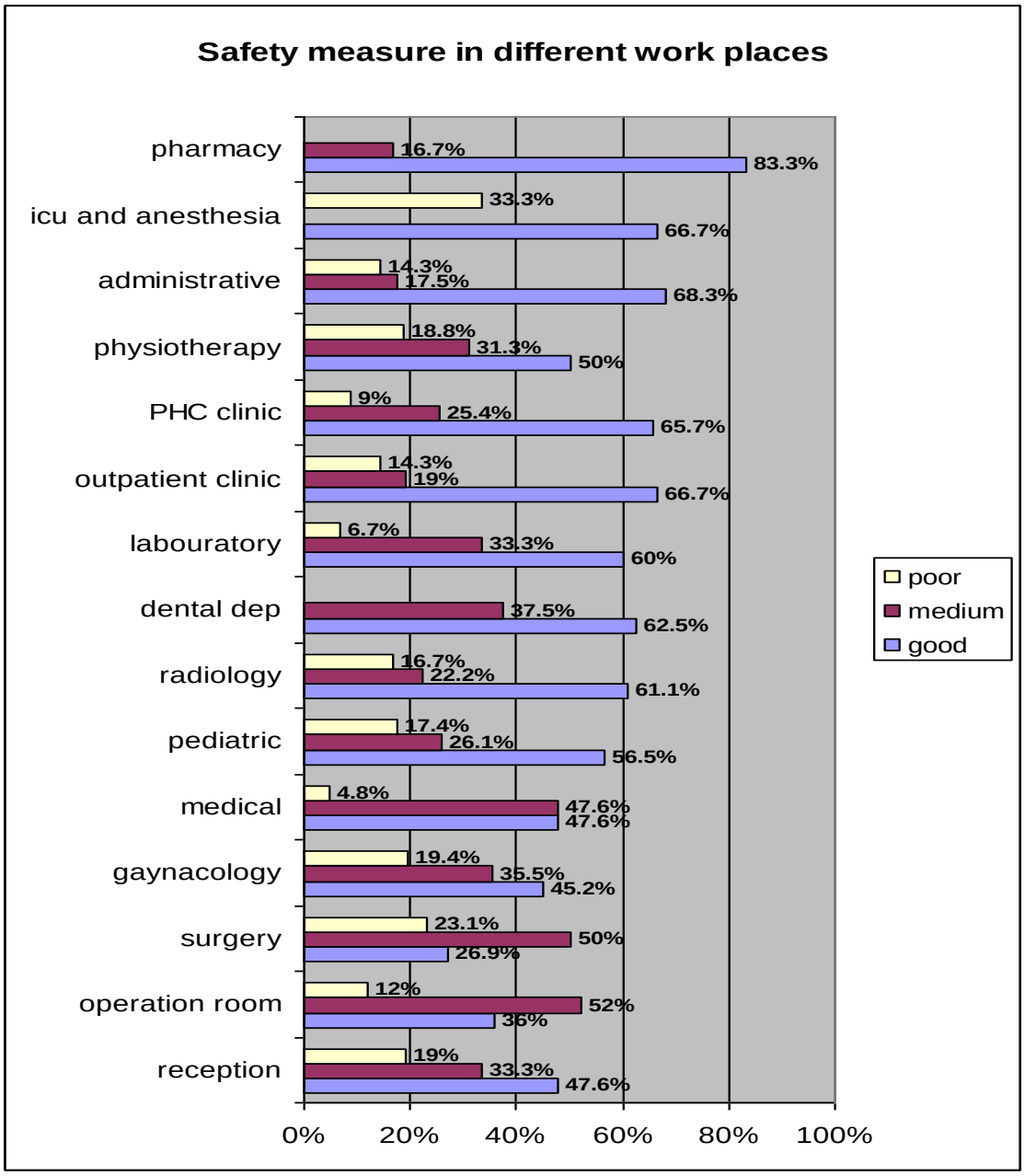


Figure (43) Availability of safety measures at work places.

Relation between work places and temperature

Cross tabulation between work places and temperature at work places shows that most of the workplaces are good temperature and some of them (physiotherapy 50%, medical department 47.6%, laboratory 46.7%, surgery 46.2%, pediatric 39.1% , dental department 37.5%, gynecology 35.5%, reception 33.3%, and ICU and anesthesia 33.3%) have medium range of temperature as shown in (figure 44).

