



ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH

ASSESSING THE PREVALNCE OF WORK RELATED
MUSCULOSKELETAL DISORDERS AND ASSOCAIATED
FACTORS AMONG WORKERS IN SELECTED GARMENTS IN
ADDIS ABABA, ETHIOPIA.

By

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LIST OF ACRONYMS AND ABBREVIATIONS

AAU	Addis Ababa University
AORs	Adjusted Odd Ratio
BSc	Bachelor Natural Sciences
BOLSA	Bureau of Labor and Social Affairs
BMI	Body Mass Index
COR	Crude Odd Ratio
CI	Confidence Interval
DC	Data Collectors
E.C	Ethiopian Calnder
ETB	Ethiopian Birr
FDRE	Federal Democratic Republic of Ethiopia
FTEs	Full-time Equivalent Employees
GBD	Global Burden of Disease
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
HSE	Health and safety Executive
ILO	International Labour Organization
MOLSA	Ministry of Labor and Social Affairs
MSDs	Musculoskeletal Disorders
OHS	Occupational Health and Safety
PI	Principal Investigators
SPSS	Statistical Package for Social Sciences
SPH	School of Public Health
SRS	Simple Random Sample
WHO	World Health Organization
WRMSDs	Work Related Musculoskeletal Disorders

ABSTRACT

Background:-Musculoskeletal disorders are serious problems that every human being would face through the process of his/her life. Studies show that these problems frequently occur in work place. The problem is growing in textile specifically among garment workers in many developing countries. In Ethiopia there is little evidence on the ergonomic exposure for development of musculoskeletal disorder in garment industries.

Objective:-This study was to determine prevalence of work related musculoskeletal disorders and its associated factors among garment worker in Addis Ababa, Ethiopia.

Methods:-Institutional based cross-sectional study design was implemented from March – April /2016 among 422 garment workers in selected Garments in Addis Ababa. An Amharic version pre tested Standard Nordic Musculoskeletal questionnaire and Quick Exposure Check tool were used to collect data using six data collectors and two supervisors. Data was entered in EPI info version 7 and analyzed using SPSS version 20. Frequency tables, graphs and descriptive summaries were used to describe the study variables. Model fitness and collinearity test were done. To control the effect of confounding variables, multiple logistic regression models with hierarchical entry of variables was done. Variables with p-value less than 0.05 under 95% CI in final model were considered as having significant association with dependent variable.

Result: The response rate of this study was 100%. Three hundred and fifty five (84%) of them were female. The median age of the study subject was 29 years inter quartile range of (25-35). The one year prevalence of work related musculoskeletal disorders was 65.4% with 95% C.I: (60.9, 69.7). Among behavioral factors, habits of not doing physical exercise and alcohol consumption were significantly associated with development of musculoskeletal disorders [AOR: 1.96, 95% CI (1.03-3.72)] and [AOR: 9.4, 95% CI (1.15-76.7)], respectively. Among psychosocial factors, job stress and job satisfaction were associated with higher odds of MSDs [AOR: 4.6, 95% CI (2.55-8.4)] and [AOR: 3.9, 95% CI (2.18-7.07)], respectively. Work environment related factors like work hour per week [AOR: 7.9, 95% CI (3.2-19.5)] and working department had significant association after adjusting all others factors.

Conclusion and Recommendation:-Based on findings of this study, there is significant prevalence and associated factors of musculoskeletal disorders in garment workers. Owners and governmental bodies should focus on preventive strategies and safety guidelines in order to prevent workers from occupational hazards.

Key words: - Ethiopia, Garment worker, Work related musculoskeletal disorders.

1. INTRODUCTION

1.1 BACKGROUND

Musculoskeletal disorders are serious problems that every human being would face through the process of his/her life. Studies show that these problems frequently occur in work place. “Work-Related Musculoskeletal Disorders” (WRMSDs) is a term used to describe a painful or disabling injury to the muscles, tendons or nerves caused or aggravated by current work exposure. This can be preventable or at least can be delayed (1, 2).

Globally, health and safety executive estimate that the total number of WRMSDs cases (prevalence) in 2014/15 was 553,000 out of a total of 1,243,000 all work related illnesses. Of which, 66% of the total which account high burden even in developing nations (3).

According to the U.S. Bureau of Labor Statistics, the rate of nonfatal occupational injury and illness cases was 109.4 cases per 10,000 full-time workers in 2013, decreased from 112 and 117 in year 2012 and 2011 respectively, in which 45.3 percent of the injuries and illnesses were musculoskeletal disorders (4).

Prevalence of musculoskeletal disorders becomes progressively more common throughout the world during the past decades. Work related musculoskeletal disorders (WRMSD) have deleterious effect that produce work related disability among the workers with considerable financial consequences due to workers compensation and medical expenses. Various work related factors have been identified as predisposing the disorders (5).

Factors contributing for the development of WRMSDs in garment workers are wide spread and most of occupational injuries had their own contributing factors. Individual factors (age, sex, physical activities) and organizational factors (employment status , payment methods, working hours) , work environment (types of work, type of setting chair are also important underlying factors for the progress of WRMSDs (6-9).

Textile has long history of tradition in Ethiopia as traditional weaving, which is still practice in the rural and semi urban communities for making traditional clothes. The first modern mill, Dire Dawa Textile Factory was established in 1939 but the number of factories didn't expand until 1990s (10). In nowadays, Garment is rapidly growing sectors in Ethiopia. Reports show that until the end of 2007 E.C. There were 102 garment industries in Ethiopia. Among these garments 79 of them found in Addis Ababa and 22 of them found Oromia special zone near by Addis. The ownership status of the garments shows 75 of them owned by local investors and others are foreigners. Approximately more than 10,000 workers (70% female) were working in this sector which became a great source of employment (10).

Readymade Garment (RMG) sector plays an important role in the overall economic development of Ethiopia. Garment sectors have great contribution for bringing foreign currency. When observe the shares, garment sector only have 2.76% and 78.2% from the total country export and textile industries export respectively. Ethiopia's textile export is mainly targeted at European and African markets. In Europe, the export destinations for Ethiopian textiles are Italy, Sweden, and Belgium. African major export destinations are Djibouti, Kenya, and Swaziland (10).

Like other African countries, Ethiopia is facing the health problem related to Occupation and at the same time getting the emerging challenges from industrialization and rapid urbanization. Recently, Ethiopian has reinforced its policy towards rapid industrialization for its economic development (11). But occupational health care facilities and activities are not well organized in the country. Nowadays, ministry of labor and social affairs (MOLSA) working on implementation of occupational health and safety in any industries but the practice is still not well organized (11).

Considering high expansion of garments industries in Ethiopia, it is important to monitor the health risk associated with occupational exposure. Therefore this study was planned to determine the magnitudes of musculoskeletal disorders and associated factors in selected garment workers in Addis Ababa.

1.2 STATEMENT OF THE PROBLEM

Globally, more than half of all countries do not provide official statistics for work related occupational disease. There are particularly serious data limitations in the area of work-related diseases and occupational accidents, especially in developing countries, due to factors including long latency of many diseases before the symptoms are detected and the weakness in the national capacity for identification, diagnosis and compensation of occupational diseases (12).

Work-related lower back pain was estimated to cause 818,000 disability-adjusted life years lost annually. Worldwide, 37% of lower back pain was attributed to occupation, with two-fold variation across regions. The attributable proportion was higher for men than women, because of higher participation in the labor force and in occupations with heavy lifting or whole-body vibration (13).

Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity in many working populations and are known as an important occupational problem with increasing compensation and health costs, reduced productivity, and lower quality of life (14).

A study from garment worker in sir lanka showed that due to exposure of work related musculoskeletal disorder the back was the most frequently affected region (57.3%), followed by knees (31.7%), shoulders (9.1%), hand and wrist (7.3%), neck (6.7%), and forearm and elbow (3.0%) (7).

According to the studies conducted in Galan city garments in Ethiopia showed that prevalence of the musculoskeletal disorder were neck 51.7%, Shoulder 45%, elbow 40% and wrist 37.7% of work related disorders from sewing machine operators in selected garment industries (6, 9).

Work-related musculoskeletal disorders are one of the most important occupational health problems in garment industries. This disorder causes long period of work disability and lost productivity (15, 16).

There were a gap in report regarding musculoskeletal disorders at countries level by Ministry of Health and Ministry of Labour and Social Affairs (17). There were very few studies in Africa including Ethiopia, there was one study in Ethiopia (9, 18).

This study mainly focus on addressing problems of work related musculoskeletal disorders in garment industries by participating all workers engaged in production department to see variation of burden within variation of job status. In the methodological aspects it lacks assessment of musculoskeletal disorders in standardized Nordic assessment tools to associate the magnitude of musculoskeletal disorders. Therefore, this study aimed to address some of the issue concerning work related musculoskeletal disorders from workers in selected garments industries in Addis Ababa.

1.3 SIGNIFICANCE OF THE STUDY

Ethiopia is planning second five year Growth and Transformation Plan (GTP) to be in the middle income countries in the near futures. Rapid growing of Ethiopian garment industries is the major source in economic development in the countries. To achieve this goal it needs healthy work force for the garment industries (19).

There were different researches conducted in the area of textile and garment industries regarding work place exposure like occupational injuries and illness. But there was limited study in area of assessing musculoskeletal disorders and focusing specific working group and specific body region but this study will address the prevalence of musculoskeletal disorders in all production workers in each department and nine of body region to see prevalence variation within body region and working department (9, 18).

So understanding what factors influence the prevalence of musculoskeletal disorders among garment workers will help to develop effective strategies to prevent and control musculoskeletal disorders and disability.

Therefore, this study was provide significant input for further detail study and valuable information for garment managers, programmer, governmental and non-governmental organizations working on OHS for further improvements in textile and garment factories workers health and safety.

2. LITRATURE REVIEW

General overview

Work related musculoskeletal disorders (WRMSDs) have been considered as the potential threats of major public health problems associated with unsafe work environments.

About 6,300 people were dying every day as a result of occupational work related problems in the world. The daily hardship cost of human is the burden of poor occupational safety and health practices that can cause pain and disability in the functions of upper body musculoskeletal systems (13).

Work related musculoskeletal disorders (WRMSDs) are groups of syndromes characterized by symptoms of soft tissue pain, swelling, weakness, discomfort, painfulness and loss of function that can be caused or aggravated by work related exposures. These disorders have been recognized as a source of significant disability, pain and disadvantage for the injured person and a substantial burden on millions of people in both developing and developed countries, and affect all age groups and can also have a major impact on worker function, performance and productivity (20).

The disaggregation by developing and developed regions, however, shows that while musculoskeletal conditions account for around 3.4 percent of the total burden of disease in the developed world, they account for 1.7 percent in the developing world (21).

A study in Bangladesh the common health problem in female garment workers shows that musculoskeletal disorder was the leading health problems which was 55% of workers had complained about musculoskeletal problem (22).

Back pain is extremely common in both industrial and developing countries, with up to 50 percent of workers suffering an episode each year. Back pain causes 0.8 million disability adjusted life years (DALYs) each year and is a major cause of absence from work and of correspondingly high economic losses. Nearly 40 percent of back pain is due to occupational risk factors, and many of these factors can be prevented with the

cooperation of labor, management, industrial engineers, ergonomists, and health workers (21).

2.1 Prevalence of work related musculoskeletal disorders

According to the study conducted in Dhaka city from 600 garments worker in Bangladesh showed that the prevalence of the neck and back pain 37.7%, neck and shoulder pain 26.4%, chest 15.1%, wrist and hand 14.2%, in the lower abdomen 3.9% and lower limb 3.77%. Majority (57.5%) of the respondents mentioned that they suffered from some kind of musculoskeletal disorders in different body site (23).

Almost two third of the garment workers in Bangladesh were suffering from musculoskeletal disorders and the overall prevalence was found 60.7% whereas 10.0% had muscular weakness in different part of the body. Where gender, age, body weight, marital status and education can be associated factors (24).

The same study in India from 172 workers of small scale garments shows that the prevalence of musculoskeletal disorders among garment workers were prevalent (78.5%) out of these neck (60.7%) was the commonly affected part followed by upper back (35.6%), lower back (31.1%), shoulder (24.4%), hand/wrist (23.0%) the most commonly reported disorders (25).

The prevalence of musculoskeletal problems among in Sri Lankan garment workers was quite high, with just a handful of sewing machine operators reporting upper extremity or neck pain. This is surprising as the garment industry typically carries one of the highest rates of neck and shoulder pain relative to other manufacturing fields (7).

A study conducted in Galan city from Ethiopian 422 garment workers the prevalence of self- reported work related neck , shoulder , elbow, and wrist were 51.7%, 45%, 40%, 37.7% of the workers developed musculoskeletal disorders respectively (6, 9).

2.2 Factors associated with work related musculoskeletal disorders

Factors associated with the development of WRMDs in garment workers are categorized in form of personal and behavioral (BMI, physical activities, smoking), socio-

demographic (age, sex, educational status, monthly salaries), work environment factors (employment status, payment methods, working hours, types of work, working section, high loaded work, sitting and standing hours).

2.2.1 Individual and Behavioral factors

The association between WRMSD and numerous socio-demographic factors is well documented in the literature. Cross sectional study was conducted in U.S California, Thailand, Bangladesh, Sir lanka, and the United Kingdom identified gender, increasing age, education and Personal smoking history as important predictors of WRMSDs (7, 24, 26, 27).

