



بسم الله الرحمن الرحيم

*University of Shandi*



*Faculty of Post Graduates and scientific research*

**Prevalence of Physical and Chemical  
Occupational Hazards among carpenters in  
Khartoum popular market's carpentry shops  
2018**

**A dissertation submitted for partial fulfillment for the requirement  
of M.Sc. Degree in community health nursing**

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# الآية

{ فَإِنْ آمَنُوا بِمِثْلِ مَا آمَنْتُمْ بِهِ فَقَدِ اهْتَدَوْا<sup>ط</sup> وَإِنْ تَوَلَّوْا  
فَإِنَّمَا هُمْ فِي شِقَاقٍ<sup>ط</sup> فَسَيَكْفِيكَهُمُ اللَّهُ<sup>ج</sup> وَهُوَ السَّمِيعُ الْعَلِيمُ }

صدق الله العظيم

البقرة الآية (137)

## DEDICATION

*This research is lovingly dedicated to my  
respective parents who have been my  
constant source of inspiration. Without  
their love and support this project would not  
have been made possible.*

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## Abbreviations

<b>Abbreviations</b>	<b>Meaning</b>
<b>DM</b>	Diabetes mellitus
<b>HTN</b>	Hypertension
<b>CVD</b>	Cardiovascular disease
<b>HIV/AIDS</b>	Human immune deficiency/Acquired immune deficiency
<b>NIOSH</b>	National Institute for Occupational Safety & Health
<b>MSDs</b>	Musculoskeletal disorders
<b>PPE</b>	Personal Protective Equipments
<b>OSHA</b>	Occupational health and safety

## Abstract

**Background:** Carpentry is a hazardous job in which carpenters face their own unique set of occupational hazards, used many dangerous tools, surrounding many safety and health hazards and they face an environment full of dust, clutter and many health risks.

**Aim:** The study aimed to identify physical and chemical occupation hazard among carpenters during the period from October-November 2018.

**Methods:** This descriptive cross –sectional community based study, done in popular market’s workshops. Thirty (30) carpenters enrolled in this study selected by a purposeful sampling technique, questionnaire, checklist, Peak expiratory flow meter and sphygmomanometer were used. The collected data analyzed using the statistical package for social sciences (SPSS) version 14 presented frequencies and percents in form of tables and figures.

**Result:** The study showed that 37% have no eye problems, while (14.8%) of them experienced redness, less than half (44.4%) of carpenters had no problems with their ears. All carpenters were not used goggles, earplugs and helmets while majority (90%) of them were not provided with needed PPE during the work, majority (80%, 73.3%) of them had a clutter environment, and do not store and labeled the chemical products in proper way, respectively.

**Conclusion:** The study concluded that carpenters had no eyes, respiratory, skin, ears and musculoskeletal problems, they experienced stress during work. It was clear that they had a poor working environment and lack of needed PPE the study recommended that they should have a heavily training in the importance of personal protective equipments (PPE).

## الدراسة ملخص

**مقدمة:** النجارة من المهن الخطيرة، يواجه فيها النجارون مجموعة فريدة من المخاطر المهنية الخاصة بهم ، ويستخدمون العديد من الأدوات الخطيرة ، ومحاطون بالعديد من المخاطر المتعلقة بالسلامة والصحة ، ويواجهون بيئة مليئة بالغبار، والفوضى، والعديد من المخاطر الصحية.

**الأهداف:** هدفت الدراسة إلى تحديد مخاطر المهن الفيزيائية والكيميائية بين النجارين خلال الفترة من أكتوبر- نوفمبر 2012.

**طريقة البحث:** هذه الدراسة الوصفية المجتمعية ، تمت في ورش النجارة بالسوق الشعبي. تم استخدام ثلاثين (30) نجاراً مسجلين في هذه الدراسة تم اختيارهم من خلال تقنية أخذ العينات الهادفة . استخدم الاستبيان ، قائمة المراجعة ، مقياس تدفق الزفير الذروي ومقياس ضغط الدم. البيانات التي تم جمعها وتحليلها باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS) الإصدار 14 عرض التكرارات والنسب المئوية في شكل جداول وأرقام.

**النتيجة:** أظهرت الدراسة أن 37% ليس لديهم مشاكل في العين، في حين أن (14.8%) منهم يعانون من احمرار ، أقل من نصفهم (44.4%) من النجارين لا يعانون من مشاكل في آذانهم. لم يستخدم جميع النجارين نظارات واقية وسدادات أذن وخوذات، في حين لم تزود أغلبية (90%) منها بمعدات الحماية الشخصية أثناء العمل، وكانت أغلبيتهم (80% ، 73.3%) لديهم بيئة فوضى، ولا تخزن وتسمى المنتجات الكيماوية بالطريقة الصحيحة ، على التوالي.

**الخلاصة:** وخلصت الدراسة إلى أن النجارين ليس لديهم مشاكل في الجهاز التنفسي ، الجلد ، العيون ، الأذنين و لا في العضلات والعظام ، كما انهم يعانون من التوتر أثناء العمل. كان من الواضح أن لديهم بيئة عمل سيئة ونقص في معدات الوقاية الشخصية كما أوصت الدراسة على تدريبهم على أهمية معدات الوقاية الشخصية (PPE).



## **1.1 Introduction:**

An occupational hazard is a hazard experienced in the workplace. There are many types of occupational hazards, including chemical hazards, biological hazards (biohazards), psychosocial hazards, and physical hazards. Men occupy a large majority of hazardous jobs and therefore they suffer 80% of occupational deaths. Throughout the world, there is growing acceptance that accidents and ill-health at work impact not only on the lives of individual workers, their families and their potential for future work, but also the productivity and profitability of their enterprises and ultimately the welfare of the society in which they live. <sup>(1)</sup>

Carpentry is a skilled trade in which the primary work performed is the cutting, shaping and installation of building materials they traditionally worked with natural wood and did the rougher work such as framing, but today many other materials are also used. <sup>(2)</sup> Carpentry requires training which involves both acquiring knowledge and physical practice. Training may be gained through non-union vocational programs such as high school shop classes and community colleges. Carpenters may work for an employer or be self-employed. In the United States, 98.5% of carpenters are male, and it was the fourth most male-dominated occupation in the country in 1999. <sup>(3)</sup>

Carpenters face their own unique set of occupational hazards which include Cancer risk from wood dust, exposure to loud noise from machinery and tools, chemicals, solvents and other materials, dermatitis, allergic reactions or respiratory problems. Also they have a risk of pain or injury from working in awkward positions, performing repetitive tasks, or lifting. Risk of entanglement of body parts into rotating parts or machinery, extreme temperatures when working outdoors, working at

heights, stress or extended work days and risk of eye injury from flying particles <sup>(4)</sup>.

In the United States the Occupational Safety and Health Administration tries to prevent illness, injury and fire through regulations. However, self-employed workers are not covered by the OSHA act. <sup>(5)</sup>

Occupational health nurses deliver health and safety programs and services to workers and community groups. They focus on promotion and restoration of health, prevention of illness and injury. Their main role is the Identification of workers and work place hazards; they monitor their health status by conducting research on the effects of workplace exposures and using the data to help prevent injury and illness. They are providing emergency care, treatment, follow-up, referrals, and rehabilitation for job-related injuries and illnesses. Also their responsibility is to counsel workers on issues ranging from substance abuse to family problems. <sup>(6)</sup>

### **1.2 Problem statement:**

The Chief of the International Labour Organization Health and Safety programme, pointed out that the workplace hecatomb of 1.1 million deaths exceeds the average annual deaths from road accidents, war, violence and HIV/AIDS. Approximately one-quarter of those deaths result from exposure to hazardous substances which cause such disabling illnesses as cancer and cardiovascular, respiratory and nervous-system disorders. He warned that work-related diseases are expected to double by the year 2020. <sup>(7)</sup>

### **1.3 Justification:**

Carpentry is a hazardous job in which workers used many dangerous tools surrounding many safety and health hazards. There are no studies in Sudan in this field, also there are no regulations to follow the carpenters health and safety. The International Labour Organization report estimated that 2 million occupational fatalities occur across the world every year. The overall annual rate of occupational accidents, fatal and non-fatal, is estimated at 270 million .Some 160 million workers suffer from work-related diseases and about two-thirds of those are away from work for four working days or longer as a result. <sup>(8)</sup>

### **1.3 Research objectives:**

#### **1.3.1 General objectives:**

To study the occupational hazards among carpenter's workshops

#### **1.3.2 Specific objectives:**

To identify the hazards that carpenters are exposed to at work.

