



Addis Ababa University

College of Health Sciences

School of Public Health

Self-Reported Work Related Musculoskeletal Disorders
and Determinant Factors Of Female Beauty Salon Hair
Dressers, In Addis Ababa, Ethiopia, 2016

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Abbreviations / Acronyms

AAU:	Addis Ababa University
AOR:	Adjusted Odds Ratio
BMI:	Body mass index
CI:	Confidence Interval
COR:	Crude Odds Ratio
HSE:	Health and safety executive
ILO:	International labor organization
MSD:	Musculoskeletal disorder
NIOSH:	National Institute of Occupational Safety and Health
QOL:	Quality of life
SPSS:	Statistical Package for Social Sciences
WHO:	World Health organization
WMSD:	Work related musculoskeletal disorder

Abstract

Background: Hair dressers are one of the high risk professionals for work related musculoskeletal disorder. Which are not frequently studied and there is little evidence on this problem. So studying about work related musculoskeletal disorder among hairdressers is one of the key issues in improving worker's health and safety.

Objective: The aim of this study is to assess the magnitude and associated factors of self reported work related musculoskeletal disorder among hair dressers in Addis Ababa, Ethiopia.

Method: Across sectional study was conducted among hair dressers who were working in Addis Ababa, city with a sample size of 609. Five sub cities and hairdressing salons were selected randomly. Data were collected using structured questionnaire adapted from Nordic questionnaire. Six data collectors and two supervisors were involved. Data was entered; coded and cleaned using Epi Info version 7 and then the data was exported into the SPSS 20 for analysis. Bivariate and multivariate logistic regression analyses were used to determine association.

Result: The prevalence of work related musculoskeletal disorders was 76.6%. The most commonly affected body parts were, the lower back (71.5%), shoulder (51.6%) and hand or wrist (46.6%). The risk factors of the WMSDs that were identified included, work experience [AOR: 2.5, 95%CI (1.2-5.4)], time spent in standing position for long periods [AOR: 2.6, 95%CI (1.6-7)], working hours per week [AOR: 1.5, 95%CI (1.06-2.4)], BMI[AOR: 2, 95%CI (1.1-4.1)], and thermal condition[AOR: 1.6, 95%CI (1.0-2.4)]. Taking sufficient rest by hair dressers was one of the coping strategies adopted by the hairdressers.

Conclusions and recommendation: The prevalence of work related musculoskeletal disorder among hair dressers was higher and the three most body parts reported were lower back, shoulder and hand. Generally the tasks ,working posture ,work experience , workload, thermal condition and BMI in hair dressing were create a high risk of work related musculoskeletal disorder to hairdressers . The problem should have got public and regulatory bodies attention to promote health of workers in the salon.

1. Introduction

1.1 Background

Work-related musculoskeletal disorders (WMSDs) as injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs associated with exposure to risk factors in the workplace. WMSDs do not include disorders caused by slips, trips, falls, motor vehicle accidents, or similar accidents [1, 2] and include all MSDs that are induced or aggravated by work and the circumstances of its performance. It describes a wide range of inflammatory and degenerative conditions. These conditions result in pain and functional impairment of musculoskeletal system of the body [2-4].

WMSDs have been a worldwide issue in many countries. A recent statics report of health and safety executive of Great Britain, 2015 showed that WRMSDs accounted for 44% of the prevalence of all work related ill-health and the number of new cases of WRMSDs (incidence) was 169,000, an incidence rate of 530 cases per 100,000 people. An estimated 9.5 million working days were lost due to WRMSDs [5].

In many of the WRMSDs studies, risk factors that contribute to the development of WMSDs broadly categorized as workplace activities (ergonomics), workplace physical conditions, individual, psychosocial and organizational factors [6]. The main workplace activities related with WMSDs are awkward and static postures, repetitive work, vibration and manual handling [7]. The workplace physical conditions include extreme temperature, poor lightning, work environment, etc [8]. Individual factor includes medical history, obesity, physical activity, clothing, smoking and Leisure time activities [6]. Psychosocial and organizational factor includes work demand, work control, relationship, support, job security, etc [9]. It has been widely accepted that awkward and constrained postures result in musculoskeletal stress on different body regions of seated workers and are a major factor in the development of musculoskeletal disorders [9, 10].

Hair dressers are one of the high risk professionals for WRMSDs, which might be due to the long standing work posture, repetitive tasks such as, hair washing, cutting, blow-drying, hair blow waving, rolling and hair designing are performed in different ergonomic work technique by the hair dressers. Beyond the working conditions and ergonomic factors they are highly contacted with the customer and the job become

demanding. China's National Health Interview Survey 2002 reported that, of the top 15 major occupations, female hair dressers were the third most at risk for work-related lower back pain. Various health problems can occur as a result of exposure to different risk factors [11]. Majority of hair dressers develop WMSD due to the presence of exposure to work place factors. However, studies concerning occupational health particularly on WRMSD among hairdressers are rare.