About three quarters of garment workers worldwide are female (28). Females are more likely than their male counterparts to report WRMSD symptoms in anybody region. Women employed in shipyards and assembly plants also described higher rates of neck and upper extremity pain than their similarly employed male coworkers (24, 27). In the contradict of others in Ethiopia being males to be a risk for developing WRMDs than females [AOR = 1.8,95 % CI: (1.7–4.8)] (6, 9).

Study in Ethiopia showed that personal factor was identified as the potential risk factor related to elbow, wrist, neck, shoulder musculoskeletal disorders among garment sewing operators. From this study those who had service year >16 years were about five times more likely to develop musculoskeletal disorders than those who had short (1–5 years) year of services. And also Workers who did not have habit of doing physical activities were 5 times more likely to develop musculoskeletal disorder than those who had the habit of doing physical activities more than three times per week. Workers whose payment was via piece rate were 2 times more likely to develop musculoskeletal disorder than those paid through hourly payment (6, 9).

2.2.2 Working Environmental factors

Working in the same positions for long periods, lifting or transferring dependent patients and treating an excessive number of patients in one day were the most perceived job risk factors for WMSDs among Nigerian Nurses (29).

The risk factors associated with the occurrence of WRMSDs are mostly related to biomechanical (uncomfortable posture at work) commonly associated with environmental and ergonomic problems. The major environmental causes are the use of inappropriate equipment (including working chairs, tables) and narrow working area (especially on office workers) (30).

Study in Ethiopia showed that environmental factor was identified as the potential risk factor related to elbow, wrist, neck, shoulder musculoskeletal disorders among garment. From the participants 46.4% of them were always exposed to repetitive task with repeating the same task within 30 seconds, 47.4% of them doing high loaded work within working hour, 87% of them having sufficient light to operate sewing machine and 72% of the operators were not using an adjustable chair (6).

2.2.3 Psychosocial factors

The association between WRMSD and psychosocial factors is not studied well in garments and textile industries. Earlier studies of psychosocial factors reviewed by different scholars, they suggest that job stress is positively associated with musculoskeletal symptoms. A two year follow-up study conducted in Denmark sewing operators assessed that job stress in association with MSDs, this shows that workers have high stress had more than 2 times higher prevalence than compared to low stress (31-32).

2.3 Conceptual Framework

This conceptual framework was developed by reviewing different literature to associate the dependent variables and independent variables (26).

Musculoskeletal disorder at work place can result from different factors. The factors associated with musculoskeletal disorders are personal factors (like age, sex, marital status, education status, service year), behavioral/psychosocial factors (like BMI, physical exercise, smoking behaviors, job satisfaction an job stress) and working environment factors (like employment status, payment methods, working hours, training, repetitive task, working department, working loaded work, flexibility of the chair).

The socio-demographic factor and behavioral/psychosocial factors affects the musculoskeletal disorders directly and indirectly through other factors. The work environment factors directly link with the occurrence of work related musculoskeletal disorders in the garment industries. Work environment related factors either affecting the workers personal behaviors or directly determine the occurrence of work related musculoskeletal disorders. In the following page conceptual frame work shows that the inter-relationship between musculoskeletal disorders (dependent variable) and associated factors (independent variable) in detail list (Figure 1).

Conceptual frame work for musculoskeletal disorder among workers in three garments

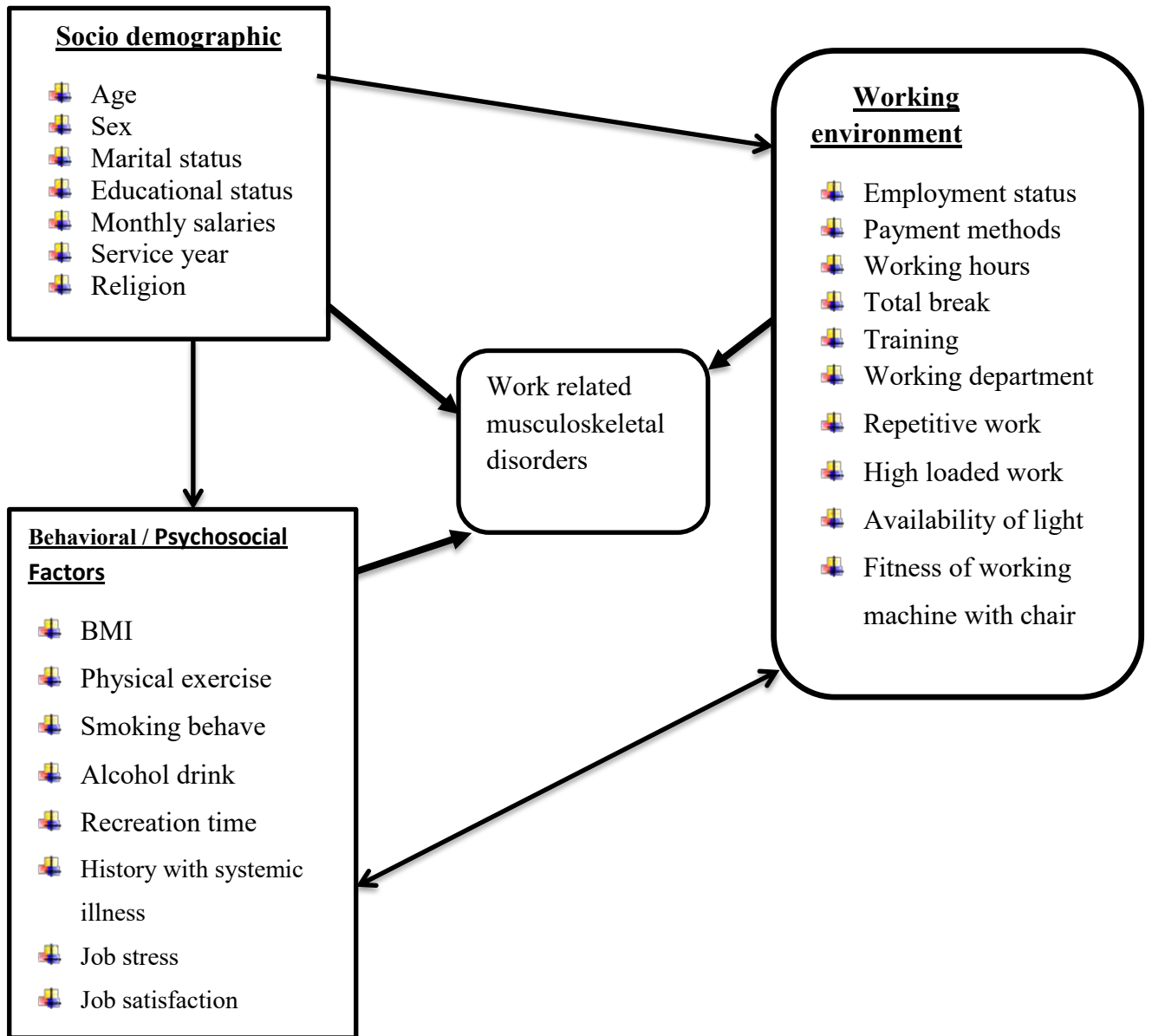


Figure 1: Conceptual framework of musculoskeletal disorder (Adapted with some modifications from after reviewed different literatures).

3. OBJECTIVES

3.1 *General objectives*

- ❖ To assess the prevalence of musculoskeletal disorders and its associated factors among garment workers in selected Garments in Addis Ababa, Ethiopia, 2016.

3.2 *Specific objectives*

- To determine prevalence of musculoskeletal disorders among garment workers in the selected garments in Addis Ababa.
- To identify the factors associated with musculoskeletal disorders among workers in the selected garments in Addis Ababa.

4. METHODS

4.1 Study setting

This study was conducted in Addis Ababa, capital city of Ethiopia. Geographically, the town is located at $9^{\circ}1'48''\text{N}$ latitude and $38^{\circ}44'24''\text{E}$ longitudes. It's found on elevation of 2355meter above sea level. According to the master plan of the city, the total area of land of the town is 52700 hectare or 527km^2 . The city has three layers of government, City Government at the top, 10 sub-city Administrations in the middle, and 116 (Woreda) kebeles at the bottom (44).

This study was conducted in three garment industries in Addis Ababa. These industries did not allow us to state its name and characteristic in details.

Garment A- with **200** employees and 160 production unit workers. It was established since 1969 E.C.

Garment B- with **560** employees, it was established since in 1981 E.C and has 240 production unit workers.

Garment C- with **442** employees. The factory was established in 1974 E.C and has around 250 production unit workers.

In three factories, they use general working cycle as raw materials preparation, pattern and sample preparation, cutting, make up and finishing. To address these entire tasks they have five major working sections (Table 1).

Table 1. Department, job group and main task of garment industries workers

Job group		Task
Designing and marking section	Designer and markers	Pattern making , marking by manual, preparing the working instruction for cutting, sewing and finishing
Cutting section	Cutting personnel	Spread fabric , cutting & fusing, bundling , cut panels and quality check
Sewing section	Operators	works sewing and pressing activities
Quality control and supervisors	Supervisors and quality control personnel	Supervise and quality check in all section
Finishing section	Finishing personnel	Final pressing, numbering, printing, ironing and packing

Source: - Ethiopian Textile Industry Development Institute (TIDI)

4.2 Study design and period

Institutional based cross-sectional study was conducted from March to April / 2016.

4.3 Source population

All production workers working in selected garments were source population

4.3 Study population

Workers who are directly engaged in the production unit from whom data is collected were study population.

4.5 Eligibility criteria

4.5.1 Inclusion Criteria

- Those who had not any history of MSDs before starting the garment job and had work experience above one year and were included in the study with consideration of their willingness to participate.

4.5.2 Exclusion Criteria

Workers who were ill and unable to communicate were excluded.

4.6 Variables

4.6.1 Dependent variables

Work related musculoskeletal disorders- (Yes, No).

4.6.2 Independent variable

Socio-demographic variables: age, sex, marital status, religion status, educational status, monthly salaries and service year.

Work Environment factors: - Employment status, payment methods, working hours, total break excluding lunch time, health and safety training, repetitive work within less than 30 second, high loaded work, availability of light, types of setting chair, working department and fitness of working machine with sitting chairs.

Behavioral factors and Personal factors – Body mass index, physical exercise, smoking behavior, alcohol drinking, recreation activities, medical history with MSDs.

Psychosocial factors: - job satisfaction and job stress.

4.7 Sample size determination

To determine sample size, for first specific objective using single population proportion formula was used by considering the following assumptions of 95% confidence level ,5% margin of error and a prevalence of musculoskeletal disorder from previous study was elbows/forearm disorder (40%), hand/wrist disorder (37.7%) (6) and shoulder disorder (51.7%), neck disorder (45%) in Galan city garments , Oromia, Ethiopia (9).

$$n = \frac{(Z \alpha/2)^2 p (1-p)^2}{d^2}$$

Where

- n= Initial sample size
- $Z \alpha/2$ = Confidence level at 95% = 1.96, using level of significance of $\alpha=0.05$.
- P = prevalence of musculoskeletal disorder among Galan city garment worker.
- d = margin of error to be tolerated = 5%
- Z = value of a standard normal distribution score= 1.96

The decision was done by comparing the sample size in objective one (422) and sample size in objective two (235) in terms of representativeness. The 1st objective sample size was used.

4.8 Sampling techniques

The three garment industries were purposely selected from the whole industries in the city based on their establishment and old service year garments were selected. The study samples that have been determined in the sample size determination were distributed in the three industries according to their production worker proportion number.

Assuming that work related musculoskeletal disorders varies with the nature of the working department. A stratified random sampling technique that considered a reasonable representation of all workers in the five working department was employed. Workers registrations were used as sampling frame. Finally, simple random sampling technique was applied to select the study participants from list of their payment sheet in each section according to its proportion in the three garments. To select the study participants, Microsoft excel 2010 was used to generate random numbers from their payment sheet from each garments. The next unselected numbers were included for workers absence from work during data collection (Figure 2).

Table 3. Sample size stratification based on their size and working department in three garment industries in Addis Ababa.