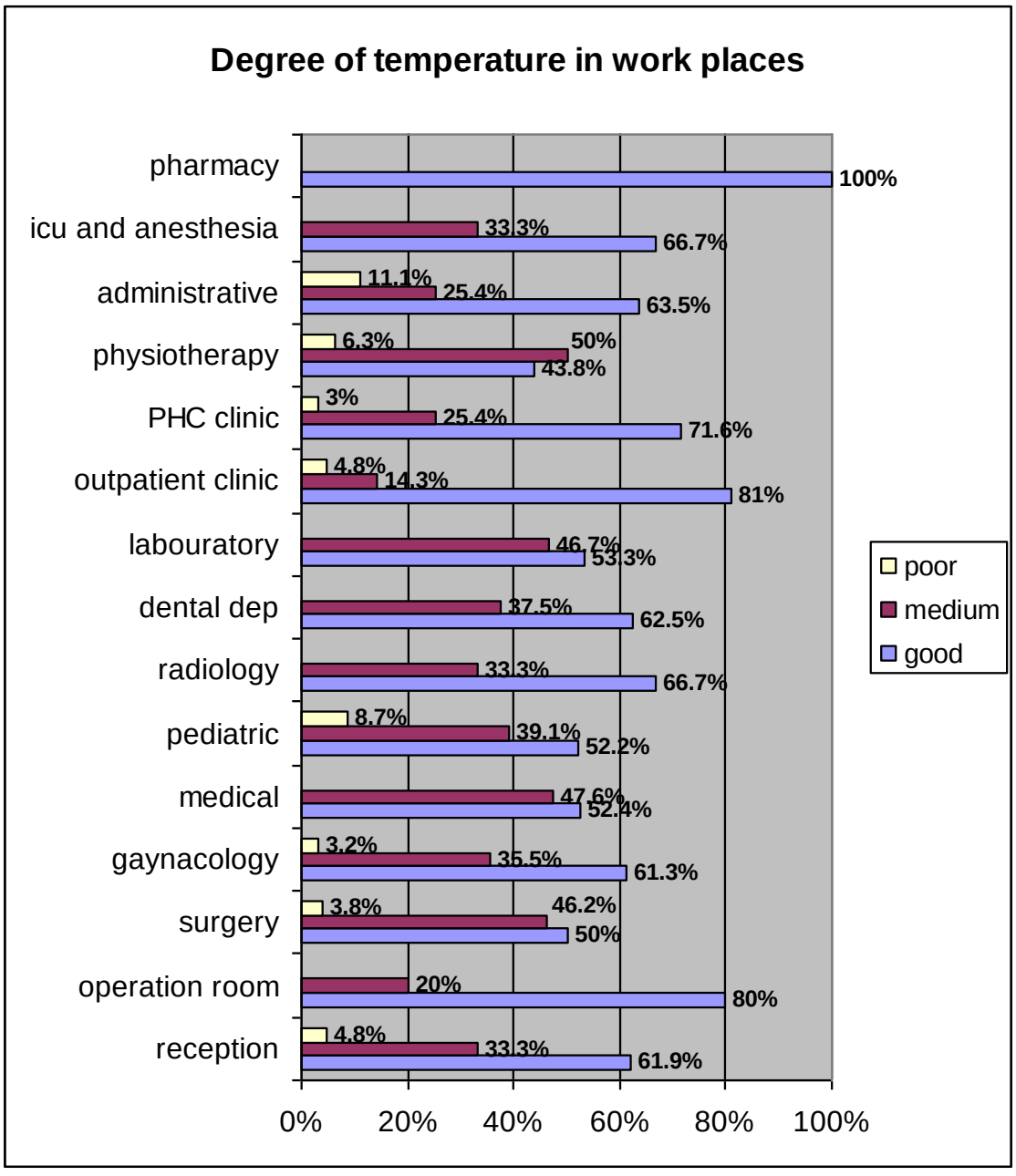


Figure (44) Temperature in different work places.