To determine the health related hazards

To identify safety related hazards to prevent the environmental hazards

To investigate risk factors associated with carpenters health problems.

## **Literature review**

### **2.1 Physical hazards**

Physical hazards are a subtype of occupational hazards that involve environmental hazards that can cause harm with or without contact. Physical hazards include noise hazards, ergonomic hazards, radiation, heat and cold stress, and vibration hazards. <sup>(9)</sup>

#### **2.1.1 Noise:**

Noise is any unwarranted disturbance within a useful frequency band; the World Health Organization estimated that about 250 million workers around the globe are exposed to potentially hazardous noise levels. <sup>(10)</sup> Globally, about 600 million workers are exposed to occupational noise <sup>(11)</sup> Occupational hearing loss is the most common occupational illness in the manufacturing sector <sup>(12)</sup>

#### **2.1.2 Noise and hypertension:**

Hypertension (HTN) or high blood pressure is a prolonged medical status where the blood pressure in the arteries is raised persistently. <sup>(13)</sup>

HTN is comparatively prevailing and acknowledged as one of the common health risk among workers exposed in loud noise. <sup>(14)</sup> There are two probable biological mechanisms for relationship between noise and high blood pressure; it can either because of release of stress hormones like steroids or by stimulation of sympathetic nervous system with release of adrenaline hormones. The pathophysiology of the noise to induce hypertension is hypothesized as involvement of dysfunctional stress mechanism. The auditory system which is also related to sympathetic nervous system and neuroendocrine system reacts to the sound stimulus through reflexes which are evidenced by cardiovascular effects such as alteration in catecholamine, epinephrine and non-epinephrine,

corticosteroids levels. The continuous exposure and repetition to the noise can be pathogenic, leading to persistent ascending of vascular auto regulation resulting to hypertension. <sup>(15)</sup> A study has showed that the levels of stress hormones like catecholamine and cortisol are higher in the exposure group than the non-exposure group. <sup>(16)</sup> A case–control study conducted in Hangzhou showed that there was a high risk of hypertension in the exposed group than in non-exposed group of study. <sup>(17)</sup> A research done in a Taiwan in an aircraft manufacturing plant showed that among 790 workers 141 were classified as hypertensive and 56 were further more diagnosed with hypertension in 10 years of study <sup>(18)</sup> A study conducted in a coal company in Nanjing with 738 participants showed the prevalence of hypertension in 29.2% of the workers who were exposed to the occupational noise. <sup>(19)</sup>

**Table (1): The table below explain the classification of blood pressure for adults** <sup>(20) (21) (22) (23):</sup>

Category	Systolic mmHg	Diastolic mmHg
Normal	< 90	< 60
Pre-hypertension	120–129	60–79
	130–139	90–99
Stage 1 hypertension	140–159	90–99
	130–139	80–89
Stage 2 hypertension	160–179	100–109
	>140	>90
Hypertensive urgency	≥ 180	≥ 110

### 2.1.3 Ergonomics:

Some of the important occupational risk factors, such as awkward posture, repetition, excessive force, hand-arm vibration leading to increase in disorders and injuries of different body parts as discussed follows:

**2.1.3.1Awkward posture:** Awkward posture may refer to significant deviation, such as static positioning, constrained body posture, etc. from the neutral body posture may be considered as an important risk factor. <sup>(24)</sup>

<sup>(25)</sup> Kneeling, Squatting, Flexion of trunk, twisted and bent trunk, twisted and bent neck, extension and flexion of neck are few awkward postures being associated with injuries and MSDs. Forward bending with lumbar flexion, pelvic tilting and restricted hip flexion may also increase tensile loads on the spine with the gradual development of low back pain. <sup>(26) (27)(28)</sup>

### **2.1.5Repetition:**

A repetitive activity involves similar motion patterns for more than 50% of the work cycles. Cyclical work activities, repeated tasks that involve frequent and prolonged movement of body parts and joints such as wrist extension, ulnar deviation of wrist, etc. may be referred to as repetition .Metal workers who perform repetitive and forceful wrist movements may have musculoskeletal and neurological problems because of nerve entrapment in the carpal tunnel. <sup>(29)</sup>

### **2.1.6Excessive Force:**

When there are forceful exertions, impact and impulsive loadings, the load exceeds the musculoskeletal strength at various joints and segments of the human body causing fatigue and injury .Overexertion combined with lifting, bending and repetition has been identified as one of the risk factor which reduces muscular force for carrying out the task and affects motor control and impairs accuracy of the movement. <sup>(30)</sup>

## **2.2Chemical Hazards**

Carpenters are the most workers who exposed to hazardous chemicals. Some glues, resins and isocyanate based paints and varnishes have caused occupational asthma. Some solvents can cause respiratory irritation and skin sensitization (e.g. dermatitis). Chemicals used in the woodworking

industry must be labeled. The label must contain basic information about the product and the hazards. Most of the chemicals in or applied to wood or wood products may enter the body through breathing (such as adhesives, paint strippers, paints, varnishes, stains and water-based wood preservatives which can be inhaled either as droplets or fumes. ), swallowing or skin contact. Prolonged or repeated skin exposure can cause dryness, cracking and dermatitis. <sup>(31)</sup>

### **2.2.1 Wood dust and Respiratory Problems:**

Previous studies of occupational wood dust exposures have reported negative health effects such as decline of pulmonary function, alveolitis allergy, asthma, chronic bronchitis, rhinitis, mucous membrane irritation, contact dermatitis and nasal cancer. <sup>(32)</sup>

Many industrial activities are associated with some kind of occupational hazard that can cause injury in an insidious manner. The adverse effects of exposure to wood dust include nasal carcinoma, allergic and irritant cutaneous and respiratory reactions, and chronic respiratory impairment. <sup>(33)</sup>

A higher prevalence of respiratory impairment was found in exposed wood workers in sawmills <sup>(34)</sup> among the sawmill workers a high percentage of workers (28.4%) suffered from lung restriction resulting from inhalation of wood dust produced during the cutting of soft woods on sawing machines.

Several studies have shown respiratory disorders in carpenters, including the reduction of pulmonary function tests in these workers. <sup>(35)</sup> Carpenters have been shown to be susceptible to developing asthma related to their work. <sup>(36)</sup> Pulmonary function is also decreased in people exposed to wood dust. <sup>(37)</sup>

Asthma is aggravated in carpenters with more than 6.5 years of work. <sup>(38)</sup> Although the prevalence of asthma has been studied extensively among carpenters, restrictive lung diseases and allergic symptoms have been poorly addressed among workers in this occupation. <sup>(39)</sup>

Asthma can be measured by Peak expiratory flow in which readings are often classified into 3 zones of measurement according to the American Lung Association; green, yellow, and red. <sup>(40)</sup>

**Table (2): The table below explains the result of lung function test by peak expiratory flow:**

Zone	Readings	Description
<b>Green zone</b>	100-80 percent	A peak flow reading in the green zone indicates that the asthma is under good control.
<b>Yellow zones</b>	79-50	Indicates caution. It may mean respiratory airways are narrowing and additional medication may be required
<b>Red zones</b>	Less than 50	Indicates a medical emergency. Severe airway narrowing may be occurring and immediate action needs to be taken. This would usually involve contacting a doctor or hospital.