Department	Garment A		Garment B		Garment C	
	Source	Sample	Source	Sample	Source	Sample
Sewing section	88	55	132	90	137	88
Cutting section	32	20	48	30	50	29
Designer and marker	8	8	12	7	12	7
Quality and supervisors	8	7	13	7	13	10
Finishing	24	16	35	23	38	26
Total	160	105	240	157	250	160

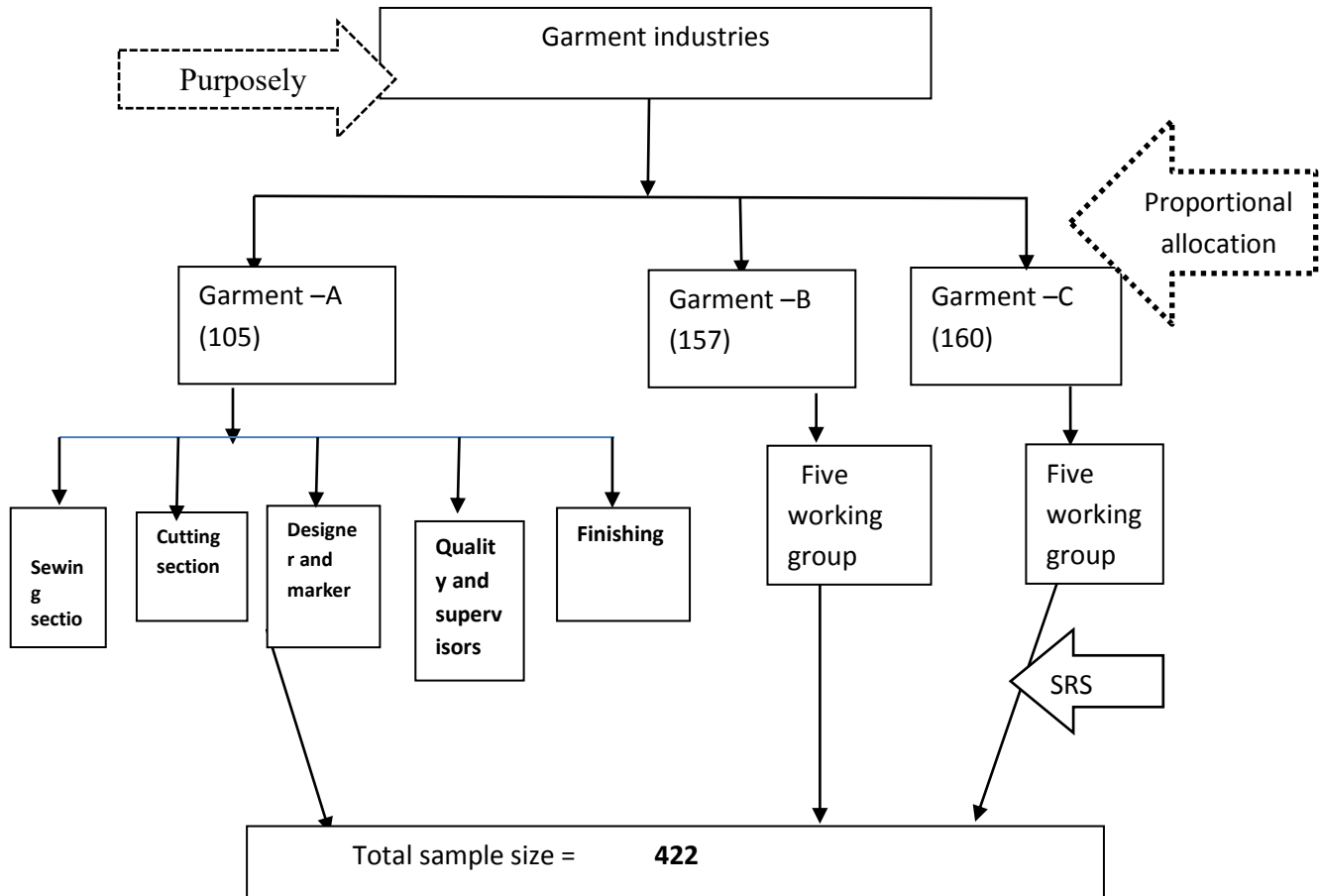


Figure 2. Schematic presentation of sampling procedure for the selection of study unit in the three garments, Addis Ababa, Ethiopia, 2016.

4.9 Data collection

4.9.1 Questionnaire

The workers were interviewed by using adopted Standardized Nordic musculoskeletal questionnaires for assessing prevalence of work related musculoskeletal disorders. This tool was not developed for clinical diagnosis. It is repeatable, sensitive and useful as a screening and surveillance tool for musculoskeletal disorders (32, 36).

The second questionnaires was for assessing associated factors, which includes socio demographic characteristics, associated factors like Environmental factors, organizational factors, behavioral factors and assessing prevalence of musculoskeletal disorders (9, 18). Using a standard translation procedure, the questionnaire was translated from English to

Amharic and back to English to insure the consistency. The interviews were managed by face to face in Amharic language using trained data collectors. Physical measurements also had been done to measure the participants' height and weight for body mass index calculation.

4.9.2 Quick Exposure Check (QEC)

The QEC is an instrument that assesses ergonomic risk factors, including physical, organizational, and psychosocial factors. It is composed of an evaluation form that includes 16 questions about postures and movements performed by the back bone and upper limbs, as well as other risk factors (amount of weight handled; how long it takes to perform a task; manual force; visual demand; vibration and level of hand force exerted; work pacing; and stress), and a score that allows for a partial (by body area) and total quantification of risk. This score results from the combination of answers given by the evaluator (observers) and the worker, for instance: posture versus force, duration versus force, posture versus duration, and posture versus frequency. The results obtained by the Quick Exposure Check (QEC) assessment was classified according to David G model as low, moderate, high, and very high (2).

The Quick Exposure Check (QEC) was applied in 100 sewing operators in the three garment industries. The level of exposure to ergonomic risk obtained by QEC score calculation model.

4.9.3 Data collectors and supervisors

For data collection purpose six data collectors their qualification is first degree Environmental Health Professional and two supervisors qualified with Masters of Public Health were included in data collection activities.

4.9.4 Operational definition

Body segments: neck, shoulder, upper back, lower back, hip /thigh, knee/leg and ankle/foot, wrist /hand (33).

Body mass index: weight in kilograms divided by the square of the height in meters (kg/m²).

Underweight= BMI <18.50

Normal range= BMI b/n 18.50-24.99

Overweight = BMI b/n 25.00-29.99

Obese= BMI ≥30.00 (8).

Job satisfaction: A score measured using the generic job satisfaction scale as yes (32 - 50) and no (10 - 31) (35).

Job stress: A score measured using the workplace stress scale as yes (16 to 40) and no (lower than or equal 15) (36).

Work related musculoskeletal disorders: is perceived pain, ache or discomfort for at least 2-3 work days in last week or last 12 months in any part of body segments (neck, shoulder, upper back, lower back, hip /thigh, knee/leg and ankle/foot and wrist /hand) caused, aggravated or exacerbated by work place exposures (33).

Health and safety training: A worker who has got any kind of training in one year Period through any kind of media about health and safety rule implemented in garment industries (9, 18).

Cigarette Smoking: It is practice of smoking cigarette by garment workers for at list one sticks of cigarette per day (37).

Alcohol drinking: it is a consumption of any kind of alcohol by garment workers at least for two times per week for different purpose.

Physical exercise: Performing any kinds of physical exercise at list two times per week for 30 minutes (37).

Systemic illnesses: - the list of systemic illnesses or diseases includes: diabetes, low thyroid or overactive thyroid, chronic renal failure, gout and dyspepsia (9, 18).

Repetitive work within less than 30 second- when workers exposed to repetitive task which repeat itself every 30 second in the same direction.

Availability of Lighting: - The presence of visible light which allow workers to move about easily and to carry out their work effectively.

4.10 Data Management

Data was checked for completeness in the questionnaires. Each questionnaire was coded, stored in appropriate area and checked for completeness by principal investigator during and after data collection. Data was entered in prepared EPI info 7 templates and exported to SPSS.V.20 for cleaning and analysis.

Data was edited and cleaned by running simple frequency and cross tabulation to check for inconsistencies and completeness, and sorting to identify outliers. And also we checked missing values and outliers for accuracy, those which causes of outliers and missed values were determined and no data was dropped from analysis.

Workers job satisfaction was assessed using a likert scale to identify the level of satisfaction on their work. The option were 5 likert scale (1-very dissatisfied, 2-dissatisfied, 3-neutral, 4- satisfied and 5 -very satisfied) with ten components. This part was computed according to Macdonald work place job satisfaction scale. The workers classified in to two categories by using demarcation threshold as satisfied (32-50) and not satisfied (10-31) (35).

Workers job stress was assessed by using Marlin Company and the American Institute of Stress scale calculation. The workers catagorized in to two as had stress (≤ 15) and no stress (16-40) (36).

4.11 Data analysis procedures

After the data was edited, coded, and entered into SPSS version 20 software program for analysis, odds ratio with 95% confidence interval was used to measure the association between work related musculoskeletal disorders and the independent (socio demographic, work environment related, psychosocial and behavioral) variables.

For first specific objective - descriptive findings were presented by frequency tables, graphs, percentage, proportion with 95% C.I and mean, standard deviation were used summarize the socio-demographic, psychosocial factors, behavioral and personal factors and working environment.

For second specific objective- to determine the independent factors associated with WRMSDs. Cross tabulation, bivariate logistic regression was used to explore presence of

statistical association between different independent variables and outcome variables using crude odds ratio (COR) with 95% C.I. Bivariate logistic regression analysis and chi-square test were performed to see the existence and significance of association between dependent and independent variables. Independent variables with p-value less than 0.05 under 95% CI were considered as having significant association with dependent variable.

Finally to determine the independent factors associated with musculoskeletal disorders, multivariate logistic regression model with hierarchical entry of variables was done. To avoid excessive number of variables and unstable estimate in the final model, only variables with P-value < 0.3 in the bivariate analysis were taken in the multivariate analysis (37-38). In the first step, the effect of socio-demographic characteristics on the work related musculoskeletal was assessed. Then, behavioral and psychosocial factors were included and their effect was seen in the presence of socio-demographic characteristics. Finally work environment factor were added to explore their effect in the presence of socio-demographic, behavioral and psychosocial factors in final model. Finally, variables with P <0.05 in the multivariate analysis were considered significant, and presented by adjusted odds ratio (AOR) with 95% C.I.

Model fitting - was checked using Hosmer- Lemeshow goodness of test which showed $\chi^2 = 8.44$ with $df = 8$ and significant of $p = 0.391$. The Hosmer- Lemeshow test should be insignificant at p-value at 0.05 indicating that the variable entered fits the model. Hence, the p-value of the test was 0.39 in the final model.

Collinearity test - was checked by Kendall's tau-b and Spearman rho test. Correlation coefficient of each variable was below 0.75. Which indicate specified independent variable is not explained by other independent variable in the model (43).

4.12 Data Quality Assurance

The quality of data was assured before, during and after the data collection. The questionnaire was prepared first in English and then translated into Amharic finally retranslated back to English by independent translators (same batch MPH student) to check for consistency. Prior to the actual data collection five percent 5 % of study

participant was pre tested in one garment which was found in Addis Ababa. Three days training was given for data collectors, before and after pretest. During the training session topic like the objectives of the study, the procedure of data collection and review of key terminologies and ethical issue of the study were discuss in detail by principal investigator.

During data collection period, the collected data was checked for completeness and for its consistencies by the principal investigators and supervisors every night time of data collection. Missed questions and variables during the first visit were filled by re-interviewing the participants. After the data collection, the collected data was rechecked for its completeness and consistency by the supervisors and principal investigator.

4.13 Ethical Consideration

Ethical clearance was obtained from the Ethical Review Committee of Addis Ababa University School of Public Health. Formal letter for cooperation was obtained from school of public health, College of Health Sciences, Addis Ababa University. Permission was asked from the Garments industries. Verbal consent was obtained from respected participants after a necessary explanation about the purpose, benefit and risk of the study and also their right on decision of whether or not participating in the study. The study participants were strongly informed that there is no any direct financial benefit and risk from this study, on the other hand the study findings would be used to design strategies for prevention and control mechanism of musculoskeletal disorder in garment workers. Concerning confidentiality, name of respondents was not included in the questionnaire.

4.14 Dissemination of the results

The finding of this study would be presented to School of Public Health, College of Health Sciences, Addis Ababa University. And it would be disseminated to respective garments and Ministry of labors and social affairs and BOLSA. Further efforts would be made to publish the findings on national or international journal.

5. Result

5.1 Socio demographic characteristics of the respondent

A total of 422 garment workers were included in the study and a complete response (100%) was obtained from all respondents. Three hundred fifty five (84%) were female and 235 (55.7%) were married. Most (59%) of the workers had education level secondary school completed and only (3%) of them unable to read and write. Most of (54%) of the respondents were in the younger age group (less than 30 years of age) and the median age of the study subject was 29 (25-35). Significant numbers of them were Orthodox Christian 295 (70%). Work experience of the respondents shows that, 265 (62%) had served from 1–5 years. Regarding monthly salary 305 (73%) of the workers had monthly income between 1000-2000 Ethiopian Birr and 13% had monthly income below 1000 Ethiopian Birr with the median of 1217(1100-1500) (Table 4).

Table 4. Socio-Demographic characteristics of participants in the selected garment industries in Addis Ababa, Ethiopia, May, 2016.

Categories of variables	Frequency (n=422)	(%)
Sex		
Male	67	16
Female	355	84
Age in years		
<20	11	3
20-24	67	16
25-29	150	35
30-34	83	20
35-39	55	13
≥40	56	13
Marital status		
Married	235	56
Single	148	35
Divorced	18	4
Widowed	21	5
Educational status		
Unable to read and write	3	1
Primary school (1-8)	89	21
Secondary school (9-12)	249	59
Certificate and Diploma	81	19
Religion		
Orthodox	295	70
Protestant	82	19
Muslim	40	10
Others	5	1
Service year		
<5 years	265	63
5–10 years	76	18
11–15 years	16	4
≥16 years	65	15
Monthly salary		
<1000 ETB	57	13
1000–1200 ETB	133	32
1201–1500 ETB	145	35
1501–2000 ETB	27	6
>2001 ETB	60	14

Others: Catholic -3, Hawariyat- 2

5.2 Behavioral and psychosocial Characteristics of the study group

Three hundred and thirty eight (80%) workers have body mass index (BMI) of normal weight (18.5-24.9kg/m²) and had no obese category based on WHO classification. Among workers in the three garments, 87 (21%) of them doing physical exercise twice and more per week. Forty four (10%) of them have medical history of systemic illness. Almost all of the workers 422 (100%) of them have no smoking behaviors. Regarding alcohol consumption, 18 (4%) of the respondents drink alcohol at least two times per week for different purpose. Three hundred and seventy eight (90%) of the participant pass their recreation/ free time by doing home activities. On other hand more than half of 223 (53%) were not satisfied with their job, 232 (55%) of them had job stress (Table 5).