Relation between work places and noise

Cross tabulation between work places and noise at work places shows that most of the workplaces are quite but some of them (dental department 75%,physiotherapy 68.8%, ICU and anesthesia 66.7% , surgery 57.7%, pediatric 52.2% , radiology 50% , reception 47.6%, administrative 44.4% ,outpatient clinic 42.9%, and laboratory 40%) have medium range of noise as shown in (figure 45).

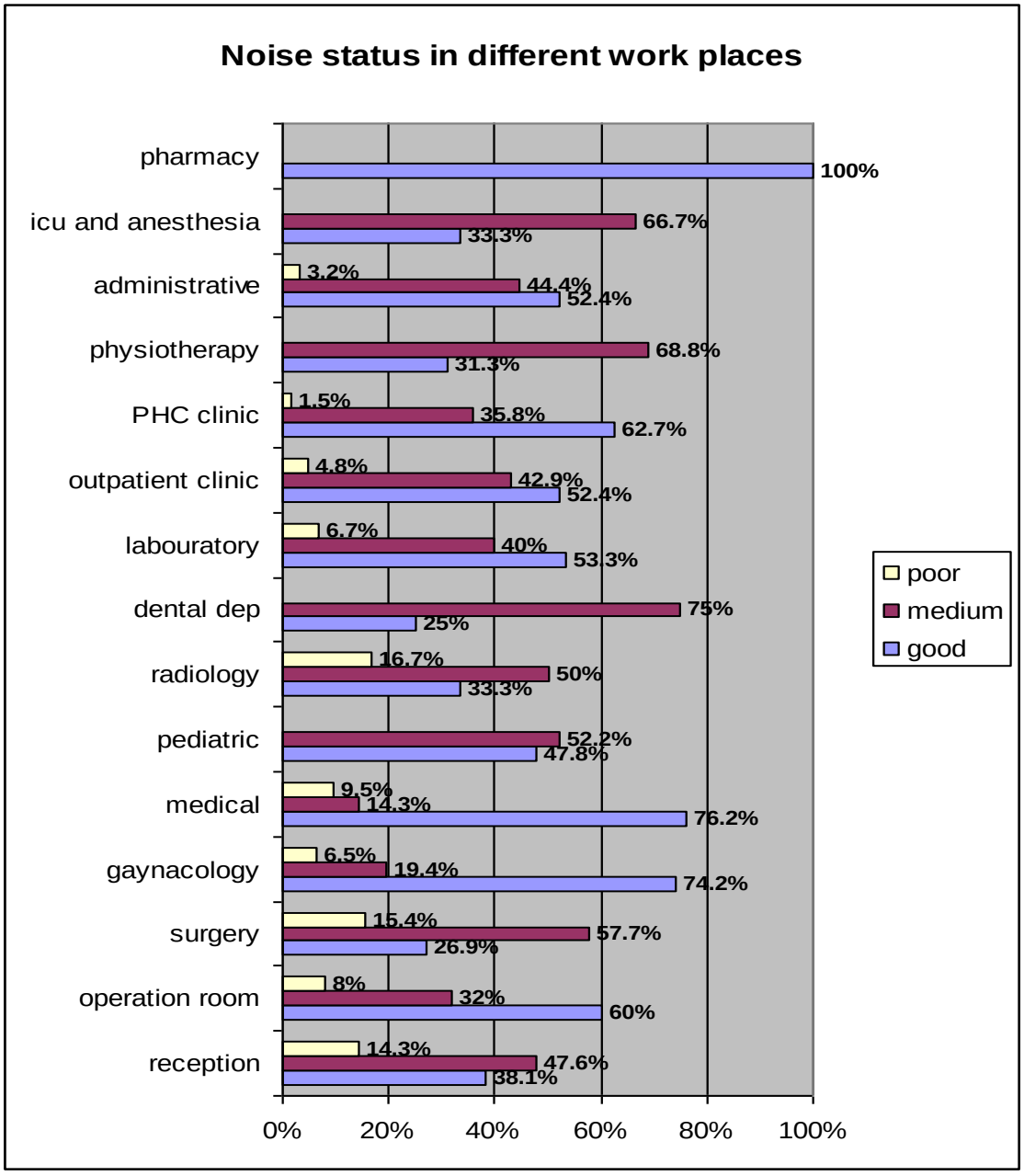


Figure (45) Noise in different work places.