### **2.3 Personal Protective Equipment (PPE):**

The purpose of personal protective equipment is to reduce workers exposure to occupational hazards. PPE is needed when there are hazards present. PPE has the serious limitation that it does not eliminate the hazard at the source and may result in worker being exposed to the hazard if the equipment fails. <sup>(41)</sup>

#### **2.3.1 Respirators**

Respirators serve to protect the worker from breathing in contaminants in the air, thus preserving the health of one's respiratory tract. Respirator functions by filtering out chemicals and gases, or airborne particles, from

the air breathed by the user and filtration may be either passive or active (powered). Masks and particulate respirators are examples of this type of respirator. <sup>(42)</sup>

### **2.3.2 Skin protection**

Occupational skin diseases such as contact dermatitis, skin cancers, and other skin injuries and infections are the second-most common type of occupational disease and can be very costly, skin hazards, which lead to occupational skin disease, can be classified into four groups as chemical agents can come into contact with the skin through direct contact with contaminated surfaces, deposition of aerosols, immersion or splashes, physical agents such as extreme temperatures and ultraviolet or solar radiation can be damaging to the skin over prolonged exposure, mechanical trauma occurs in the form of friction, pressure, abrasions, lacerations and contusions and lastly biological agents such as parasites, microorganisms, plants and animals can have varied effects when exposed to the skin. Any form of PPE that acts as a barrier between the skin and the agent of exposure can be considered skin protection. Because much work is done with the hands, gloves are an essential item in providing skin protection. Some examples of gloves commonly used as PPE include rubber gloves, cut-resistant gloves, chainsaw gloves and heat-resistant gloves. <sup>(43)</sup>

### **2.3.3 Eye protection**

Each day, about 2000 US workers have a job-related eye injury that requires medical attention. Eye injuries can happen through a variety of means. Most eye injuries occur when solid particles such as wood chips, sand get into the eye. <sup>(44)</sup>Safety glasses provide protection from external debris, and should provide side protection via a wrap-around design or side shields also Goggles provide better protection than safety glasses, and are

effective in preventing eye injury from chemical splashes, impact, dusty environments and welding. Face shields provide additional protection and are worn over the standard eyewear; they also provide protection from impact and chemical hazards. <sup>(45)</sup>

### **2.3.4Hearing protection**

Noise is often overlooked as an occupational hazard, as it is not visible to the eye. Overall, about 22 million workers in the United States are exposed to potentially damaging noise levels each year. Occupational hearing loss accounted for 14% of all occupational illnesses in 2007, with about 23,000 cases significant enough to cause permanent hearing impairment. About 82% of occupational hearing loss cases occurred to workers in the manufacturing sector. <sup>(46)</sup> NIOSH recommends that worker exposures to noise be reduced to a level equivalent to 85 dBA for eight hours to reduce occupational noise-induced hearing loss, PPE for hearing protection consists of earplugs and earmuffs. Workers who are regularly exposed to noise levels above the NIOSH recommendation should be furnished hearing protection by the employers, as they are a low-cost intervention. <sup>(47)</sup>

### **2.3.5Previous studies:**

According to cross sectional study done in Khartoum State, Sudan aimed to explore causes, factors, and out-comes of the occupational accidents during 2005-2007 in various industrial sectors of Khartoum State. The data were collected by reviewing accident records of both enterprises and Administration of Industrial Safety and by direct interviewing the injured workers using pre-designed questionnaires. The study represent the unsafe workplace conditions included "inadequate guard,""unguarded hazard,""defective safety device,""defective or lack of tool or

equipment," "hazardous workstation layout," "unsafe ventilation or lighting," "lack of personal protective equipment (PPE) and unsafe clothing," and "lack of or insufficient training. The maximum percentage of accidents was associated with "defective or lack of appropriate equipment/tools" (58.6%). Accidents related to "lack of needed PPE" recorded the highest percentage in plastic industries (68%). Clearly, accidents associated with the "use of defective equipment," and "failure to use the available equipment/tool" recorded the highest percentage in oils and soap sector (80%). The accidents associated with workers' attitude as an unsafe personal factor recorded the highest percentage in "iron and steel," and plastic industries (100% for each). (Occupational Safety of Different Industrial Sectors in Khartoum State, Sudan Part 2: Analysis of Occupational. There is lack of adequate training for workers in occupational safety and health, poor intervention in working environment and absence of an effective system for recording injuries and accidents. The caught in or between things represented the highest accident incidence rate. The machines were the major cause of accidents in Omdurman locality. Hazardous materials were the key cause of burns from a chemical source, illness and death (100%, 50% and 28.6%, respectively). The environmental conditions, as one of the chief factors mentioned by injured workers, such as defective lighting and heat were the major cause of sprain and stress (30.3%).<sup>(48)</sup>

Study done in India to analyze different types of occupational risk factors, such as awkward posture, repetitive movements and others associated with Manual material handling (MMH) activities to assess their impact on musculoskeletal disorders. Data were collected from six strata of workers viz., masons, mason helpers, carpenters, welders, gas cutters and ground-level helpers (259 workers) from a construction site of a steel plant located in India. Pain in wrists, elbows and shoulders are found to very common

for carpenters due to the use of hand tools, excessive stress (64% of the carpenters), climate and environment and physical tiredness or stress (94% of the carpenters) which are found to be highly significant. <sup>(49)</sup>

Study done in Armenia (Colombia), to explore health and working conditions in 10 carpenter's workshops, the study was conducted by describing through an observational method, 177 workers participated in the study selected as a convince sampling method . Their average age was 31 yr, the youngest 19 and the oldest 51, with a standard deviation of 10.1 year. 71% were exposed to noise that exceeds 85 dBA, and 50% were exposed to gaseous chemicals (vapours) from paints and solvents. About 29% of workers were exposed to muscular overloads because they must load and unload sections of wood and furniture manually (exceeding 50 kg). 62.5% of workers were in their first year of work. 20% of those tested smoked, 45.0% of the workers related to practice some sort of sporting activity at least once a week. 40.4% suffering from burning, irritation or redness in the eyes. Workers suffering from 17.4% nasal congestion, coughing fit 14.6%, hoarseness, 14.6%; throat discomfort, 28.6%, feeling tightness in the chest: 11.8%, and shortness of breath 21.9%,. In skin problems skin allergies were 15.7%, without any discrimination at this point whether the health event has been originated in the company or outside and the dryness in the skin were 26.4%. Accidents were reported by 27.5% and

50% of the workshops visited do not fulfill the lighting levels recommended for woodworking. <sup>(50)</sup>

A detailed descriptive study done in Zimbabwe aimed to assess the exposures and perceived risks (occupational, lifestyle and psychological factors) of workers in the wood processing industries in Mutare, Zimbabwe. 340 workers were included in the study by Random sampling technique. Use of personal protective equipment was poor and

inappropriate in the wood processing industries. All workers apart from management and medical staff acknowledged receiving a pair of security shoes/ boots and two overalls every year. All the workers are highly exposed to at least one hazard. Half of the workers also declared at least one health complaint. Skin burn, red eyes, headache and chest/throat pains were reported by more than 74% of the workers. The clinical registers indicated that the main four health problems were backaches (68%) ophthalmic problems (49%), nasal irritations (46%) and chest and throat problems (34%). In addition to the usual wood processing risks such as wood dust, noise and heat, workers reported exposure heavy lifting and pulling movements (71%), flying and falling objects (53%), awkward positions (56%), sharp metals and objects (77%), slips and trips (33%), night shift (92%), meeting production quotas (27%) and stress (23%). Use of personal protective equipment was poor and inappropriate in the wood processing industries. <sup>(51)</sup>