In Ethiopia, although the hair dressing salon businesses are growing in number and categorized under the small and micro enterprises level, which constitutes about 5.6 percent of this sector [12]. Hair salons have on average fewer than five workers and for the vast majority run by self-employed hairdressers who often work on their own, hence they are not covered by the labor inspection and occupational health services.

1.2 Statement of the problem

Musculoskeletal disorders are the most common cause of physical disability and severe long-term pain in working individuals. Population surveys estimated that for a one-month period of recall, up to 50% of people in the general population experience musculoskeletal pain at one or more anatomical sites [13]. These public health problems were not well recognizing due to data limitation the area of work related disease and absence of an effective and continuous monitoring program regarding to occupational health and safety [13].

Working in hair dressing salon were the health and safety issue is in question and knowledge of ergonomics were limited. Worldwide, with around one million Hairdressers are exposed to chemical agents, ergonomics problem and work-related disorders. WMSDs like work-related upper limb disorders, shoulder and neck problem, joint pain and aback problems with severe long term pain were the most common among them. [14, 15].

In developing countries hair dressers had poor working condition and environment, hair dresser and owner of the beauty salons were not aware of the benefits of a proper design of the work environment and appropriate work practices. A higher prevalence 75.6 % WMSDs was observed among hair dressers of one of African country Nigeria, Lagos with the main contributing Potential risk factors of working in the same position for long hours and attending large number of customer in one day [10, 16].

This should also be true for Ethiopia where there is poor working environment and no strong functioning health and safety system. Studies regarding to WMSD are limited, however a few study conducted among nurses, laboratory technologist and garment industry workers [17-19] but Information on WMSDs among hair dressers still missing. The ministry of labor and social affairs don't addressed the occupational health and safety issue of small and micro enterprise like hair dressing salons and others. Thus, the magnitude of WRMSDs on the workers was unknown. There is no clear monitoring measure of WMSDs and no clear strategy developed to prevent the impact of WMSDs for the working force. Therefore, the main aim of this study was to determine the magnitude and associated factors which contribute for the development WRMSDs among workers engaged in the hairdressing activity.

1.3Significance of the study

Work related musculoskeletal disorder are one of the most important public health problem .These problem are causing long period of disability and may increase high treatment cost. There is less information about the magnitude and impacts of Work-related musculoskeletal disorders among employed population in developing countries when compared to developed ones.

Currently in Ethiopia small and micro enterprises are expanded but Knowledge concerning on occupational health and safety to workers is minimal, as well as there is lack of strong functioning health and safety system in these fastest growing sectors. Information on occupational health risks and associated health problems is helpful for raising awareness at all level and making the problem more visible to responsible body.

The result of this study will have important public health contribution for hair dressing salon workforce largely by providing information about the magnitude of the problem to the responsible bodies in order to draw their attention to this sector. Besides it can also serve as baseline information to undertake studies on similar settings.

2. Literature review

2.1 General over view

The National Institute for Occupational Safety and Health NIOSH, in the USA defines Musculoskeletal Disorder (MSD) as a disorder and injury that affects a part of the body's musculoskeletal system, which includes bones, nerves, tendons, ligaments, joints, cartilage, blood vessels and spinal discs [20].

MSD is an important cause of occupational injury and disability in industrially developed and developing countries. It is also one of the most important problems encountered by ergonomist around the world. In developed countries, different studies regarding to MSD have suggested that musculoskeletal Disorders are most prevalent as compared to the other health problem and affect 20–40% of the adult population. In industrially developing countries, poor working environment and absence of effective work injury prevention program give up very high rate of MSDs [21].

Musculoskeletal disorders (MSDs) are an important and costly occupational health problem with consequences for workers, employers and society. About 40 million workers are affected by work-related MSDs. Within the European Union, MSDs are the single most common cause of sickness absence from work, early retirement, and disability payments. It is estimated that the direct annual costs of the MSDs account for 2% of the European gross domestic product [22].

2.2 Burden of work related musculoskeletal disorder

Worldwide, work related low back pain (LBP) arising from occupational exposures was estimated to cause 21.7 million DALYs in 2010 and the 2010 Global Burden of Disease Study estimated that low back pain was among the top 10 diseases and injuries that account for the highest number of DALYs worldwide [23].

This disease burden is not limited to developing countries but is also a major Concern across the European Union. The European Agency for Safety and Health at Work states the musculoskeletal disorders are one of the most common type of collective occupational diseases[24].In the UK, 2% of the working population between the years of 2009 and 2010, which is almost 572,000 workers at that time, have WMSDs; on average, 13.4 days of sickness absence for each worker were reported. In addition,

MSDs were the main reason of disability in nearly 25% of the 2.5 million workers who were being paid disability benefit [25].

The U.S Bureau of Labor Statistics found that in 2012 MSDs accounted for 29% of all illnesses and injuries that required days off work .Looking at one specific MSD for illustration. collected data on 152 gainfully employed patients who were having surgery for lumber disc her nation ; 53% of the patients in the study reported taking sick leave because of their MSD, and 10% said that they had been awarded a permanent work disability pension as a result of back pain [26].