Relation between work places and ventilation

Cross tabulation between work places and ventilation at work places shows that most of the workplaces are quite but some of them (dental department 75%,physiotherapy 68.8%, ICU and anesthesia 66.7% , surgery 57.7%, pediatric 52.2% , radiology 50% , reception 47.6%, administrative 44.4% ,outpatient clinic 42.9%, and laboratory 40%) have medium range of noise as shown in (figure 46).

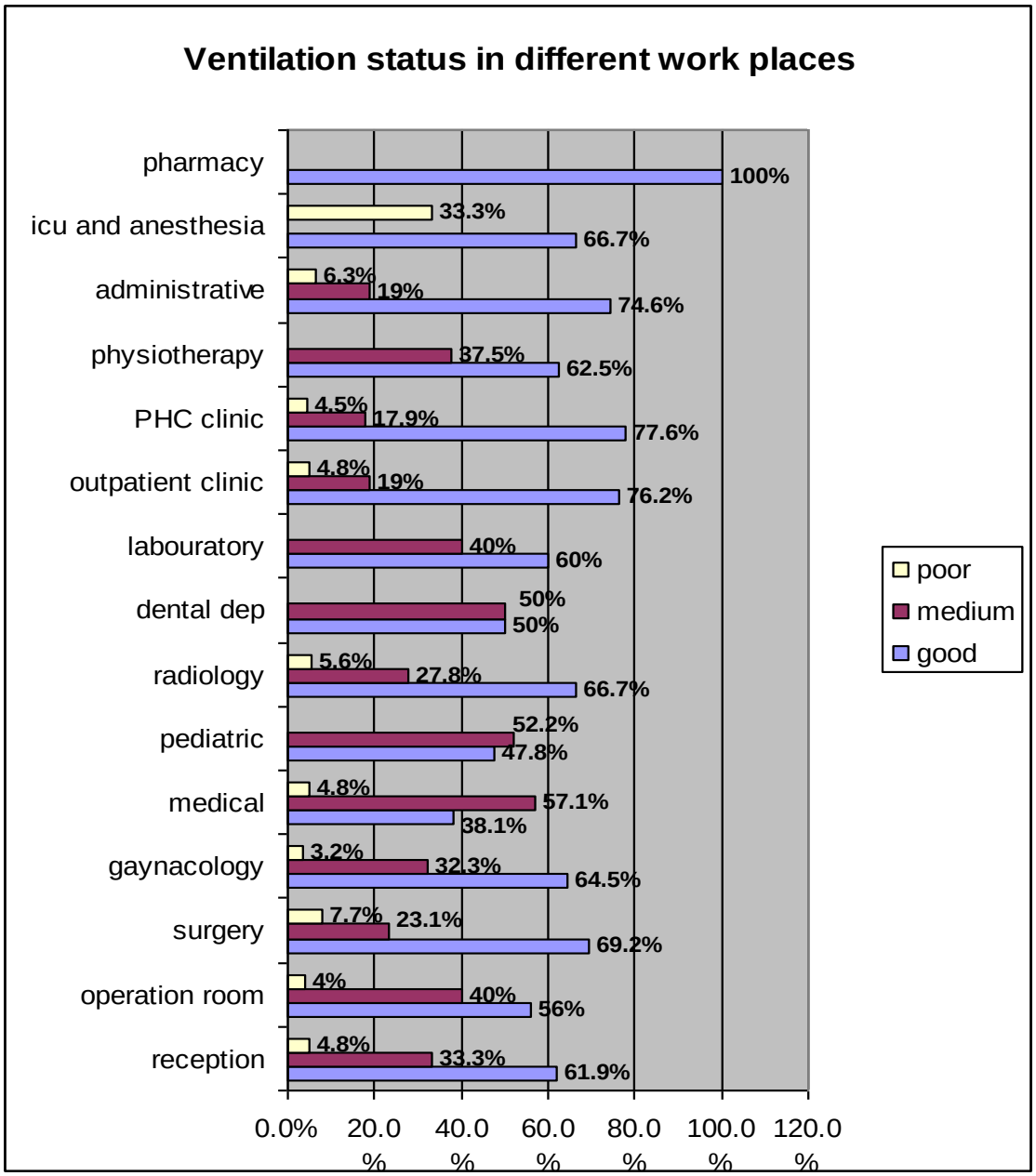


Figure (46) Ventilation in different work places.