## METHDOLOGY

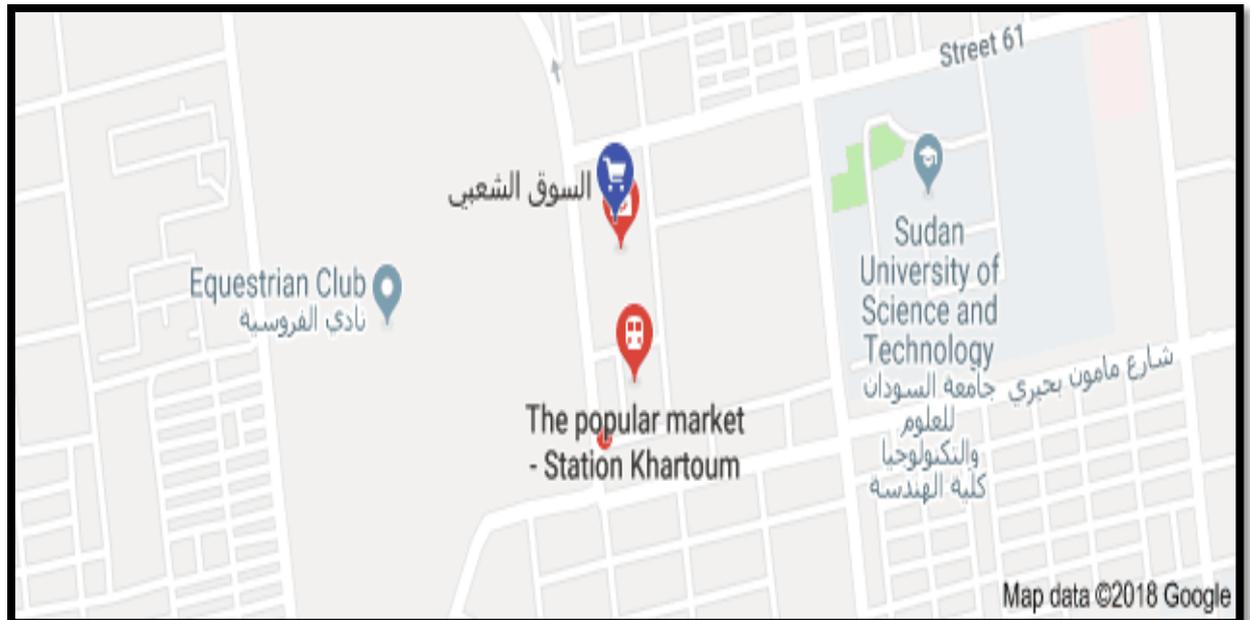
### 3.1 Study design:

This is a descriptive cross-sectional community based study to assess the physical and chemical occupational hazards among workers at woodworking shops

### 3.2 Study area:

The study is conducted in Popular Market. It's located in the southern part of Khartoum and it's a famous station equipped many buses that carry people to different sites of Khartoum. Also the market is packed with shops specialized in the sale of various goods such as electrical equipment, Utensils, devices, stock, accessories dining rooms and kitchen. The market have many shops for Sewing clothes, curtains and formal uniforms, and also shops for woodworking and creating wood furniture such as chairs, cupboards, beds, windows, doors and office's furniture. This market is a destination for middle families in Sudan.

(Attached map).



### 3.3 Study duration:

The study will be conducted during the period from October to November 2018.

### 3.4 Study population:

The study will include the carpenters in Popular Market workshops during the study period.

### **3.4 Sampling:**

#### **3.4.1 Sample size & Sampling technique:**

The study include thirty (30) carpenters which selected by non probability sampling. Purposeful sampling technique was used during the study period.

#### **3.5 Data collection tools & technique:**

##### **3.5.1 Data collected by using:**

1. Questionnaire: A modified version of British Medical Research Council's Committee questionnaire was used to identify the respiratory symptoms (cough, phlegm, breathlessness, wheezing, and nasal symptoms). The questionnaire was self administered by participants and translated into Arabic language to be suitable for them. It composed of 22 questions, 1- 6 demographical data, 7 – 17 physical hazards questions and 18 – 22 chemical hazards questions. <sup>(52)</sup>
2. Observational checklist was used to identify the work condition environment and the safety measures (PPE) used by participants.

##### **3.5.2 Materials used:**

1. Sphygmomanometer used to measure blood pressure (BP) for participants
2. Peak expiratory flow meter device used to measure the level of lung function.

#### **3.8 Data analysis:**

Data coded and analyzed using the statistical package for social sciences (SPSS) version 14, the result presented in form of frequencies and percentages in tables and figures.

#### **3.10 Ethical considerations:**

- Approval from University of Shandi – Faculty of Post Graduates
- Permission from Alshabi Market workshops

The purpose of study was explained.

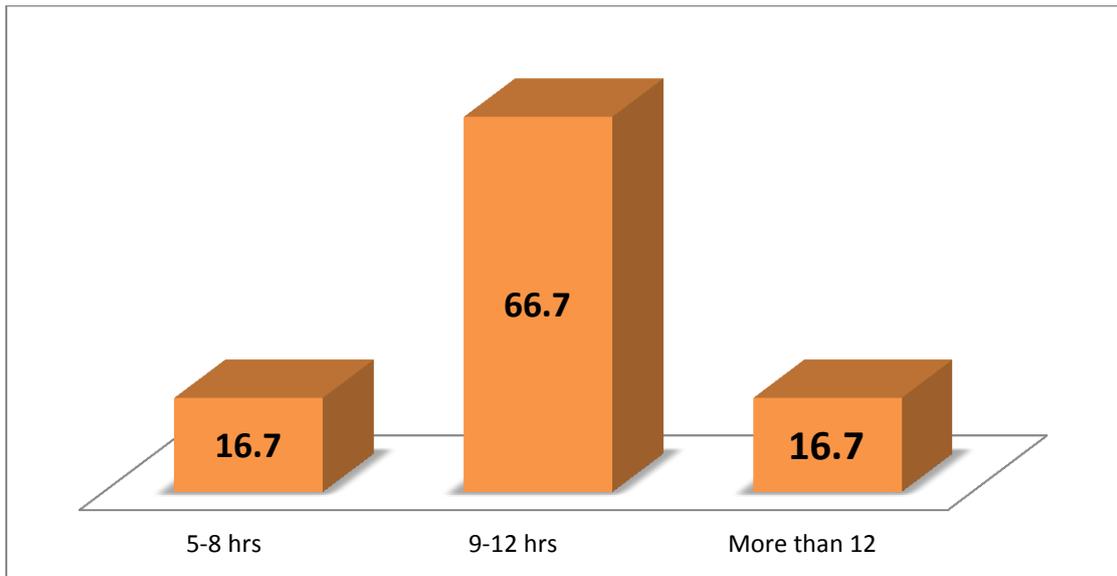
- Verbal consent obtained from each participant. Confidentiality was assured