Table 5. Behavioral and Psychosocial characteristics of study participants in the selected garments industries in Addis Ababa, Ethiopia, May, 2016.

Categories of variables	Frequency (n=422)	(%)
Body Mass Index (BMI)		
Under weight	29	7
Normal weight	338	80
Overweight	55	13
Habit of doing Physical exercise		
None	335	79
Two times per week	57	13
≥3 times per week	24	6
Medical history of systemic illness		
Yes	44	10
No	378	90
Habit of Alcohol drink		
Yes	18	4
No	404	96
Recreation type		
Watching and reading	44	10
Doing home activities	378	90
Job stress		
≤15(no)	190	45
16-40 (yes)	232	55
Job satisfaction		
10-31 (no)	223	53
32-50(yes)	199	47

5.3 Work environment characteristics

From the three garment industries, employment status of the all workers were permanently employed, four hundred and three (95%) of them paid fixed monthly salary. In one garment 19(5%) of respondent paid their salary per production rate. Almost all them worked for eight hours per day in their work, furthermore, 329 (78%) of them worked for ≤ 48 hours per week. Two hundred and sixty (61%) of the participants were not having break (excluding lunch time) and almost all workers 389 (93%) of them had no health and safety training on the issue of ergonomic at workplace.

Regarding nature of the job, it was found that majority 242 (57%) of the workers work as sewing operator. Almost half of the respondents, 220 (52%), were always exposed to repetitive work with repeating the same task within 30 seconds. Three hundred and thirty one (79%) of the participants were sometimes doing high loaded work within working hour.

About three forth (73.5%) of the total respondents worked in sitting position. When we observe operators working in sewing section used to sit whole day on a wooden chair. Of the total worker 112 (26.5%) of them worked daily by standing position of them were cutting and finishing section. Fitness of the working machine with sitting chair 208 (49%) said not comfortable, almost all (100%) of them have sufficient light for working (Table 6).

Table 6. Work environment characteristics of study participants in the selected garments industries in Addis Ababa, Ethiopia, May, 2016.

Category of variables	Frequency (<i>n</i> = 422)	(%)
Payment methods		
Fixed monthly	403	95
Per production	19	5
Working hours per week		
≤ 48 hour	329	78
>48 hour	93	22
Total break hours except lunch time		
None	260	61
≤15 minutes	6	2
15-30 minutes	156	37
Training on ergonomics issue		
Yes	33	8
No	389	93
Working department		
Sewing operators	242	57
Cutting section	78	19
Designer and marking	20	5
Quality and supervisor	18	4
Finishing section	64	15
Repetitive movement within < 30 seconds		
Never	105	25
Sometimes	97	23
Always	220	52
Doing high loaded work		
Never	35	8
Sometime	331	79
Always	56	13
Fitness of the working machine with setting chair		
Comfortable	102	24
Non comfortable	208	49

5.4 Prevalence of work related musculoskeletal disorders in different body segment

About two third (65.4%) with 95% C.I: (60.9, 69.7) of the participants reported pain at least in one part of their bodies, over the past 12 months. From all self-reported pain, lower back pain was the highest (44%), followed by ankles/foot pain (41%), regarding seven day prevalence for lower back pain and ankles/foot pain had each 19% as shown in (Figures 3).

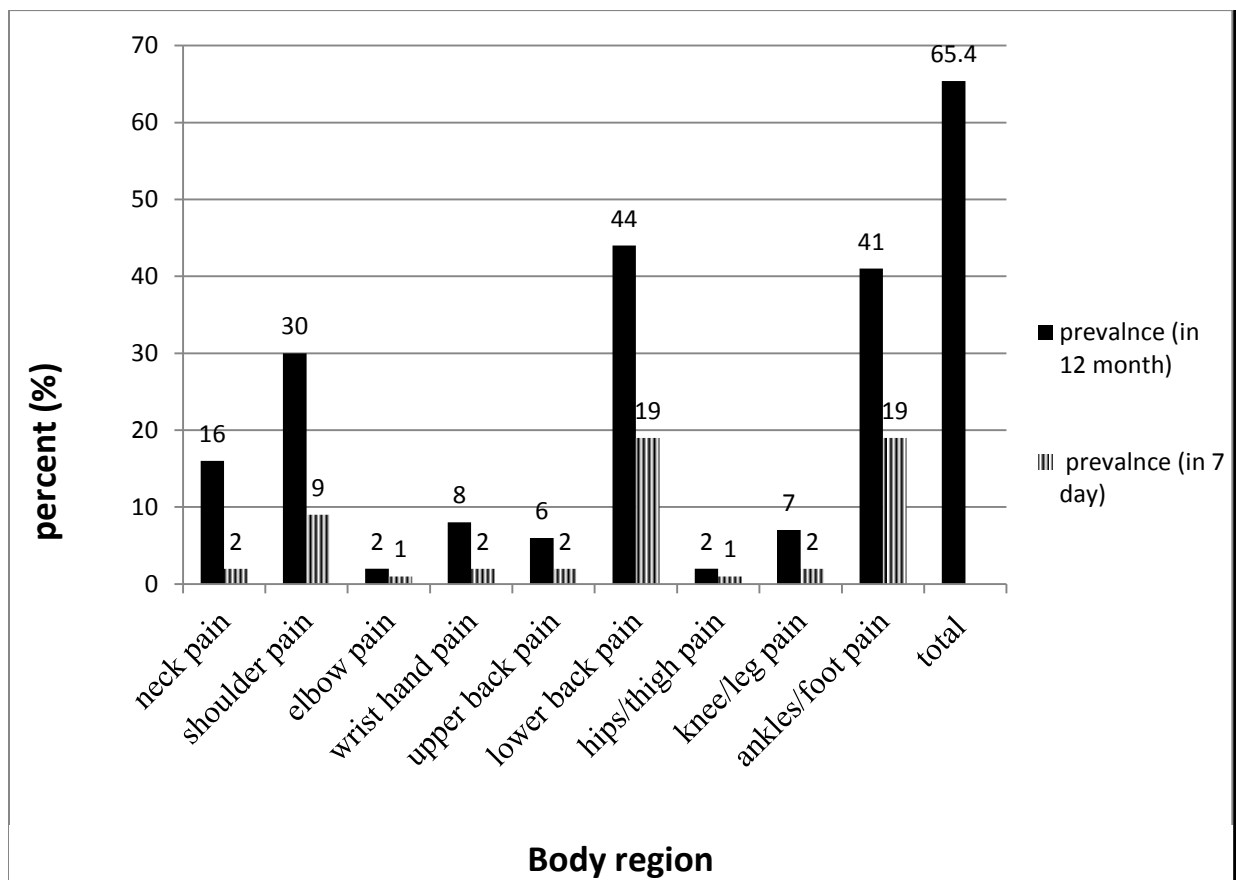
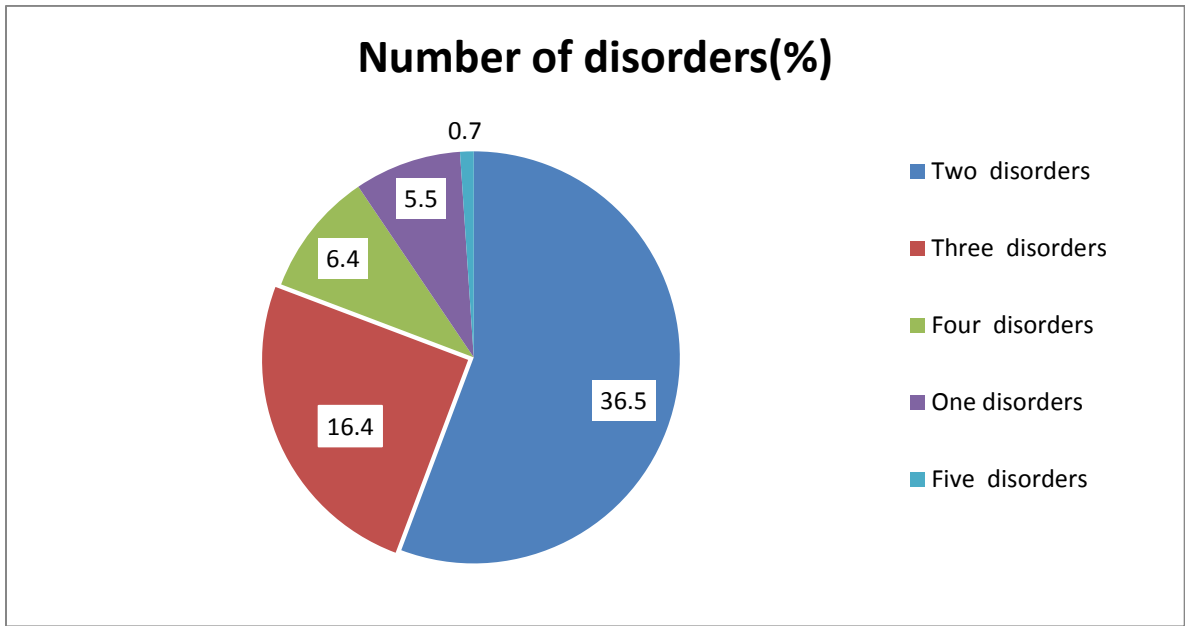


Figure 3: Twelve month and Seven day Prevalence of WRMSDs on different body segments among garment worker (n=422) at three garments in Addis Ababa, May, 2016.

5.5 Number of work related musculoskeletal disorders among garment workers

Workers who are working in garments had reported a maximum of five musculoskeletal disorders in different body segments. Higher number of disorders happened on two body region, 154 (36.5%) of them had developed two disorders (Pie chart 1).



Pie chart 1: Number of work related musculoskeletal disorders among garment workers (n=422) at three garments in Addis Ababa, May, 2016.



Figure 4: sample photos for workers working in cutting and sewing section in garments April 2016.

Sewing section



Figure 4: sample photos for workers working in cutting and sewing section in garments April 2016.

Table 7 shows the distribution of musculoskeletal disorders in different body segments of workers working in five working section. Workers who are working in sewing section reported the highest number of low back pain (122) and workers who are working in cutting and finishing section reported highest number of Ankle /foot disorders.

Table 7: Work related musculoskeletal disorders in different body segment within different working setting among garment workers in garment industries in Addis Ababa, Ethiopia, may 2016.

S. No	Body segment	Number of disorders in working setting					Total case
		Sewing operators	Cutting personnel	Designer and marking	Supervisors and quality control	Finishing personnel	
1	Neck	57	4	5	0	5	68
2	Shoulder	111	5	2	4	5	127
3	Elbow /forearm	2	1	0	0	4	7
4	Wrist /hand	15	9	0	2	10	36
5	Upper back	21	0	2	0	3	26
6	Lower back	122	24	3	7	28	184
7	Hip /thigh	5	1	0	0	1	7
8	Knee /leg	19	6	0	0	5	30
9	Ankle /foot	102	27	2	9	32	172

5.6 The ergonomic risk assessment result obtained by the Quick Exposure Check (QEC)

From total of assessed sewing operators 80% of them were developed musculoskeletal disorders. The score assessed by observer and workers, utilization of vibration tools for more than 4 hrs per day shows that all of them exposed for vibration high risk. In body region neck score lies in high risk (Table 8).

Table 8. Quick Exposure Check result among sewing operators (n=100) in garments industries in Addis Ababa, May, 2016

Risk rating (RR)	Level of exposure (low ,Moderate, High, Very high)	WRMSD	
		Yes	No
Back	Moderate	80	20
Shoulder/arm	Moderate	80	20
Wrist /Hand	Moderate	80	20
Neck	High	80	20
Stable base (driving)	Low	80	20
Vibration	High	80	20
Work pace (difficulty in keeping up this work)	67% low 33% moderate	51 29	16 4
Environment (presence of stress)	60% low 40% moderate	51 29	9 11

5.7 Bivariate analysis

Socio demographic characteristics association with WRMSD

Socio-demographic factors: Sex, age, marital status, education status and monthly salaries were significantly associated with WRMSDs. The odds of WRMSDs among female is 3 times that of males [COR: 2.99, 95% CI: (1.75-5.1)]. The age of workers above 35 years had more than 5 times higher chance to develop WRMSDs than below 20 years of age [COR: 5.65, 95% CI: (1.42-22.4)]. Educational level is significantly associated with outcome variable those have education level primary and secondary 2 times higher prevalence of WRMSDs compared to those have certificate and diploma [COR: 2.22, 95% CI: (1.33-3.7)]. Monthly salary had significant association with work related musculoskeletal disorders. personnel, their monthly salaries below 1500 birr have 4.5 times odds of getting disorders than who earn monthly salary above 2000 birr [COR: 4.45, 95% CI: (2.39-8.6)] (Table 9).

Table 9.Bi-variate analysis for socio-demographic factors with WRMSD among garment workers in garments industries in Addis Ababa, 2016 (n=422).