Relation between work places and light

Cross tabulation between work places and light at work places shows that most of the workplaces are good (dental department 25%, physiotherapy 25%, and medical 19%, and PHC clinics 17.9%) have medium range of light as shown (figure 47).

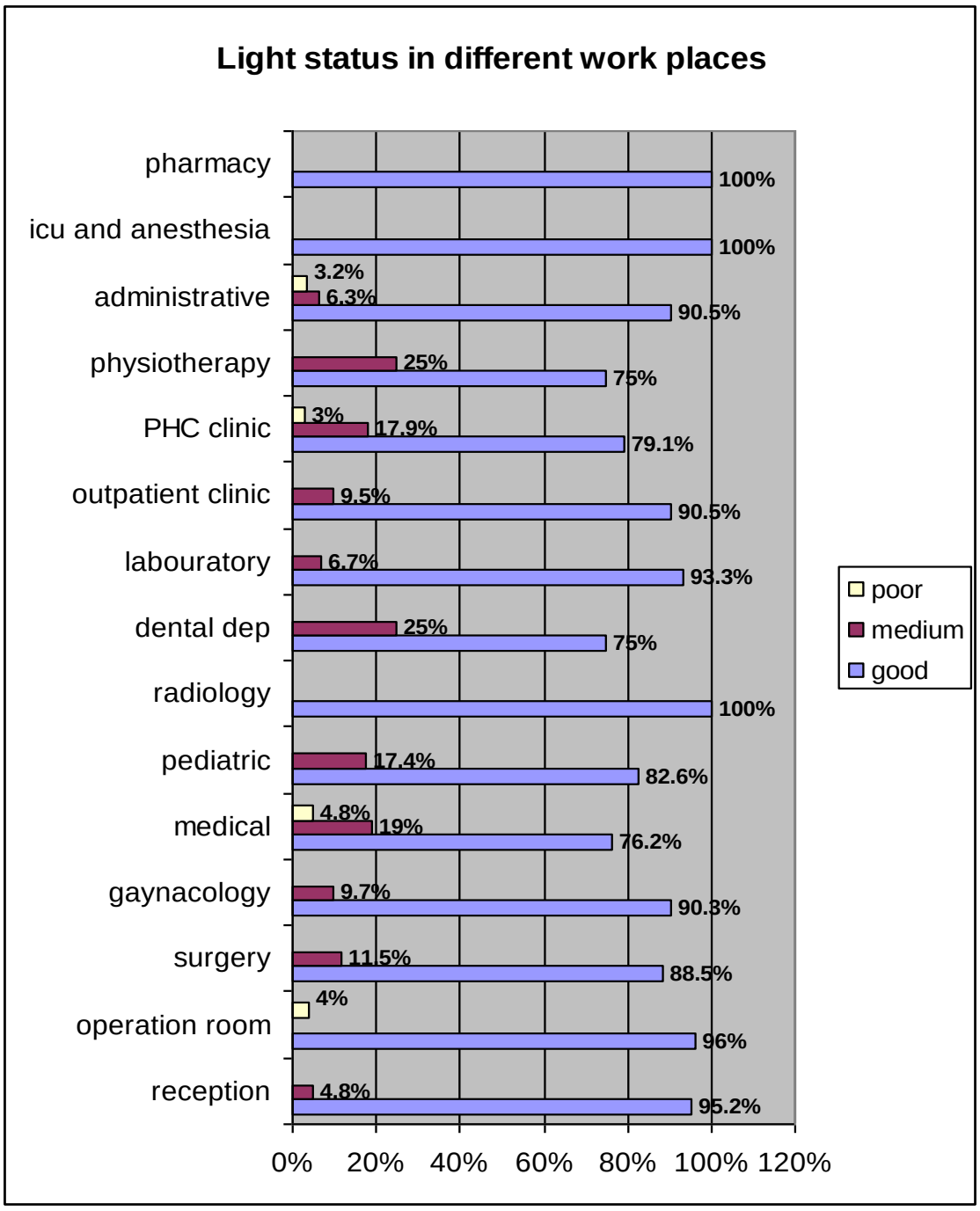


Figure (47) Light in different work places.