## Result

**Table (3): Demographical data of carpenters:**

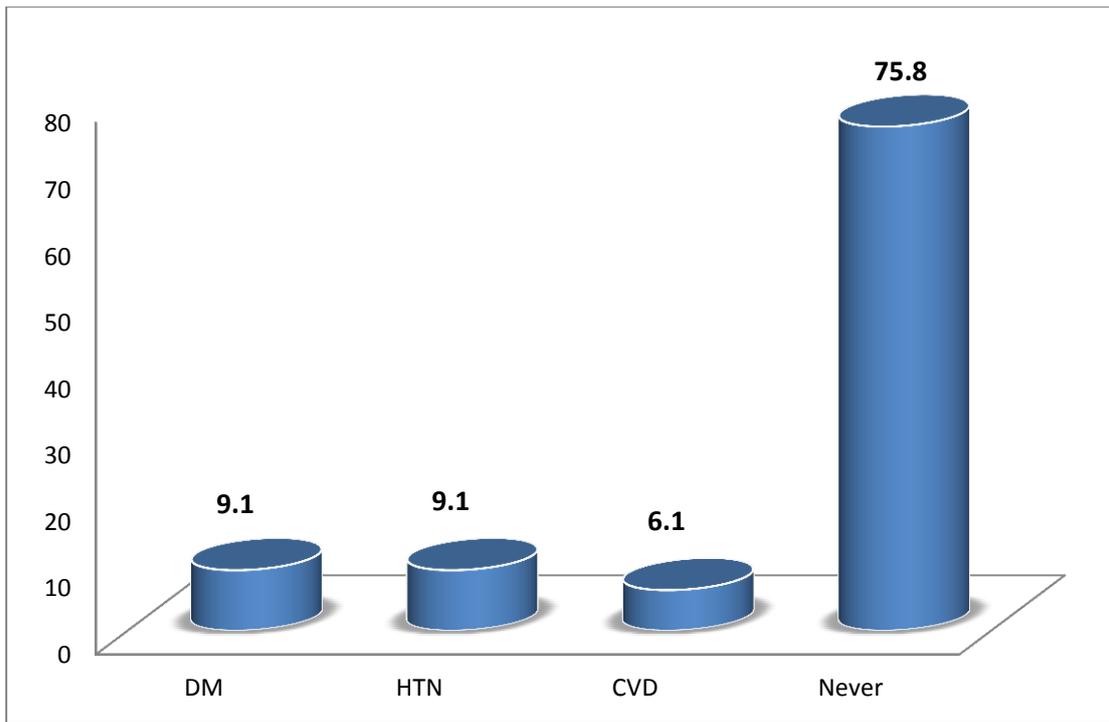
<b>Age</b>		
	<b>Frequency</b>	<b>Percent</b>
<b>15 - 30 years</b>	<b>7</b>	<b>23.3%</b>
<b>31 - 46 years</b>	<b>10</b>	<b>43.3%</b>
<b>47 - 61 years</b>	<b>13</b>	<b>33.3%</b>
<b>Marital status</b>		
<b>Single</b>	<b>9</b>	<b>30%</b>
<b>Married</b>	<b>18</b>	<b>60%</b>
<b>Divorced</b>	<b>2</b>	<b>6.7%</b>
<b>Widowed</b>	<b>1</b>	<b>3.3%</b>
<b>Education levels</b>		
<b>Illiterate</b>	<b>3</b>	<b>10.0%</b>
<b>Primary school</b>	<b>13</b>	<b>43.3%</b>
<b>Secondary school</b>	<b>8</b>	<b>26.7%</b>
<b>Occupational certificate</b>	<b>3</b>	<b>10.0%</b>
<b>Diploma</b>	<b>2</b>	<b>6.7%</b>
<b>B.sc</b>	<b>1</b>	<b>3.3%</b>
<b>Experience</b>		
<b>Less than 1 year</b>	<b>8</b>	<b>26.7%</b>
<b>1-5 years</b>	<b>9</b>	<b>30.0%</b>
<b>6-10 years</b>	<b>8</b>	<b>26.7%</b>
<b>More than 10 years</b>	<b>5</b>	<b>16.7%</b>

The table above show that the demographical data of carpenters, in which 43.3%, between 31-46 years age, more than half (60%) were married. While less than half (43.3%) of carpenters were primary school education level. On the other hand 30% of them have 1-5 years of experience, and the same percent (26.7%) of them had less than 1 year and 6-10 years



**Fig. (I): Working hours/shift among the carpenters**

The figure above show that the two third (66.7%) of carpenters working from 9-12 hours per shift.



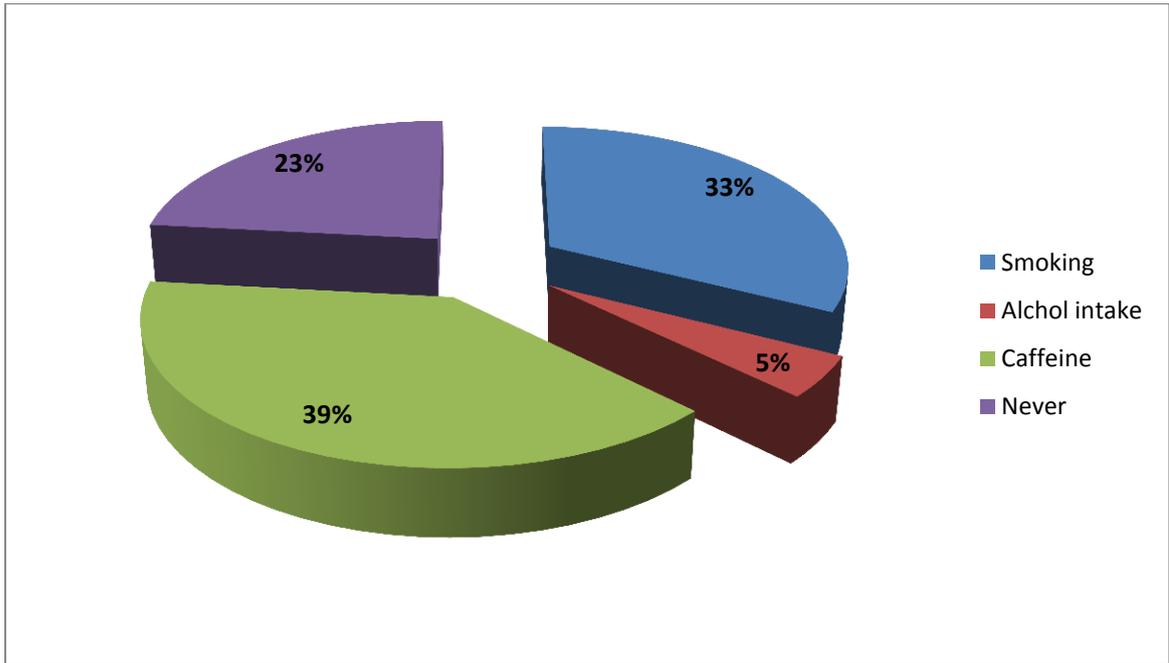
**Fig: (II) History of chronic diseases**

The figure above shows that the majority (75.8%) of carpenters have no history of chronic diseases.