Categories of variables	WRMSDs		COR 95% CI	p-value
	Yes	No		
Sex				
Male	29	38	1.00	
Female	247	108	2.99(1.75-5.1)	<0.001
Age in years				
<20	4	7	1.00	
20-24	40	27	2.59(0.69-9.7)	
25-29	96	54	3.11(0.87-11.1)	
30-34	51	32	2.78(0.75-10.3)	0.036
35-39	42	13	5.65(1.42-22.4)	
≥40	43	13	5.78(1.46-22.9)	
Marital status				
Married	163	72	1.00	
Single	85	63	0.59(0.38-0.91)	0.09
Divorced	13	5	1.14(0.39-3.34)	
Widowed	15	6	1.1(0.41-2.96)	
Educational status				
Unable to read and write	2	1	1.95(0.17-22.3)	
Primary school (1-8)	60	29	2.01(1.08-3.75)	0.02
Secondary school	173	76	2.22(1.33-3.7)	
Certificate , Diploma	41	40	1.00	
Religion				
Orthodox	197	98	3.01(0.49-18.34)	
Protestant	55	27	3.05(0.48-19.38)	0.311
Muslim	22	18	1.83(0.27-12.19)	
Others	2	3	1.0	
Service year				
<5 years	170	95	1.0	
5–10 years	46	30	0.85(0.5-1.44)	
11–15 years	12	4	1.67(0.52-5.34)	0.304
≥16 years	48	17	1.57(0.85-2.89)	
Monthly salary				
<1000 ETB	32	25	1.92(0.92-4.0)	
1000–1200 ETB	90	43	3.14(1.67-5.9)	<0.001
1201–1500 ETB	109	36	4.54(2.39-8.6)	
1501–2000 ETB	21	6	5.25(1.84-14.91)	
>2001 ETB	24	36	1.0	

Behavioral and psychosocial factors associated with WRMSDs

Out of selected personal/behavioral and psychosocial factors doing exercise, medical history of illness, alcohol drink, recreation activities, job stress and job satisfaction had association to work related musculoskeletal disorders. the odds of musculoskeletal disorders among those workers not having physical exercise is about 3 times that of workers having physical exercise [COR: 2.97, 95% CI: (1.83-4.83)]. And also, workers who have medical history of systemic illness had 3 times higher chance to develop disorders as compared to without illness [COR: 3.07, 95% CI: (1.33-7.0)]. Alcohol drinking habit was another factors show more than 4 times higher odds of having pain than non-drinkers. Similarly, those worker stressful by their job had 6 times more odds to develop WRMSDs than with no stress [COR: 6.38, 95% CI: (4.07-9.98)]. In the same way, those worker who didn't satisfied by their job had more than 8 times more likely to have WRMSDs compared to those satisfied by their job [COR: 8.4, 95% CI: (5.24-13.48)] (Table 10).

Table 10. Bi-variate analysis for behavioral and psychosocial factors with WRMSD among garment workers in garments industries in Addis Ababa, 2016 (n=422).

Categories of variables	WRMSDs in nine region		COR 95% CI	p-value
	Yes	No		
Body Mass Index (BMI)				
Under weight	20	9	1.0	0.85
Normal weight	219	119	0.83(0.36-1.87)	
Overweight	37	18	0.93(0.87-2.43)	
Habit of doing Physical exercise				
Yes	39	48	1.0	<0.001
No	237	98	2.97(1.83-4.83)	
Medical history of systemic illness				
Yes	37	7	3.07(1.33-7.0)	0.006
No	239	139	1.0	
Habit of Alcohol drink				
Yes	16	2	4.43(1.0-19.54)	0.032
No	260	144	1.0	
Recreation activities				
Watching and reading	22	22	1.0	0.025
Doing home activities	254	124	2.04(1.09-3.84)	
Job stress				
≤15(no)	83	107	1.0	<0.001
16-40 (yes)	193	39	6.38(4.07-9.98)	
Job satisfaction				
10-31 (no)	192	31	8.4(3.6-16.36)	<0.001
32-50(yes)	84	114	1.0	

Work environment factors associated with WRMSDs

From all work environment factors, Garment workers whose payment method per production rate was 71% lesser odds of sustaining MSDs compared to those who paid fixed monthly salary [COR: 0.29, 95% CI: (0.11-0.75)]. Those worked for above 48 hours per week were 7 times higher risk to develop MSDs than who worked for 48hrs or less [COR: 7.67, 95% CI: (3.6-16.36)]. Likewise, workers who didn't have break hour except lunch times had 7 times odds of MSDs relative to workers with have break hour for 15-30 minutes [COR: 1.87, 95% CI: (1.23-2.83)].

The presence of work related musculoskeletal disorder was more than 3 times higher among those who work in sewing section compared to those who work in quality control and supervisors section [COR: 3.4, 95% CI: (1.28-8.98)]. Garment worker who exposed to repetitive work within < 30 second for always had 4 times odds compared those didn't exposed to repetitive task [COR: 4.09, 95% CI: (2.5-6.7)]. Doing highly loaded work for always was another factors significantly associated with work related musculoskeletal disorders [COR: 4.23, 95% CI: (1.72-10.48)]. Health and safety training and Fitness of the working machine with setting chair were not significant for musculoskeletal disorders to occur (Table 11).

Table 11. Bi-variate analysis for work environment factors with WRMSD among garment workers in garments industries in Addis Ababa, 2016 (n=422).

Category of variables	WRMSDs in nine region		COR 95% CI	p- value
	Yes	No		
Payment methods				
Fixed monthly	269	134	1.0	
Per production	7	12	0.29(0.11-0.75)	0.007
Working hours per week				
≤ 48 hour	191	138	1.0	<0.001
>48 hour	85	8	7.67(3.6-16.36)	
Total break hours except lunch time				
None	184	76	1.87(1.23-2.83)	0.012
≤15 minutes	4	2	1.54(0.27-8.68)	
15-30 minutes	88	68	1.0	
Health and safety training				
Yes	21	12	1.0	0.824
No	255	134	1.08(0.78-2.27)	
Working department				
Sewing operators	187	55	3.4(1.28-8.98)	<0.001
Cutting section	35	43	0.81(0.29-2.27)	
Designer and marking	4	16	0.25(0.06-1.04)	
Quality and supervisor	9	9	1.0	
Finishing section	41	23	1.78(0.62-5.1)	
Repetitive work within < 30 seconds				
Never	45	60	1.0	
Sometimes	65	32	2.7(1.52-4.8)	<0.001
Always	166	54	4.09(2.5-6.7)	
Doing high loaded work				
Never	11	24	1.0	
Sometime	228	103	4.8(2.28-10.2)	<0.001
Always	37	19	4.2(1.72-10.48)	
Fitness of the working machine with setting chair				
Comfortable	68	34	1.0	0.758
Non- comfortable	208	112	0.92(0.58-1.48)	

5.8 Multivariate logistic regression

After bivariate logistic was done for each variable, the multivariate analysis was done by considering conceptual framework (Figure 1) and enter method was used hierarchically to assess the relative effect of the descriptive factors on the outcome variable (musculoskeletal disorders). To avoid excessive number of variables and unstable estimate in the final model, only variables with P-value < 0.3 in the bivariate analysis were taken in the multivariate analysis (37-38).

From the socio-demographic factors, salary becomes significant in the first and second models. workers earning monthly salary of ETB 1501-2000 was 3.9 times and more than 6 times more likely to develop musculoskeletal disorders compared to those earning above 2001 ETB, in both the first and second models [AOR (95% C.I): 3.9 (1.23-12.44) and 5.95 (1.65-21.38)] respectively (Table 12).

In behavioral and psychosocial factors, habit of physical exercise, alcohol consumption, job stress and job satisfaction sustained their significance through the second and third models. Workers who had no habits of doing physical exercise were about 2 times more likely to develop MSDs than workers doing physical exercise at least two times per week [AOR:1.96, 95% CI (1.03-3.72)]. Workers who drink alcohol had more than 9 times higher odds to develop WRMSDs than those didn't have habit of alcohols consumption [AOR: 9.4, 95% CI (1.15-76.7)]. Furthermore, the odds of MSDs among job stressed was more than 4 times than among the non- stressed [AOR: 4.6, 95% CI (2.55-8.4)]. Similarly, the odds of having MSDs in workers not satisfied by their job had 4 times more higher [AOR: 3.92, 95% CI (2.18-7.07)]. Medical history of systemic illness significant at model two but no kept its strength in model three (Table 12).

Among the working environment factors, working hour per week and working department were significant in the final model. Workers with more than 48 hrs Per week had 8 times more probable to develop WRMSDs than working 48 hrs and less by adjusting all factors [AOR: 8.5, 95% C.I (3.15- 23.25)]. Additionally, workers working in sewing department and finishing department were having odds of 5 and 8 times more coincidental to develop WRMSDs compared to workers working in quality control and

supervisors [AOR (95% C.I): 5.56 (1.22-24.87)] and [AOR (95% C.I): 6.09 (1.28-28.9)] respectively (Table 12).

In condensed model those variables significant at third model were added to the analysis to see their effect. Six of them still strongly significant association with development of musculoskeletal disorders.

In the final model, some socio-demographic factors (sex, age, marital status, education and service), behavioral factors (systemic illness and recreation activities) and work environment factors(payment method, total break, working with repetitive task with 30 second and working high loaded work) didn't show significant association with work related musculoskeletal disorders (Table 12).

Table 12. Multivariate logistic regression analysis of the adjusted effect of selected socio-demographic , behavioral and psychosocial, work environment factors of participants associated with WRMSDs in the three garments, A.A, Ethiopia, May, (n=422).

Variables	Adjusted OR with (95% C.I)			Condensed model AOR (95% CI)
	Model 1	Model 2	Model 3	
Model 1. Socio-demographic variables				
Sex (RG male)	1.8(0.94-3.54)			
Age Group (RG- <20)				
(20-24 Vs RG)	1.53(0.38-6.09)			
(25-29 Vs RG)	1.94(0.5-7.55)			
(30-34 Vs RG)	2.28(0.51-10.8)			
(35-39 Vs RG)	4.46(0.92-21.6)			
(≥40 Vs RG)	5.55(0.95-32.4)			
Marital status (RG- Married)				
(Single Vs RG)	0.65(0.37-1.13)			
(Divorced Vs RG)	0.81(0.26-2.51)			
(Widowed Vs RG)	0.53(0.17-1.6)			
Education status (RG- certificate ,diploma and above)				
(Unable to read & write Vs RG)	0.62(0.04-9.23)			
(Primary Vs RG)	1.09(0.2-2.29)			
(Secondary Vs RG)	1.31(0.71-2.40)			
Monthly salaries (RG- >2001)				
(<1000 Vs RG)	1.5(0.37-3.89)	1.23(0.48-3.18)	0.4(0.11-1.41)	
(1000–1200Vs RG)	2.53(1.13-5.66)*	2.42(1.06-5.53)*	0.6(0.21-1.76)	
(1201–1500 Vs RG)	3.83(1.77-8.28)**	3.96(1.74)**	1.5(0.55-4.27)	
(1501–2000 Vs RG)	3.91(1.23-12.44)*	5.95(1.65-21.38)**	3.5(0.83-14.8)	
Service year (RG- <5)				
(5-10 Vs <5 ^{RG})	0.53(0.25-1.10)			
(11-15 Vs <5 ^{RG})	0.64(0.14-2.75)			
(≥16 Vs <5 ^{RG})	0.66(0.22-1.97)			
Model 2: Socio-demographic +(behavioral and psychosocial) variables				
Physical exercise				
(No Vs Yes ^{RG})		4(1.25 -12.8)*	2.1(1.08-4.4)*	1.96(1.03-3.72)*

Variables	Adjusted OR with (95% C.I)			Condensed model AOR (95% CI)
	Model 1	Model 2	Model 3	
Recreation activities				
(home activities Vs watching and reading ^{RG})		1.7(0.48-6.0)		
Systemic illness				
(Yes Vs No ^{RG})		3(1.18-8.43)*	2.87(0.92-8.89)	
Alcohol drink				
(Yes Vs No ^{RG})		10.6(1.75-65.3)*	9.7(1.49-90.05)*	9.4(1.15-76.7)*
Job stress				
(Yes Vs No ^{RG})		3.5(2.05-5.9)**	4.5(2.43-8.64)**	4.6(2.55-8.4)**
Job satisfaction				
(No Vs Yes ^{RG})		4.6(2.7-8.06)**	4(2.16-7.4)**	3.92(2.18-7.07)**
Model 3: Socio-demographic +(behavioral and psychosocial) + work environment variables				
Payment method (RG-Fixed salary)				
(Per production Vs fixed ^{RG})			0.68(0.14-3.13)	
Working hours per week				
(>48 Vs ≤48 hrs. ^{RG})			8.5(3.15-23.2)**	7.9(3.2-19.5)**
Total break				
(No Vs 15-30 min ^{RG})			1.3(0.63-2.73)	
(<15 min Vs 15-30 min ^{RG})			0.76(0.05-11.38)	
Working department (RG- Quality control and Supervisors)				
(Sewing Vs ^{RG})			5.5(1.22-24.87)*	6.2(1.7-21.4)**
(Cutting Vs ^{RG})			1.3(0.3-5.73)	1.22(0.33-4.5)
(Designer and marker Vs ^{RG})			0.55(0.08-5.7)	0.6(0.1-3.4)
(Finishing Vs ^{RG})			6.09(1.28-28.9)*	4.4(1.14-1.7)*
Repetitive work RG- never				
(Sometimes Vs ^{RG})			1.81(0.75-4.34)	
(Always Vs Never ^{RG})			1.23(0.48-3.12)	
High loaded work RG- never				
(Sometimes Vs ^{RG})			2.39(0.89-6.39)	
(Always Vs Never ^{RG})			2.29(0.6-8.67)	

RG- Reference Group, *:- Significant at p- value <0.05, ** significant at p- value <0.001

6. Discussion

Work related musculoskeletal disorders occur commonly among garment workers and has been reported with a variable rate. In this study, the overall prevalence of self-reported WRMDs among garment workers was 65.4% [95% C.I: (60.9, 69.7)]. The annual prevalence is higher than three different studies done in Bangladesh from garment workers and the prevalence range 55%-60% (22-24). It is lower than a study conducted from small scale garment worker in India showed that 78.5% (25) and in Thailand Cambodian garment workers showed that 92% (39). Two studies assessed prevalence of 6 month (40) and 30 day (26), but this study finding is for 12 month prevalence. This difference could be due to variations in operational definitions of WRMDs assumed by different studies, difference of the study setting and sample size variation.