The readings for the different work environment measurements in governmental PHC and Hospitals gives the same readings of the employees answers, which shows that the light and temperature was acceptable, noise, and ventilation were not satisfactory and there values was slightly abnormal.(annexes of the readings is enclosed).

Chapter six

Conclusion and implications

Chapter 6. Conclusion and implications

In this chapter, we are going to display different results, and the implications for the study and suggested recommendations.

6.1 main results

The study population formed of 364 participants, they are distributed into four categories (physicians33.5%, nurses 31.3%, administrative 25.5%, and paramedical 9.6%), female represents 25.3%. Most of the study population is highly educated, and aged between 25-54yrs, with mean age (39.62±9.52), and 89.8% of the study population is free from chronic diseases.

The result shows that 68.4% use work devices, while only 54.7% of them has suitable work furniture and devices, and 45.6% have safe work place and work devices.

Knowledge of OHS shows that 77.2% have enough knowledge about the safety and occupational health services, 49.7% of them know what ergonomic science means, but only 29.5% of the study population knows the proper value of the work breaks, and 3.6% of them know the proper value of illumination.

Post work symptoms show that 58.2% suffer from tiredness and exhaustion, 69 .4% due to their work, 41.2% have sleep disturbances, 64.5% of them due to their work, and 20.6% feel tension and anxiety during work.

Muscle and joint pain: 45.9% have muscle and joint pain; 59.3% of them due to the work. The highest complaint was back pain 20.3%, and 26.4% complain of eyestrain.

Medical intervention shows that 37.3% of the sick workers have first aid at the site, 37.3% received specific treatment, 25.5% have no intervention at all, and 9.6% received post injury rehabilitation.

Work satisfaction shows that 47.8% have partial satisfaction, 39.8% show complete satisfaction, and 12.4% are not satisfied.

Willingness to change their work places shows that 28.3% wish to change their work (45.5% to other directorate, 30.7% to other work inside departments, 20.8% to other section in the same directorate, and 3% to other ministry), and 95.3% wish to change the current working system.

Environmental measurement: light was good and acceptable for 87.4% of the work places, ventilation was good in 66.5%, temperature was good in 64%, and Noise was good in 53.3% workplaces.

Special relations show these results, There was a statistical significant relationship between educational level and awareness p-value (0.002).

There was statistical significant relationship between place of work and application of ergonomical standard at work, p-value (0.007).

There was statistical significant relationship between muscle pain and sex p-value (0.000).

Relation between sex and muscular pain in specific back pain shows that females has more complaint than males, for the place of work, ICU and anesthesia was the highest complaint of muscular pain 67%. Nurses and Paramedical (32%, 29%) have the most complaint of muscular pain.

Eyes complain show medical and laboratories (43%, 40%) were the highest, and among professions, nurses were the highest.

Safety measures were good in 56% of the workplaces.

6.2 Summery of the study

Ergonomical conditions of the employees

The research result shows that 45.3% complains of unsuitable work furniture and devices, 54.4% have no safety at work, of those 61% have no safety furniture, 68.9% have no safe lighting system and glare protection, 57.6% have noisy work environment, 70% have no safe devices, 48.4% have no safe ventilation system and temperature adjustment at work place, and 72.4% have more crowd ness at work place. The result also shows that 58.2% suffer from post work tiredness and exhaustion, of them 69.4% due to their work, 41.2% of the study population has sleep disturbances, of them 64.5% due to their work, and 45.9% has muscle and joint pain in their work; of them 59.3% due to the work..

These research results show that ergonomical work condition of the employees is not too much well, and many of their complaints can be prevented by increase ergonomical knowledge and training as the literature stated.

University of Wisconsin-Milwaukee 2002 stated that control of work conditions is the surest way to minimize glare and reduce eye fatigue.

Ekberg et al. 1995 stated that early symptoms in the neck and shoulder are signals not only of ergonomic deficiencies in the work situation, but in particular of work organizational conditions.