**Table (4): Family history and Measurements of hypertension:**

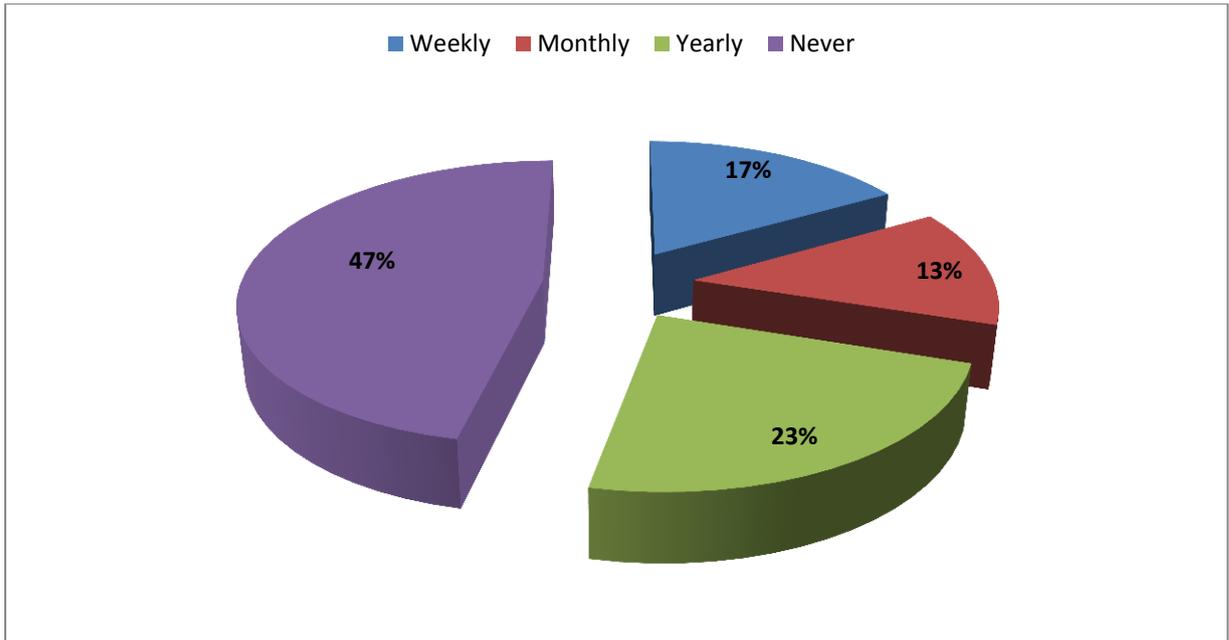
<b>History of hypertension</b>		
	<b>Frequency</b>	<b>Percent</b>
Yes	13	43.3%
No	17	56.7%
<b>Measurements of Hypertension</b>		
Normal	16	53.3%
Pre-hypertension	11	36.7%
Stage (1) hypertension	2	6.7%
Stage (2) hypertension	0	0.0%
Hypertensive urgency	1	3.3%

The table above explain that more than half (56.7%) of carpenters had no family history of hypertension. Whoever more than half (53.3%) had a normal blood pressure.



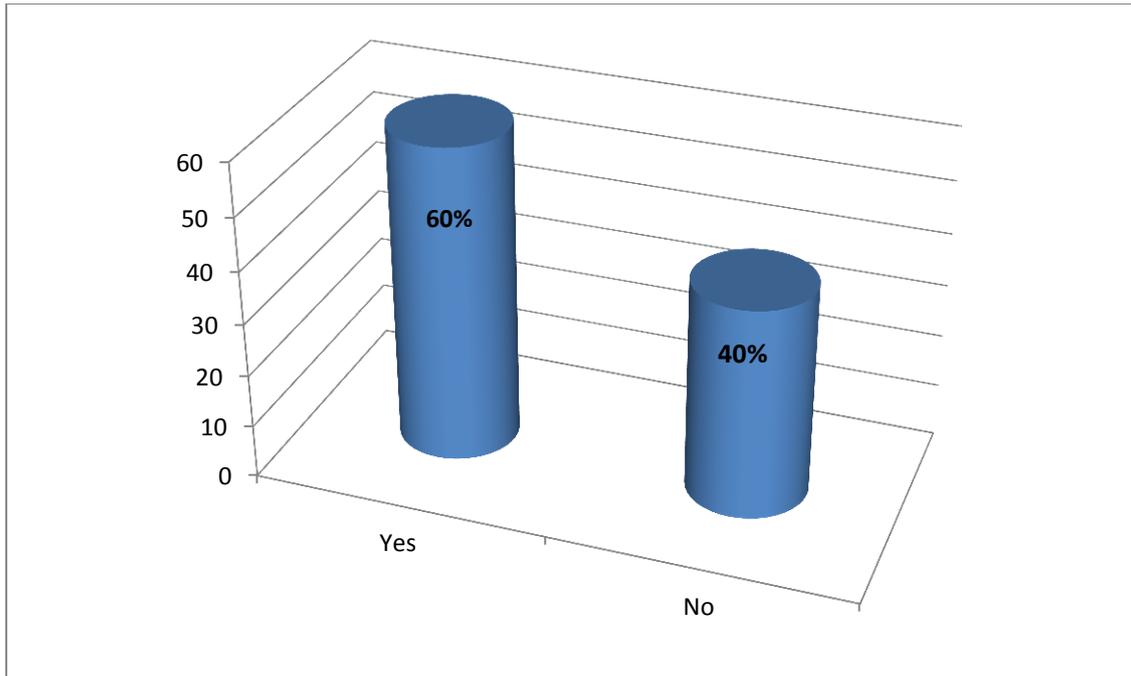
**Fig.: (III) Habits among carpenters**

The figure above show that more than third (39%) of carpenters has caffeine intake habit.



**Fig. : (IV) Periodic physical exercises among carpenters**

The figure above clarify that t less than half (47%) never have a periodic physical exercises.



**Fig.: (V) Suffering from noise and unpleasant sounds among carpenters**

The figure above show that more than half (60%) of carpenters were suffering from noise and unpleasant sounds

**Table (5): Stress and causes of stress during work**

<b>Stress during work</b>		
	<b>Frequency</b>	<b>Percent</b>
Yes	16	53.3%
No	14	46.7%
<b>Causes of stress during work</b>		
Work overload	15	20.0%
Prolonged shift	15	20.0%
Extreme Heat	17	22.7%
Environment hazards	8	10.7%
Dangerous tools	20	26.7%

The table above explain that more than half (53.3%) of them experienced stress during work, 26.7% of them mentioned that the causes of stress were dangerous tools and the same percent (20%) work overload and extreme heat.

**Table (6): Health problems related to physical hazards and the etiology of Musculoskeletal.**

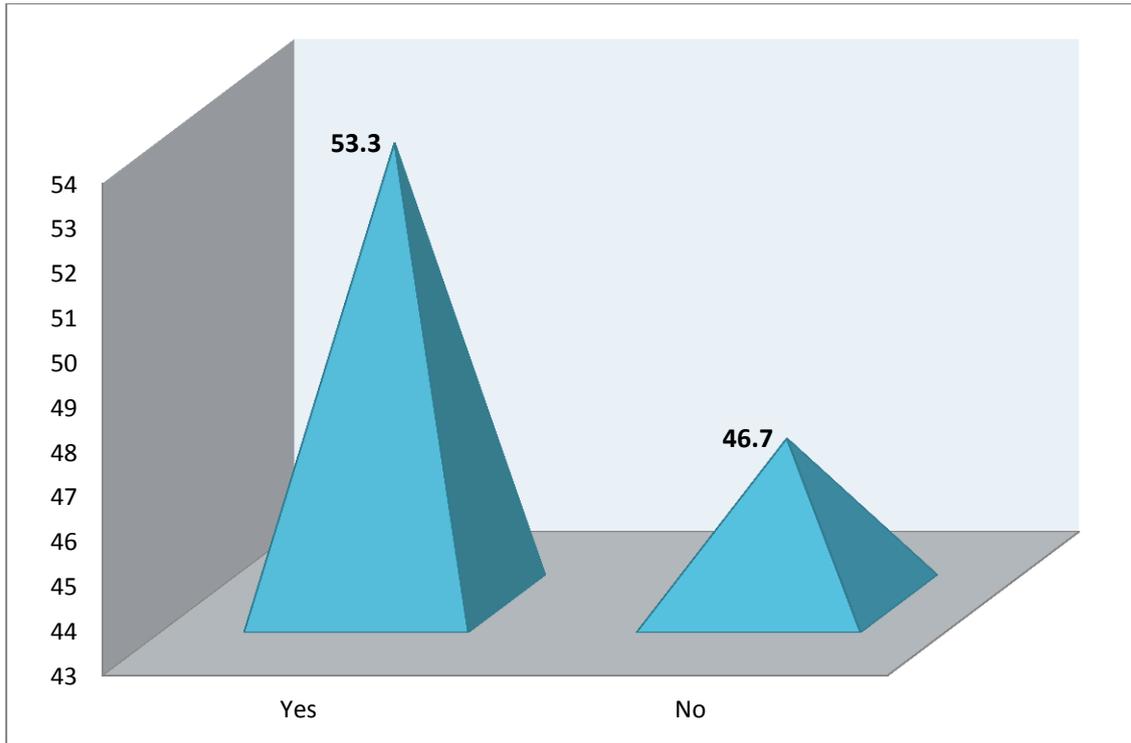
<b>Ear problems</b>		
	<b>Frequency</b>	<b>Percent</b>
Hearing loss	1	2.8%
Discharge	12	33.3%
Tinnitus	7	19.4%
Never	16	44.4%
<b>Musculoskeletal problems</b>		
Backache	12	20.3%
Wrist pain	10	16.9%
Shoulders pain	12	20.3%
Elbow pain	11	18.6%
Never	14	23.7%
<b>Risk factors of musculoskeletal problems</b>		
Hand tool	10	27%
Prolonged sitting and standing	15	40.5%
Excessive stress	12	32.4%