The prevalence of specific body region, the annual prevalence of neck pain in India (60.7%) (25), Ethiopia (51%) (9, 18) and Bangladesh (37.7%) (23). these results are higher to the results of the present study (16%). However, our report higher than a study in Sri Lanka found 6.7% (7). This disparity might be difference in study subjects; participants of listed studies were sewing operators that increase the burden. But the study subjects of this study were all production workers including sewing operators.

Another body region shoulder pain prevalence (30%) is consistent with study in India, Bangladesh and slightly lower than study in Ethiopia (18, 23, 25). Elbow pain (2%) in this study is comparable with a study in Sri Lanka found 3% (7) and it was lower with another study in Ethiopia by sewing operators which is 40% (6, 18). The annual prevalence of wrist and hand in Sri Lanka found 7.3% (7), which is consistent with result of this study and lower than a study in India (23%) (25), Ethiopia (37%) (6, 18) and in Daka city Bangladesh (14.2%) (23). Upper back (6%) is lower as compared to a study in India (25). Prevalence of lower back pain (44%) slightly higher than a study in Daka city in Bangladesh and India found that the annual prevalence of lower back pain to be 37.7% and 31.1% respectively. This may be because of our study combined study participants from three different settings with different working section. The nature of activities

performed at different working section could bring variation in prevalence of musculoskeletal disorders.

In addition to prevalence of MSDs within study subject, we also assessed numbers of disorders by body region at individual level. The number of disorders within body region had reported maximum of five disorders 3 (0.7%). Almost 37 % participant from this study had minimum two disorders. This could be the comfortably of machine with sitting and sanding position. The design of sewing machine had standard height but not comfortable for all workers due to variation body height. In garment there were common fixed setting chair but working area design had impact on health of workers.

From total of 80% of them were developed WRMSD. The score assessed by observer and workers assessment. Utilization of vibration tools for more than 4 hrs per day shows that all of them exposed for vibration with high risk. In this study, body region neck score lies in high risk, but moderate in study Brazil. Back, Shoulder /arm, Wrist /hand lies moderate risk but high in Brazil. Work pace (difficulty in keeping) lies 67% low risk the same is true in Brazil. Environment (stress) lies 60% low, but moderate in Brazil (43). This disparity might be due to the difference in the industries setting and technology used by Brazilian and Ethiopia.

Different in globe study showed that several factors were related to the occurrence of work related musculoskeletal disorders. Some like socio demographic, behavioral, and psychosocial and work environment factors.

In this study, we did not observe a trend of increasing pain with increasing age. Age is not significant but in the reverses many researchers revealed that older age workers have higher risk than younger age workers (9, 18, 22-23). And also salaries and service year is not significant in this study but from different literature approved that the increment of salaries of employees in garment setting was depending on their year of service in the same industry. From this study, those had high service year and older age group shifted to less load working section. This may decrease level of body pain. The probability to develop work related musculoskeletal disorders could be higher among highly paid

employees and longer service year than those who were paid less and had short year of service (6, 18, 27). From garments administration more focus given for education than service year. Those have certificate and diploma with zero service have more salaries than who had 27 service years and primary or secondary education. Highly paid workers were younger age and less service year.

Among the behavioral factors of the study a participant, who had no habits of doing physical exercise had 2 times more odds to develop musculoskeletal disorders compared to doing physical exercise at least two times per week for 30 minutes. This is supported by another study done in Ethiopia, reported habits of not doing physical exercise had significant with occurrence musculoskeletal disorders (6). Practicing physical exercise may develop good endurance of body muscles and this might decrease the occurrence of muscular pain. A study conducted in Angles and Boston USA (26, 41) and in Ethiopia (18) shows that workers with medical history of systemic illness has significant association with musculoskeletal disorder. But in this study there is no significant difference in musculoskeletal disorders by presence of systemic illness. This inconsistency might be due to the life style of the two nation is too different.

Workers with habits of alcohol consumption had 9 times higher odds of MSDs than those workers who do not drink alcohol. This is not supported by study in Thailand among Cambodian garment worker which shows that no association with MSDs (39). This inconsistency may be due to a small number of respondents for alcohol drinking habit. The estimation interval was high. This is due to small respondent 18 workers from total.

A strong association exists between job satisfaction and job stress with development of musculoskeletal disorders, those stressful by their job had more than 4 times odds of developing WRMSDs than with no stress. Similarly, workers who are not satisfied by their job had 4 times higher odds MSDs than satisfied by their jobs. This findings are supported by studies done at Angles and Boston USA (26, 41) but the severity is not comparable with us. And also earlier studies of psychosocial factors, reviewed by different scholars (31-32), suggest that job stress is positively associated with musculoskeletal symptoms. This is might be the difference in work setting, the salaries rate and safety standards availing for the workers. Because most of the questions

regarding job stress and satisfaction are focus on availability of safety and good facility the working organization.

Studies conducted in several garment industries across the world, showed that work environment factors are associated with the increased prevalence WRMSDs. Studies done at different countries like Indian, Los Angeles, California, Thailand reported that workers worked above 48 hours per week significantly affect the occurrence of musculoskeletal disorders among the garment worker as compared to worked for 48 hrs and below (9, 18, 25-27). The results of the present study is higher as compared others countries, which had 8 times higher odds of musculoskeletal disorders. These inconsistencies indicate that workers passing more than 48 hours per week higher in developing countries than developed. This finding is also exceed the standard set in Ethiopian labour proclamation number 377/2003 that states as follows; “The time during which a worker actually performs work or avails herself/himself for work in accordance with law, collective agreement or work rules shall not exceed 8 hours per day ” (42).

In this study, workers working in sewing section and finishing section were 6 times and 4 times more likely to develop musculoskeletal disorders than workers working in quality control and supervisors section. This finding strongly consistent with study conducted in Dhaka city from three garments (23). It shows that the disorders were more common among the workers who worked in sewing and finishing section. Workers working in these sections pass most of their time by setting and standing position. Due to this most of anatomical body region develop muscular pain. From this evidence it can be suggested that sewing operators in different setting and different population is the affected working group and need more appropriate modern technology and technique in terms of operators.

7. Strengths and Limitations of the study

7.1 Strengths of the study

The following is strength of this study.

- Use of mixed tools; interview and ergonomic risk assessment method to improve data validity.

7.2 Limitation of the study

This study could have the following limitation

- ❖ Being cross sectional study doesn't allow the study to establish causal relationship between factors and musculoskeletal disorders symptoms.
- ❖ The one year musculoskeletal disorders prevalence may be under or over-estimated due to recall bias.
- ❖ Social desirability bias might be also introduced, although much effort is done to minimize it.
- ❖ We did not have any measurement scale for measuring the intensity of the pain/discomfort which was reported by respondents.

8. Conclusions and Recommendations

8.1 Conclusions

In this study, it is evident that the majority of the workers had been suffering from some kind of musculoskeletal disorders depending upon the nature of work. From nine body region lower back pain and ankles/foot pain dominant. The musculoskeletal disorders were more common among the workers who worked in sewing and finishing section. The occurrence of musculoskeletal disorders is significantly associated habits of doing physical exercise, job stress, job satisfaction, alcohol consumption, work hour per week and working department.

8.2 Recommendation

Based on the findings in this study; the following recommendation are forwarded accordingly

To the garment industries

- ✓ Better to practice self-stretching physical exercise during their break time to avoided muscles fatigue.
- ✓ Minimize extra working hour duties
- ✓ Better to use work ration, to decrease repetitive exposure of body region by the same task
- ✓ The owners should create good working environment for workers to be motivated. By satisfying their need, like salaries increment, rewarding good performer..

To Bureau of labor and social affairs (BOLSA)

- ❖ The implementation of health and safety policy in country level is invisible. So regional BOLSA should applies health and safety practice at garment industry level.

Further Research:

- Better to study with different design and setup could be essential to get strong conclusion.

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Annex I: ENGLISH VERSION PARTICIPANT'S INFORMATION SHEET

Hello my name is -----I am here on behalf of Zenebe Girma, post graduate student from AAU, School of public health. I am member of research team on assessment of musculoskeletal disorders and associated factors and requesting you to participate in this study which would require your response to an interview on some related issues.

Title of the study: *Assessing the prevalence of work related musculoskeletal disorders and associated factors among textile workers in selected garments in Addis Ababa, Ethiopia.*

Introduction: The textiles sector poses many hazards that can harm to workers in different way. The risk of work related musculoskeletal disorders increasing from time to time and become the most public health problem in the world. The problem is growing in textile specifically among garment workers in many developing countries. In Ethiopia the expansion of textile and garment industries is very high. Due to low work place occupational health and safety practice, the occurrence of work related musculoskeletal disorders among garment workers will be high.

Objective: The Objective of this study is to assess the prevalence of musculoskeletal disorders and its associated factors among workers in selected garment in Addis Ababa, Ethiopia, 2015/16.

Duration of interview: This interview will take about 15 minutes

Confidentiality: to establish secured safeguards of the confidentiality of research data, your name will not be written in this form and all information given by you will be kept strictly confidential.

Benefit of the study: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design of occupational health and safety programs based on the recommendations and the findings.

Risk and /discomfort of the study: The study has no any risk for the participants.

Right of the participant: Participating and not participating is the full right and participants can stop from participation in the study at any time. This would have no effect at all on your health benefit or other administrative effect and nobody will enforce you to explain the reason of withdrawal. Participant can skip question which the worker doesn't want to respond.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa university school of public health. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.

Annex II: INFORMED CONSENT FORM

Title of the study: *Assessing the prevalence of work related musculoskeletal disorders and associated factors among textile workers in selected garments in Addis Ababa, Ethiopia.*

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate investigator is Zenebe Girma. I have been fully informed in the language I understand about the research project objective is to assess prevalence of work related musculoskeletal and its association factors among garment workers.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the garments factory.

If you want more information and check about this study you can contact through the following address.

Investigator: Mr. Zenebe Girma Tel: 0913 71 96 88 (Mobile)

Advisor: Dr. Abera Kumie, SPH, AAU; Mobile: 0911882912\ Office: 011-5157701

Ms. Meaza Gezu, School of Public Health, Mobile: 0912 03 27 97

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of witness signature _____ (Data collector, supervisor, any third person)

Signature _____ Date _____

ANNEX III- QUESTIONNAIRE- ENGLISH VERSION

Part 1: Socio – Background characteristics for the study subjects.



CODE -----

Working department **A.** sewing section **B.** cutting section
C. Designing and Marking **D.** Quality control and Supervisors **E.** Finishing Section

S. No	Questions /variables	Coding category	Skip to
101	How old are you	Age in years _____	
102	Sex of worker	1. male 2. female	
1 03	What is your current marital status?	1. Married 2. Single 3. Divorced 4. Widowed	
104	Educational level	1. Unable to read and write 2. Write & read only 3. Primary school completed (1-8) 4. secondary school complete(9-12) 5. Certificate/ diploma / Degree	
105	Monthly salary	----- birr	
106	Overall, how-many-years have you been worked in garment	----- years	

107	What is your religion?	1. Orthodox Christian 2. Catholic 3. Protestant 4. Muslim 5. If other (specify) _____	
-----	------------------------	---	--

Part 2: Personal factors associated with WRMSDs among garments worker

S. No	Questions /variables	Coding category	Skip to
201	Height in meter	meter	
202	Weight in kg	kg	
203	BMI (body mass index)	Underweight (<18.5 kg/m ²) Healthy (18.5–24.9 kg/m ²) Overweight (25–29.9 kg/m ²) Obese (≥30 kg/m ²)	
204	Do you have Habit of doing physical exercise at least twice per week for 30 minutes?	Yes No 	Q.206
205	If yes for Q204 how often?	Two times per week ≥Three times per week	
206	What types work do you practice after leaving in these compound	No at all The same types of work Others specify _____	
207	How you pass your recreation time?	Watching movies and reading books Others specify _____	
208	Do you Smoke cigarette?	Yes No 	Q210
209	If your answer is yes for question number 208 How many cigarettes do you smoking per day?	-----sticks -----packet	
210	Do you consume any kind of alcohol at least twice per week?	Yes No	
211	Medical history of systemic illness	Yes No	

Part 3: Organizational factors associated with WRMSDs among garments workers

S. No	Questions /variables	Coding category	Skip to
301	Employment status	Temporary Permanent	
302	Payment method	Hourly payment Fixed monthly payment Per production payment	
303	Total working hours per weeks	----- hrs	
304	Total working breaks excluding lunch break	1. None 2. ≤15 minutes 3. above 15 minutes	
305	Training on issue of ergonomics	Yes No	

Part 4: Psychosocial factors associated with WRMS disorders among garments workers.