Knowledge and practice of the employees

There was strong positive statistical relation between educational level of the employees and awareness as high educated population was the high knowledgeable of the study population. This result is accepted and logical that the educational level will improve knowledge and ability to recognize hazard at work.

University of California San Diego stated that knowledge of ergonomic principles can prevent the ergonomical risk factors.

Harry C 2002 stated that the most important knowledge to know for the computer operator was proper sitting to avoid ergonomical risk factors.

Alireza et al 2002 stated in the research applied in Iran that among laboratory workers, only 16% have the enough knowledge about ergonomics.

Narelle et al. 2000 stated that designers and engineers have little information about ergonomics resulted in serious ergonomic problems.

The research result shows that only 49.7% of the study population knows what ergonomic science, and 70% do not know the detailed information about ergonomics.

Risk factors for ergonomical disorders and musculoskeletal complaints

John t. Bielecki 2002 enumerated the factors associated with LBP (low back pain) as follows:

- Factors Associated with Work-Related Low Back Pain.
- Previous workers' compensation claim for low back pain.
- Psychophysical demands.
- Psychosocial stresses.

- ❖ Biomechanical demands.
- ❖ Physical conditioning.

He mentioned also that some other factors like inadequate staff performing the needed tasks in a hurry poses many risk factors that may cause musculoskeletal disorders.
Most of the studies in the literature demonstrated that the musculoskeletal complaint, in particular back pain, is the major determinant of bad ergonomics.

Edlich RF et.al. 2004, stated that the occupational back injury is the second leading occupational injury in the United States among health care personnel; and nurses have the highest rate of back pain, with an annual prevalence of 40-50% and a lifetime prevalence of 35-80%.

Susan Wilburn, 2001 stated that low back injuries are the leading occupational health problem affecting healthcare workers and are increasing among nurses and nurses' assistants. She mentioned also that according to the research applied in the University of Wisconsin, on 1996 at the Institute of Medicine Report addressed by Nurse Staffing in Hospitals and Nursing Homes that 38% of nurses are complaining from back injuries.

American federation employees 1997 mentioned in their publication that nurses and nurse's aides have prevalence rate for their back injuries 43% of all nursing home injuries.

Susan Terry, 1997 stated that work-related back injuries have been shown to account for 53.3% of all work related injury claims, particularly nursing assistants being at high risk of injury.

The risk factors for ergonomic disorders in this research are not well differentiated, but there are some complaints from the work conditions.

The research result shows that there was strong relation between muscle pain and the sex, but there was no relation with the other factors.

The research results show that 45.9% of the study population has muscle and joint pain in their work; of them 59.3% due to their work.

The research results show that back pain among the study population was 20.3%, and back stiffness 13.5%, the result shows that females are more affected by back pain (31.5%) than males (16.5%), and among all professions nurses (32%) and Paramedical (29%) are the most complaints of back pain. Taking into consideration that most of the Palestinian population can bear the pain as their culture and believes due to religious thinking, resulted in missing of some of musculoskeletal symptoms and misdiagnosis for some of the disorders. On the other hand there is significant disproportion for the number of nurses and Para medicals and the medical professions, which nearly resemble their percentage in the target population, which are medical professions 31.1%, nurses 32%, administrative 23.8%, and paramedical 9.7% .

The research results show low prevalence rate for low back pain in MOH hospitals and clinics due to many factors, (absence of job description, lack of commitment with the work tasks like rising and moving the patients, daily changing the bed sheets, and dependence on the family members to serve the patients).

Eileen Mason and Stephanie Dukes, 2003 stated that in the survey of cyto-technologists in Washington more than 85% of respondents reported some musculoskeletal

discomfort, mainly headache, neck pain and stiffness, pain of the lower and upper back, and upper-extremity discomfort.

The research result shows that 16.8% from the study population has headache and neck ache, and 9.9% has stiffness in their muscles.

The result is low in comparison with the literature due to recall bias and absence of occupational registry for the employees.

Rick Alan 2005 mentioned in the study of National Institute for Occupational Health and Safety that eyestrain and other vision-related physical problems (blurred vision, headaches, back and neck pain) are more common among office workers than carpal tunnel syndrome.

American optometric Association 1998b, in their national survey, found that more than 14% of their patients present with eye or vision-related symptoms resulting from VDT work.