The table above shows that less than half (44.4%) of carpenters had no problems with their ears. While 23.7% had no musculoskeletal problems, same percent (20.3%) had mentioned backache and shoulder pain. On other hand two fifth (40%) of them mentioned prolonged sitting and standing as the cause of musculoskeletal problems.

**Table (7): History and causes of accident among carpenters during work**

<b>History of accidents</b>		
	<b>Frequency</b>	<b>Percent</b>
Cuts	11	23.9%
Abrasions	9	19.6%
Lacerations	11	23.9%
Never	15	32.6%
<b>Causes of accidents</b>		
Defective lightening	21	19.8%
Heat	16	15.1%
Exhaustation	18	17%
Insufficient training	20	18.9%
Lack of needed PPE	19	17.9%
Defective tools	12	11.3%

The table above explains that 32.6% of carpenters had no history of accidents. While same percent 23.9% of them were experienced cuts and lacerations. Only 19.8% of accidents caused by defective lightening



**Fig.: (VI) History of respiratory diseases**

The figure above show that more than half (53.3%) of carpenters had a history of respiratory diseases

**Table (8): Health problems related to chemical hazards**

<b>Eyes problems</b>		
	<b>Frequency</b>	<b>Percent</b>
Redness	8	14.8%
Discharge	7	13%
Burning	7	13%
Blurred vision	6	11.1%
Irritation	6	11.1%
Never	20	37%
<b>Respiratory problems</b>		
Nasal congestion	7	10.8%
Phlegm	8	12.3%
Chest wheezing	7	10.8%
Cough	9	13.8%
Shortness of breathing	8	12.3%
Sore throat	6	9.2%
Never	20	30.8%
<b>Skin problems</b>		
Allergies	9	24.3%
Dryness	13	35.1%
Never	15	40.5%

The table above explain that 37% have no eye problems, while (14.8%) of them experienced redness. Concerning the respiratory problems (30.8%) had no respiratory problems, while 13.8% had experienced cough. On other hand two fifth (40.5%) have no skin problems, 35.1% experienced.

**Table (9): Work environment conditions**

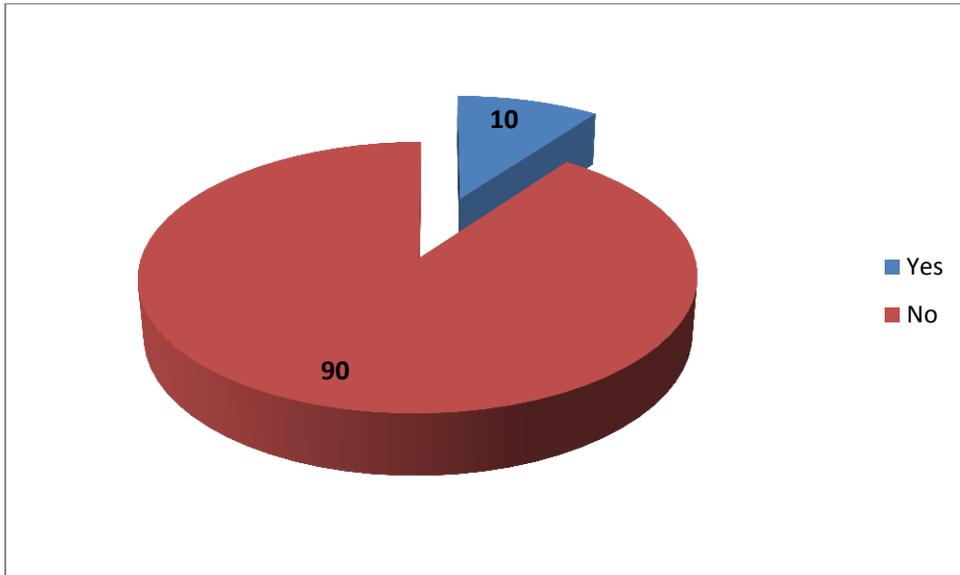
Items	Available		Not available	
	Frequency	Percent	Frequency	Percent
Enough lightening	19	63.3%	11	36.7%
Well Ventilated / windows/fans	16	53.3%	14	46.7%
Clutter	24	80.0%	6	20.0%
Chemicals product stored well and labeled	8	26.7%	22	73.3%

The table above show that majority (80%, 73.3%) of carpenters had a clutter environment and do not store and labeled the chemical products in proper way, respectively.

**Table (10): Uses of personal protective equipments during work**

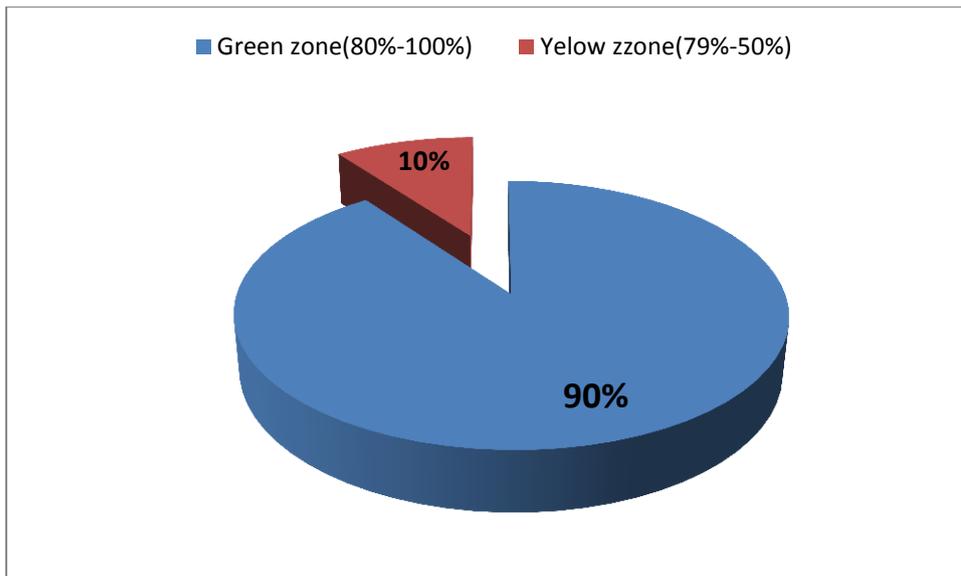
Items	Available		Not available	
	Frequency	Percent	Frequency	Percent
Glove	1	3.3%	29	96.7%
Security shoe/boot	13	43.3%	17	56.7%
Goggle/ Protective face shields	0	00.0%	30	100%
Nose/mouth mask	11	36.67%	19	63.3%
Earplug	0	00.0%	30	100%
Helmet	0	00.0%	30	100%

The table above show that all carpenters were not using goggles, earplug and helmet. The majority of them (96.7%) were not using gloves during the work.