Questions to measure job stress (Q 401-408)						
S. No	Questions /variables	Job stress score				
		Never	Rarely	Some times	Often	Very often
401	Conditions at work are unpleasant or sometimes even unsafe.	1	2	3	4	5
402	I feel that my job is negatively affecting my physical or emotional wellbeing	1	2	3	4	5
403	I have high loaded work to do and/or too many unreasonable deadlines.	1	2	3	4	5
404	I find it difficult to express my opinion or feelings about my job conditions to my superiors.	1	2	3	4	5
405	I feel that job pressures interfere with my family or personal life.	1	2	3	4	5
406	I have adequate control or input over my work duties.	5	4	3	2	1
407	I receive appropriate recognition or rewards for good performance.	5	4	3	2	1
408	I am able to utilize my skills and talents to the fullest extent at work	5	4	3	2	1
Questions to measure job satisfaction (Q 409-418)						
S. No	Questions /variables	Job satisfaction score				
		Very	Dissatisfied	Neutral	Satisfied	Very

		dissatisfied				satis fied
409	I receive recognition for a job well done.	1	2	3	4	5
410	I feel close to the people at work.	1	2	3	4	5
411	I feel good about working at this company.	1	2	3	4	5
412	I feel secure about my job.	1	2	3	4	5
413	I believe management is concerned about me.	1	2	3	4	5
414	On the whole, I believe work is good for my physical health	1	2	3	4	5
415	My wages are good.	1	2	3	4	5
416	All my talents and skills are used at work.	1	2	3	4	5
417	I get along with my supervisors.	1	2	3	4	5
418	I feel good about my job	1	2	3	4	5

Part 5: Working environmental factors associated with WRMS disorders among garments workers.

S. No	Questions /variables	Possible answer	Skip to
501	Repetitive work within <30 seconds	Never Sometimes Always	
502	Doing high loaded work	Never Sometimes Always	
503	Availability of sufficient light	Yes No	
504	Types of setting chair	Fixed Adjustable	
505	Fitness of the working machine with setting chair?	Comfortable Non comfortable	

Part 6: Prevalence of WRMSDs among garments workers by Nordic Musculoskeletal Questionnaire

Please answer by using the tick boxes

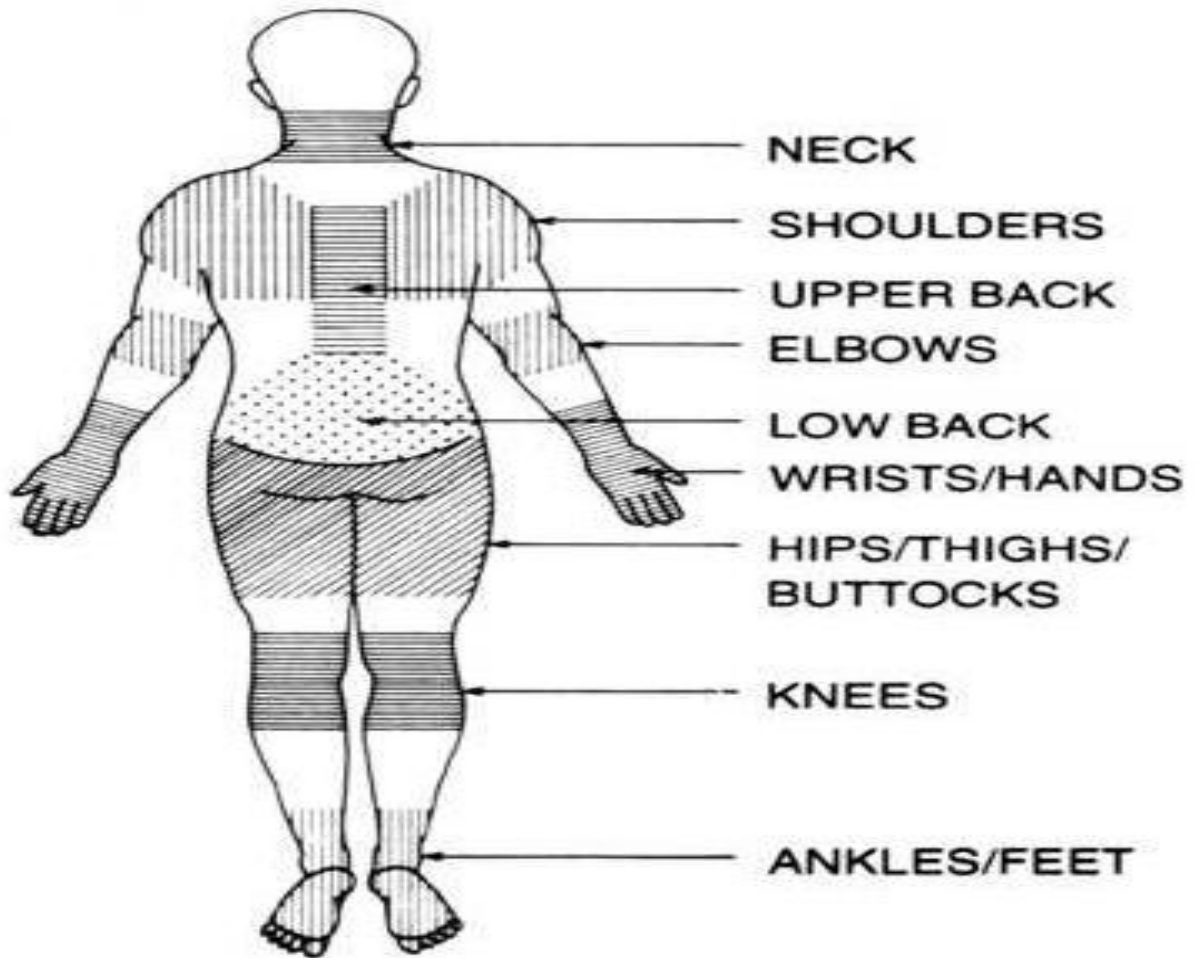
– one tick for each question

Please note that this part of the questionnaire should be answered, even if you have never had trouble in any parts of your body.

Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	Have you had trouble during the last 7 days:	During the last 12 months have you been prevented from carrying out normal activities (eg. job, housework, hobbies) because of this trouble:
1 Neck No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	2 Neck No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	3 Neck No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
4 Shoulders No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right shoulder 3 <input type="checkbox"/> in the left shoulder 4 <input type="checkbox"/> in both shoulders	5 Shoulders No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right shoulder 3 <input type="checkbox"/> in the left shoulder 4 <input type="checkbox"/> in both shoulders	6 Shoulders (both/either) No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
7 Elbows No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right elbow 3 <input type="checkbox"/> in the left elbow 4 <input type="checkbox"/> in both elbows	8 Elbows No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right elbow 3 <input type="checkbox"/> in the left elbow 4 <input type="checkbox"/> in both elbows	9 Elbows (both/either) No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
10 Wrists/hands No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right wrist/hand 3 <input type="checkbox"/> in the left wrist/hand 4 <input type="checkbox"/> in both wrists/hands	11 Wrists/hands No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/> in the right wrist/hand 3 <input type="checkbox"/> in the left wrist/hand 4 <input type="checkbox"/> in both wrists/hands	12 Wrists/hands (both/either) No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
13 Upper back No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	14 Upper back No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	15 Upper back No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
16 Lower back (small of the back) No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	17 Lower back No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	18 Lower back No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
19 One or both hips/thighs/buttocks No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	20 Hips/thighs/buttocks No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	21 Hips/thighs/buttocks No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
22 One or both knees No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	23 Knees No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	24 Knees No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>
25 One or both ankles/feet No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	26 Ankles/feet No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>	27 Ankles/feet No Yes 1 <input type="checkbox"/> 2 <input type="checkbox"/>

Figure 2 Musculoskeletal questionnaire

Human Body segments



Annex- IV: Amharic Version Participant's Information Sheet

በአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ቤት

የጥናቱ መግለጫና የፈቃደኝነት መስጫ የአማርኛ ቅፅ

መግቢያ:- ጤና ይስጥልኝ እንደምን አሉ? እኔ _____ እባላለሁ። እዚህ የመጣሁት ይህንን ጥናት የሚያካሄድ የአዲስ አበባ ዩኒቨርሲቲ የጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል የድህረ ምረቃ ተማሪ የሆነውን ዘነበ ግርማ ወክዬ ነው። በአዲስ አበባ ከተማ በሚገኙ ጨርቃጨርቅ ኢንዱስትሪ ውስጥ በሚሰሩ ሠራተኞች በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው። ስለዚህ በጥናቱ ላይ ተሳትፎ ለማድረግ ወይም ላለማድረግ እንዲወስኑ በቅድሚያ የተወሰነ መረጃ እንሰጥዎታለን።

የጥናቱ ርዕስ: በአዲስ አበባ ከተማ በሚገኙ ጨርቃጨርቅ ኢንዱስትሪ ውስጥ በሚሰሩ ሠራተኞች በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው።

የጥናቱ ጥቅም: ይህ ጥናት ለተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት የገንዘብ፣ የጤና እንክብካቤም ሆነ ሌሎች ጥቅሞች የሉትም። ነገር ግን በሂደት የጥናቱ ውጤት ለሚመለከተው አካልና እንደ ግብዓትነት ያገለግላል። በተለይ በመስኩ እንደ መነሻ መረጃ ሆኑ ያገለግላል።

የጥናቱ ጉዳት: የቃለ መጠይቁ ተሳታፊ በጥናቱ የሚደርስባቸው ምንም ዓይነት ጉዳት አይደርስባቸውም።

ሚስጥራዊነት : ተሳታፊዎች ስማቸውን እንዲጠቅሱ አይጠበቅም። ማንኛውንም ተሳታፊዎች የሚሰጡትን መረጃ በሙሉ ሚስጥራዊነቱ እንዲጠበቅ የጥናቱ ስነ-ምግባር ያስገድዳል በመሆኑም ተሳታፊው የሚሰጠው መረጃ ሚስጥራዊነት ስለሚኖረው ተሳታፊው ከአስተዳደራዊ ጫና ነፃ ነው።

የተሳታፊዎች መብት:- ተሳታፊው በዚህ ጥናት ላይ የመሳተፍ ወይም አለመሳተፍ መብቱ የተጠበቀ ነው። በመሳተፍ ላይ እያሉ ካልፈለጉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ ለመመለስ የማይፈልጉትን ጥያቄ አለመመለስ ይቻላል። ቃለ-መጠይቁ በአማካይ 10-15 ደቂቃ ይወስዳል። በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል።

መገናኘት የሚፈልጉ ከሆኑ:- የጥናቱ ተሳታፊ ስለጥናቱ ሁኔታ እና ይዘት ግልፅ ካልሆነለት በማንኛውም ሰዓት መረጃ የመጠየቅ መብት አለው። ለዚህም ዋናው አጥኚው ስም ዘነበ ግርማ /0913 71 96 88 እና የጥናቱ አማካሪ ስም ዶ/ር አበራ ቁሜ 0911 88 29 12 እና ወ/ሪት መዓዛ ገዙ 0912 03 27 97 ማግኘት ይችላሉ። በዚህ ሰዓት ስለ ቃለ መጠይቁን ዓላማ ወይም ይዘት የሚጠይቁኝ ነገር አለ ? በጥናቱ ለመሳተፍ ፈቃደኛ ነዎት?