The research result shows that, the employees who complain from eye symptoms represent 26.4% of the study population, of them 11.5% their symptoms persist to the next day.

Medical interventions

JienSup Kim 2004 stated that employers who have implemented ergonomic programs have had great success in avoiding work-related musculoskeletal injuries.

Environmental and occupational risk management 2003 stated that in a report by the

Bureau of Labor Statistics, USA, "in nursing and personal care facilities with a well-thought-out ergonomics program in place, these injuries can be drastically reduced".

The research results show that, from the injured employees at work, only 37.3% have first aid at the work place, and specific treatment offered to the affected employees was 37.3%, while 25.5% has no measure at all, and only 9.6% received post injury rehabilitation.

The percentage of post injury measures is slight low to cover the expected injuries among the workers, and rehabilitation services to resume their work are very low. This means that the health system is poor of such specific services and must include OHS in its programs to enable decrease complication and fast return to work.

Safety regulations

Bill Wright, 2003 stated in OSHA report that they will consider a specific plan to reduce ergonomic injuries through established specific guidelines to reduce ergonomic-related injuries and would be developed for nursing homes.

J W Collins et al. 2004 stated that adoption of the "best practices" prevention program significantly reduced injuries for full time and part time nurses in all age groups.

Environmental and occupational risk management (EORM) 2003 stated that "with a well-thought-out ergonomics program in place, the big number of work ergonomical injuries can be drastically reduced".

The research results show that 57.4% of the study population has safety measures guidelines at work mostly displayed as instruction.

The research results show also that 93.1% of the study population knows their job hazards and 86.3% of them know how to avoid such hazards.

This show that the employees are aware of the hazards due to their self education, but the organization or the health system did not establish any specific guidelines for safe work, and we have to consider such national guidelines in our health system.

6.3 Conclusions of the study

The results in relation with the other studies and surveys in the other places show that there are disproportions in the employees' distribution number in different professions. Particularly, there is a shortage in nursing professions in relation to the physician and administrative. Other implication from the results shows that in spite of this shortage in nursing numbers, some of them are not working in the nursing services causing overload on the entire nurses and a reduction of services provided, these implication came upon the data from the study population and distribution and from the case finding after selection of the cases.

The relatively low prevalence of low back pain and other musculoskeletal symptoms among different working categories is due to many factors such as, the working system, absence of penalties and incentives, lack of knowledge about occupational diseases, religious factors (referring most of the complaints to the chances) and the strong national loyalty leads not to care of any hazards when serving military injured people (the most dominant during in the period of this study) this implication came from the present situation and special experience of the researcher during data collection.

There was no special consideration to the physical structure of the employees as final distribution in the work places.

The relation between the high-level management and the other levels is so weak as the performance analysis shows.

There are no follow up or monitoring to the safety instructions or regular check up for environmental parameters.

Absence of health registry (work accidents and diseases) in health care facilities.

Absence of occupational health services in the health care facilities.

6.4 Recommendations

The recommendations proposed according to the study findings in order to improve the general work conditions are:

- Utilization of health medical records for treatment and follow up of occupational diseases and accidents.
- Establishment of work environment monitoring and related follow up programs.
- Regular periodical examination for the workers according to law.
- Establishment of national guidelines for occupational safety and training.
- Implementation of continuous training and education programs to the workers for safety at work and safe use of devices and provide brochures and posters.
- Taking further steps to improve the diversity and the cultural competence of the health care workforce and upgrade their skills.
- Encouraging workers to identify and record occupational faults and hazards.
- Purchasing adjustable work furniture and devices to suite most of the workers.
- Training safety keepers to recognize, identify, and early interfere to prevent the work hazards.

- Encouraging further advanced researches.

6.5 Further research on the subjects

- Identify work hazards of the health care workers.
- Effect of proper training of the workers on the safety measure at work.
- Role of suitable work furniture in preventing ergonomical disorders.
- Suitability of employees distribution for different professions in healthcare facilities.
- Causes of psychosocial and stress factors among health care workers.
- Causes and differentiation of sick leaves among employees of MOH.
- Implementation of medical registry for health care workers and its use in evaluating work process.
- Further research to compare the result in different sittings.

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Annexes