**Fig.: (VII) Provision with Personal protective equipments during work**

The figure above shows that majority (90%) of carpenters were not provided with needed PPE for protection during work.



**Fig : (VII) Measurements of lung function test**

The figure above shows that majority (90%) of carpenters had a normal level of lung function test

**Table (11): Crosstab stress during work \* number of working hours/shift**

Number of working hours/shift	Stress during work		
	Yes	No	P. value
5 – 8 hours	4	1	.159
9 – 12 hours	11	9	
More than 12 hours	1	4	

The table above explain the chi-square and correlation between stress during work & number of working hours, which show there is no relation between them.

**Table (12): Crosstab stress during work \* number of working hours/shift**

Experience	Wrist pain		
	Yes	No	P. value
Less than 1 year	6	2	0.19
1 – 5 years	1	8	
6 – 10 years	1	7	
More than 10 years	2	3	

The table above explain the chi-square and correlation between experience & wrist pain, which show there is no significant statistical relationship in (P.value = 0.19).

## Discussion

Thirty (30) carpenters included in the study, the mean of their age 31- 46 years, 43.3%, more than half (60%) were married, less than half (43.3%) of carpenters were primary school education level, while 30% of them have 1-5 years of experience, and the same percent (26.7%) for less than 1 year and 6-10 years of experience.

Fortunately the findings from this study showed that majority (90%) of carpenters with the normal level of pulmonary function test. While a positive family history of respiratory diseases were (53.3%).this findings were inconstant with several studies which shown a respiratory disorders in carpenters, include the reduction of pulmonary function tests in the workers <sup>(35)</sup>. A higher prevalence of respiratory impairment was found in exposed wood workers in sawmills. While (28.4%) suffered from lung restriction resulting from inhalation of wood dust produced during the cutting of soft woods on sawing machines. <sup>(34)</sup>

In compare to study conducted in a coal company in Nanjing (China) with 738 participants showed the prevalence of hypertension in 29.2% of the workers who were exposed to the occupational noise <sup>(19)</sup>, fortunately it's not compatible with the current study more than half (53.3%) of workers had a normal blood pressure in the other hand more than third (36.7%) of them have a risk to develop hypertension may be due to positive family history (43.3%).

Concerning the stress the current study revealed that more than half (53.3%) of carpenters experienced stress during work, and no significant statistic relation with stress during work and number of working hours per shift (p.value = .159). The possible explanation for this could be due to

dangerous tools, work overload and prolonged shift (26.7%, 20%) respectively.

The collective evidence for this study clarify that carpenters have no eye, respiratory and skin problems.13% mentioned discharge and burning as eye problems. This finding supported by study done in Armenia (Colombia), showed that (40.4%) suffering from burning, irritation or redness in the eyes. <sup>(49)</sup> Moreover regarding respiratory problems 13.8% of them were mentioned coughing. Also 24.3% of carpenters mentioned skin allergies and 35.1% suffering from skin dryness .This finding also supported with the study mentioned earlier skin allergies were 15.7%, and 26.4%. Skin dryness. Mean while carpenters had no problems in their ears and musculoskeletal problems, and no significant statistic relation with stress during work and wrist pain (p.value = 0.19).

In the current study all the carpenters not used goggles, earplugs and helmets while majority (90%) of them were not provided with needed PPE during the work. This strongly agreed with study done by Steven Jerie in wood processing industries of the Eastern Highlands of Zimbabwe, showed that the use of personal protective equipment was poor and inappropriate in the wood processing industries. The vast majority of carpenters (96.7%) were not using gloves during the work. The reasons could be due to the absent of responsible body or program for provision of PPE in

Concerning the work environment the study showed that majority (80%, 73.3%) of carpenters had a clutter environment, and do not store and labeled the chemical products in proper way, respectively. 32.6% of carpenters had no history of accidents. While 19.8% of their accidents caused by defective lightening. The literature stressed in the importance of

labeling chemicals products and the labels must contain basic information about the product and its hazards <sup>(31)</sup>.

## **Conclusion**

The findings from this study conclude that the carpenters had no eyes, respiratory, skin, ears and musculoskeletal problems, their BP and lung function test were normal. More than half of carpenters experienced stress during work. It was clear that they had a poor working environment and lack of needed PPE.

## **Recommendations**

Coordination between Ministries of Health, Environment, Labor, Industry and the relevant carpentry workshops needs to assess the personnel and environment needs.

Encourage Periodic medical examinations for all workers and workshops about occupational health and safety.

Carpenters should have a heavily training in the importance of personal protective equipments (PPE).

Further studies should be conducted about the occupational hazards and its effects on carpenters.

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**University of Shandi**  
**Faculty of Post Graduates**

**Batch 3**

Questionnaire to study the physical and chemical occupational hazards among carpenters :

**This questionnaire is for the scientific purposes only:**

Serial Number: ( )

**1-Age:**

a.15-30years       b. 31-46 years       c.47-61 years

**2-Marital status:** a.Single:       b.Married       c.Widowed       d.Divorced

**3-Education level:**

a. Illiterate       b.Basic education       c.Secondary education

d.occupational certificate       e.Diploma       f. B.Sc

**4-Experience:**

a.Less than 1 year       b.1-5 years       c. 6-10years       d.More than 10

**5-Number of working hours/shift:**

a.5-8 hrs       b. 9-12 hrs       c. More than 12

**6-Chronic diseases:**

a.D.M       b. HTN       c.CVDs       d.Never

**Section (1) Physical hazards:**

**7-Family history of hypertension?**

a.Yes       b.No

**8- Habits?**

a.Smoking       b. Ecessive alcohol drinking       c.Caffeine intake       d.never

**9-Periodic physical exercise?**

a.Weekly       b.Monthly       c.yearly       d.Never

**10-Suffer from noise and unpleasant sounds in the workplace?**

a.Yes       b. No

**11-Ear problems?**

a.Hearing loss  never  b.Discharge  c.Tinnitus  d.

**12-Stress during work?**

a.Yes  b. No

**13-Causes stress during work?**

a.Work overload  b.Prolonged shift  c.Extreme Heat   
e.Environment hazards  f.Dangerous tools & machines

**14-History of accidents?**

a. Cuts  b.abrasions  c.laceration    
d.never

**15-Causes of accidents:**

a.Defective lightening  b. heat  c.exhaustation  e.insufficient training   
f.Lack of needed PPE  j. defective tools

**16- Musculoskeletal problems?**

a.Backache  b. wrists pain  c. shoulders pain  elbow pain  never

**17-Risk factors of musculoskeletal problems:**

a.Hand tools  b.prolonged sitting and standing  excessive stress

**Section (2) Chemical hazards:**

**18-Family history of respiratory disorders?**

a.Yes  b. No

**19-Respiratory problems?**

a.Nasal congestion  b. phlegm  c.chest wheezing  d. cough   
e.shortness of breathing  f.sore thorat  j.never

**20-Skin problems?**

a.Allergies  b.dryness  c.never

**21-Eyes problems?**

a.Redness  b. Discharge  c.Burning  d.Irritation  e.blurred vision  f.never

**22-Are you provided with personal protective equipment (PPE) on the job?**

a.Yes  b. No

*Thank you very much*

**University of Shandi**  
**Faculty of Post Graduates**

**Batch 3**

**Checklist to study the occupational hazards among workers at  
woodworking shops:**

**This checklist is for the scientific purposes only:**

No	Working Environment	Available	Not Available
1.	Enough lightening		
2.	Well Ventilated / windows/fans		
3.	Clutter		
4.	Chemicals product stored well and labeled		
Personal Protective Equipments			
5.	Glove		
6.	Security shoe/boot		
7.	Goggle/ Protective face shields		
8.	Nose/mouth mask		
9.	Earplug		
10.	Helmet		

**Measurements:**

BP:

Lung function test