የፈቃደኝነት መግለጫ ቅፅ

ከዚህ በላይ ስለጥናቱ የተጻፈውን መግለጫ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ ተረድቻለሁ። በማንኛውም ሰዓት ከጥናቱ ያለምንም ቅጣት ማቋረጥ እንደምችል ተረድቻለሁ። በመሆኑም በዚህ

- 1. እስማማለሁ 2. አልስማማም (መልሱ እስማማለሁ ከሆነ ወደሚቀጥለው ገፅ ይሻገሩ። መልሱ አልስማማም ከሆነ አመለካከት ብለው ወደሚቀጥለው ሠራተኛ ይሂዱ። ለጥናቱ ፈቃደኛ ያልሆኑበትን ምክንያት በመጠየቅና በማስታወሻ ላይ በመያዝ ለጥናቱ ተቆጣጣሪ ሪፖርት ያድርጉ።

መለያ ኮድ ቁጥር ----- የተጀመረበት ሰዓት: _____ ያለቀበት ሰዓት _____

የቃለ መጠይቅ አድራጊው:-ስም ----- መለያ ኮድ ቁጥር _____

ቃለ መጠይቁን ያረጋገጠው ስፕሪንግቲን ስም _____ ፊርማ _____

አጥኝ ፊርማ 1 :- _____ ቀን _____

ANNEX V- QUESTIONNAIRE- Amharic Version

የመጠይቁ መለያ ቁጥር..... የስራ ክፍል ኮድ _____

ክፍል 1 ማህበራዊ መረጃዎችን በተመለከተ የሚቀርብ መጠይቅ

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ ኮድ ቁጥር	ይዘለል
101	እድሜዎ ስንት ነው?	እድሜ በዓመት ----- ---	
102	የፆታ ሁኔታ	ወንድ ሴት	
103	የጋብቻዎ ሁኔታ	ያገባች ያላገባች የፋታ/ች የሞተባት/በት	
104	የትምህርት ደረጃዎ ምን ያህል ነው?	ማንበብና መጻፍ የማይችሉ ማንበብና መጻፍ ብቻ አንደኛ ደረጃ የጨረሱ (1-8ኛ) ሁለተኛ ደረጃ የጨረሱ(9-12) ቴክኒክና ሙያ ወይም ዲግሪ እና በላይ	
105	የወር ገቢዎ ምን ያህል ነው?	----- ብር	
106	በዚህ ስራ ላይ ምን ያህል የስራ ልምድ አለዎት?	----- አመት	

107	ሐይማኖት-ቶ ምንድነው ?	ኦርቶዶክስ ክርስቲያን ካቶሊክ ፕሮቴስታንት እስልምና ሌላ /ግለጽ/ -----	
-----	-----------------	---	--

ክፍል 2. በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠንና ከሰራተኛው ባህሪ ጋር ተያይዞ ያሉ መንስኤዎች

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ ኮድ ቁጥር	ይዘት
201	የሰውነት ቁመት በሜትር	----- ሜትር	
202	የሰውነት ክብደት በኪ.ግ	----- ኪ.ግ	
203	የሰውነት ክብደት ከቁመት ጋር ሲነፃፀር (BMI)	1. ዝቅተኛ ክብደት (<18.5 ኪ.ግ/ሜ ²) 2. ጤናማ ክብደት (18.5—24.9 ኪ.ግ/ሜ ²) 3. ከፍተኛ ክብደት (25—29.9 ኪ.ግ/ሜ ²) 4. ከመጠን በላይ ውፍረት(≥30 ኪ.ግ/ሜ ²)	
204	የአካል ብቃት እንቅስቃሴ በሳምንት ቢያንስ 2 ቀን ለ30 ደቂቃ የመስራት ልማድ አለዎት	አዎ የለም	መልስዎ የለም ከሆነ ወደ ጥያቄ ቁጥር 206 ይሄዱ
205	መልስዎ አዎ ከሆነ ወደ ለስንት ጊዜ	1. በሳምንት ሁለት ቀን 2. በሳምንት ከሶስት ቀን በላይ	
206	ከስራ በኋላ ውጭ ምን አይነት ስራ ትሰራለህ/ሽ	1. ምንም 2. ተመሳሳይ ስራ 3. ሌላ ካለ ይገለፅ -----	
207	የትርፍ ጊዜ እንዴት	1. መዝናኛ ፊልም በማየት እና	

	ታሳልፋለህ ?	2. መፅሐፍት በማንበብ 3. ሌላ -----	
208	ሲጃራ ታጨሳለህ/ሽ	1. አዎ 2. የለም	መልስዎ የለም ከሆነ ወደ ጥያቄ ቁጥር 210 ይሄዱ
209	የጥያቄ ቁጥር 207 መልሱ አዎ ከሆነ ምን ይህል ጊዜ ያጨሳሉ	-----ፍሬ/በቀን -----ፓክ/በቀን	
210	በሳምንት ቢያንስ ሁለት ጊዜ ማንኛውንም አልኮል መጠጥ ይጠጣሉ?	1. አዎ 2. የለም	
211	አጠቃላይ የጤና ችግር መኖሩን ከጡንቻ ውጭ	አዎ የለም	

ክፍል 3. በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠንና ከመስሪያ ቤቱ አስራር ሁኔታ ጋር ተያይዞ ያሉ መንስኤዎች

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ ኮድ ቁጥር	ይዘለል
301	የቅጥር ሁኔታ	1. ጊዜያዊ 2. በቋሚነት	
302	የክፍያ ሁኔታ	1. በሰዓት 2. በቋሚ ደሞወዝ 3. በምርት ልክ	
303	በሳምንት ምን ይህል ሰዓት ይሰራሉ	----- ሰዓት	
304	በቀን ከምሳ ሰዓት ውጭ ለምን ያህል ደቂቃ እረፍት ያገኛሉ	1. ምንም የለም 2. ≤ 15 ደቂቃ 3. ≥ 15 ደቂቃ	
305	ከሙያ ደህንነት በተያያዘ በዚህ 12 ወራት ውስጥ	1. አለ 2. የለም	

	የተሰጠ ስልጠና ስለመኖሩን		
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ክፍል 4. በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠን ከስራ ድብርትና እርካታ ጋር ተያይዞ ያሉ መንስኤዎች

የስራ ድብርት የተመለከቱ ጥያቄዎች (ጥያቄ 401-408)						
ተ.ቁ	ጥያቄ	የስራ ድብርት መለኪያዎች				
		በፍፁም	አልፎ አልፎ	አንዳንዴ	ብዙጊዜ	ሁልጊዜ
401	የስራ ቦታ ሁኔታዎች ደስ የማይሉና አንዳንዴ ደህንነቱ ያልተጠበቀ ነው	1	2	3	4	5
402	ስራዬ አካላዊና ስነ-ልቦናዊ ጉዳት እያደረሰብኝ ነው ብለው ያስባሉ?	1	2	3	4	5
403	ብዙ የስራ ጫና አለብኝ ብለው ያስባሉ?	1	2	3	4	5
404	ስለ ስራ ሁኔታዎ ለአለቆች ለመናገር ይከብደኛል ብለው ያስባሉ?	1	2	3	4	5
405	የስራ ጫናው ከግልና ቤተሰብ ህይወቴ ይጋጫል ብለው ያምናሉ?	1	2	3	4	5
406	የስራ ድርሻዬን በአግባቡ ማከናወንና መቆጣጠር እችላለሁ ብለው ያምናሉ?	5	4	3	2	1
407	በጥሩ ለስራሁት ስራ እውቅና/ሽልማት ይሰጠኛል	5	4	3	2	1
408	ችሎታዬና ክህሎቴ በስራዬ በደንብ እጠቀማለሁ ብለው ያምናሉ ?	5	4	3	2	1
የስራ እርካታን የተመለከቱ ጥያቄዎች (ጥያቄ 409-418)						
ተ.ቁ	ጥያቄዎች	የስራ እርካታ መለኪያ				
		በጣም ደስተኛ አይደለሁም	ደስተኛ አይደለሁ	መካከለኛ	ደስተኛ	በጣም ደስተኛ
409	በጥሩ ለስራሁት ስራ እውቅና ይሰጠኛል ብለው ያምናሉ	1	2	3	4	5
410	ከስራ ባልደረቦቼ ቅርበት እንዳለኝ ይሰማኛል ብለው ያስባሉ	1	2	3	4	5
411	እዚህ ፋብሪካ በመስራትዎ ደስታ ይሰማዎታል	1	2	3	4	5
412	በስራዬ ደህንነት ይሰማኛል ብለው ያስባሉ	1	2	3	4	5
413	የስራ አመራሩ ሰለኔ ጥሩ ያስባል ብለው ያስባሉ	1	2	3	4	5

414	በአጠቃላይ ስራው ለአካላዊ ጤንነቱ ጥሩ ነው ብለው ያምናሉ	1	2	3	4	5
415	የሚከፈለኝ ደመወዝ ጥሩ ነው ብለው ያስባሉ	1	2	3	4	5
416	ችሎታዬና ክህሎቴ በስራዬ እጠቀማለሁ ብለው ያስባሉ	1	2	3	4	5
417	ከተቆጣጣሪዎቼ/አለቆቼ እስማማለሁ ብለው ያስባሉ	1	2	3	4	5
418	በስራዬ ደስተኛ ነኝ ብለው ያስባሉ	1	2	3	4	5

ክፍል 5. በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠን ከስራ ቦታ ጋር ተያይዞ ያሉ መንስኤዎች

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ ኮድ ቁጥር	ይዘለል
501	በመደበኛ ስራዎ ቦታ ላይ ድግግሞሽ የበዛበት ስራ (በየ30 ሴኮንድ የሚደጋገም ድግግሞሽ ስራ) ይገጥሞታል	1. በፍፁም 2. አንዳንዴ 3. ሁል ጊዜ	
502	በመደበኛ ስራዎ ላይ ክፍተኛ የስራ ጫና አጋጥሞት ያውቃል	1. በፍፁም 2. አንዳንዴ 3. ሁል ጊዜ	
503	በመደበኛ የስራ ክፍሎት ላይ በቂ የሆነ ብርሃን አለ?	1. አዎ 2. የለም	
504	ለስራ በመደበኛነት የመቀመጫ ወንበር ሁኔታ ምን ይመስላል	1. ቋሚ (ከፍ ዝቅ ማለት የማይችል) 2. ተንቀሳቃሽ(ከፍ ዝቅ ማለት የሚችል)	
505	የመቀመጫ ወንበርዎ ከመስሪያ ጠረጴዛ ወይም ማሽን ጋር ያለው ምቹነት	1. ምቹ ነው 2. ምቹ አይደለም	

ክፍል 6. ባለፉት 12 ወራት ውስጥ በስራ ምክንያት የሚከሰቱ የጡንቻና የመገጣጠሚያ አካላት ህመም መጠን ለማወቅ የተዘጋጀ መጠይቅ ኖርዲክ ስታንዳርድ

ባለፈው 12 ወራት ውስጥ በጡንቻና የመገጣጠሚያ አካላት ላይ አስቸጋሪ የሆነ የህመም ስሜት አጋጥሞት	በዚህ 7 ቀን(አንድ ሳምንት) ውስጥ አስቸጋሪ የሆነ የህመም ስሜት አጋጥሞት ያውቃሉ?	ባለፈው 12 ወራት ውስጥ በጡንቻዎ ላይ በተከሰተው መደበኛ ስራዎ እንዳይሰሩ ከልክሎት ያውቃል?
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ያውቃለሁ?					
1	አንገት ሀ. የለም ለ. አዎ	2	አንገት ሀ. የለም ለ. አዎ	3	አንገት ሀ. የለም ለ. አዎ
4	ትክሻ ሀ. የለም ለ. አዎ ከሆነ በቀኝ ትክሻ በግራ ትክሻ በሁለቱም ትክሻ	5	ትክሻ ሀ. የለም ለ. አዎ ከሆነ በቀኝ ትክሻ በግራ ትክሻ በሁለቱም ትክሻ	6	ትክሻ (በሁለቱም ወይም በአንዱ ከታየ ሀ. የለም ለ. አዎ
7	ክርን ሀ. የለም ለ. አዎ ከሆነ በቀኝ ክርን በግራ ክርን በሁለቱም ክርን	8	ክርን ሀ. የለም ለ. አዎ ከሆነ በቀኝ ክርን በግራ ክርን በሁለቱም ክርን	9	ክርን (በሁለቱም ወይም በአንዱ ከታየ ሀ. የለም ለ. አዎ
10	የእጅና አንጓው ሀ. የለም ለ. አዎ ከሆነ በቀኝ እጅና አንጓው በግራ እጅና አንጓው በሁለቱም እጅና አንጓው	11	የእጅና አንጓው ሀ. የለም ለ. አዎ ከሆነ በቀኝ እጅና አንጓው በግራ እጅና አንጓው በሁለቱም እጅና አንጓው	12	የእጅና አንጓው (በሁለቱም ወይም በአንዱ ከታየ ሀ. የለም ለ. አዎ
13	የላይኛው ወገብ/ ጀርባ ሀ. የለም ለ. አዎ	14	የላይኛው ወገብ/ ጀርባ ሀ. የለም ለ. አዎ	15	የላይኛው ወገብ/ ጀርባ (በሁለቱም ወይም በአንዱ ከታየ ሀ. የለም ለ. አዎ
16	የታችኛው ወገብ/ ጀርባ ሀ. የለም ለ. አዎ	17	የታችኛው ወገብ/ ጀርባ ሀ. የለም ለ. አዎ	18	የታችኛው ወገብ/ ጀርባ ሀ. የለም ለ. አዎ
19	ዳሌና መቀመጫ አካባቢ ሁለቱም ሀ. የለም ለ. አዎ	20	ዳሌና መቀመጫ አካባቢ ሀ. የለም ለ. አዎ	21	ዳሌ፣ ታፋ(መቀመጫ አካባቢ) ሀ. አዎ ለ. የለም
22	ጉልበት ሁለቱም ሀ. የለም ለ. አዎ	23	ጉልበት ሁለቱም ሀ. የለም ለ. አዎ	24	ጉልበት (በሁለቱም ሀ. አዎ ለ. የለም
25	እግር/አልቦ ሁለቱም ሀ. የለም ለ. አዎ	26	እግር/አልቦ ሁለቱም ሀ. የለም ለ. አዎ	27	እግር/አልቦ (በሁለቱም ወይም በአንዱ ከታየ ሀ. የለም ለ. አዎ

Annex VI. Ergonomic risk assessment matrix for quick exposure check (QEC)

Table 1: Ergonomic Risk Assessment matrix for quick exposure check

Risk Rating (RR)	L	Moderate	High	Very
	o	ate	h	y
Assessment Scores				
Back:	1	21-30	31-	41-
Shoulder/Arm:	1	21-30	31-	41-
Wrist/Hand:	1	21-30	31-	41-
Neck:	2-	7-10	11-	15-
Stable Base(driving)	1	4	9	
Vibration	1	4	9	-
Work Pace(difficulty in keeping up this work)	1	4	9	-
Environment(presence of	1	4	9	16

Source: - Quick Exposure check reference guide 2009.