However, epidemiological studies on work related MSD among different professionals have been carried out in Africa, A south Africa cross-sectional survey on office workers found that 76.5% of prevalence of MSD and back followed by the neck region were the most commonly affected body part [27]. Another study carried out in Sub -Saharan Africa Uganda, found that musculoskeletal disorders affect more than 80% of nursing professionals in Uganda [28].

Institution based cross-sectional study conducted in Ethiopia to assess the prevalence and Associated risk factors of work related neck and shoulder musculoskeletal disorders among sewing machine operators of garment industries was found to be self-reported work related neck and shoulder musculoskeletal disorders was 51.7% and 45%, respectively. Other studies also conducted in Ethiopia to evaluate ergonomic workstations in relations to work-related musculoskeletal disorders in 9 public hospital laboratories stated that 21.7% of the participant had problems with their feet or ankles and 20.8% of the participant with the knees [18].

2.3 Magnitude of work related musculoskeletal disorders in hair dresser

A comparative study conducted in UK to access current levels of self-reported health problems in hairdressers, compared to non hairdressing controls showed that significantly higher levels of musculoskeletal problems, including work-related shoulder pain (OR 11.6, 95%CI 2.4–55.4), wrist and hand pain (2.8, 1.1–7.6), upper back pain (3.8, 1.0–14.9), lower back pain (4.9, 1.5–15.9) and leg/foot pain (31.0, 3.8–267.4) in hair dressers [29].

A Pilot study in Taiwan was done to investigate the risk factors of WMSDs for hairdressers by identifying the body regions associated with significant discomfort showed that 91.7% of subjects reported shoulder discomfort as the most frequent problem followed by discomfort in the lower back (83.3%) and in the neck region (75%). Moreover, 33.4% reported a mild-to-moderate level of shoulder discomfort, followed by neck (25%) and lower back (25%). In relation to this the highest number of symptoms was arthritic pain in the neck, followed by the shoulder and lower back pain [30] .

A study conducted in Iran aimed to assess the risk of musculoskeletal disorder (MSD) and evaluate the prevalence of MSD among female hairdressers indicated that 58.7% of the hairdressers experienced pain in their lower back, 52.3% in their neck, 41.3% in their knees, and 20.3% in their ankle, the rapid entire body assessment indicate that about 46% of the 1032 postures were classified as high risk and about 14.9% a survey very high risk [15] .Another study carried out in Korea indicated that the prevalence of WMSDs was 94.4% and the most affected body part were, shoulder (61.0%), neck (59.9%), low back (53.2%)and hand and wrist (41.6%)[31] .

A study carried out in Sao Paulo Brazil on 220 hair dressers indicted that the prevalence of WRMDs was 71% and The most frequently affected body was the shoulder(49%; 95% CI 42.0–55.3), followed by the neck(47%; 95% CI 40.6–53.9) and back (39%, 95% CI32.2–45.1) [14].

An observational study conducted in India among hair dressers to asses Upper extremity and neck disability in male hairdressers with concurrent changes in pinch strength showed that 61% of the study subject had minimal disability of shoulder, arm and hand, 17% had mild disability,19% had mild to moderate disability, only 3% showed moderate to Severe disability. While in case of Neck Pain Disability Index (NPDI),61% had minimal disability,17% had mild disability,19%had moderate disability, only 3%showed more disability [32] .

A cross-sectional descriptive survey done in Nigeria showed that the 12 month prevalence of WMSD was 75.6% Two hundred and twenty-one (91.3%) participants reported gradual onset of musculoskeletal disorders. One hundred and sixteen (47.9%) participants had the onset of the WMSDs at the age range of 26–35 years. The most

commonly affected body parts were included (76.3%), shoulder (62.5%) and neck (46.3%) [16].

A study conducted in Egypt among hairdressers aimed to assess the prevalence and risk factors for viral hepatitis and musculoskeletal disorders showed that the overall musculoskeletal complaints were statistically significant higher (69.4%) [33].

2.4 Factors associated with work related musculoskeletal disorders in hairdressers

Socio demographic factors

The study done in UK among hair dressers to access WMSDs showed that there is clear association of Work related musculoskeletal disorders with age, and year of experience but there is no clear association work related musculoskeletal disorders with being female or male [29]. A study In Taiwane also identified there is significant effect of age on discomfort in the lower back and lower leg [30]. Another study in Taiwane conducted to access ergonomic risk factors for the wrists of hairdressers showed that higher rate of hand/wrist pain in female hairdressers than in male barbers [34]. A study In, Iran among hair dressers showed that task category of the participant was significantly associated with elbow, hip and thigh disorders [15]. An observational study conducted in India to asses Upper extremity and neck disability in male hairdressers showed that positive correlation was found between work experience and disability of shoulder, arm and hand with increase in age and experience [32].

Ergonomics factors

A study done in Taiwan to evaluate ergonomic Risk Factors for the Wrists of Hairdressers indicated that the relatively higher force exertion and wrist velocity of female hairstylists combined with prolonged exposure account for the higher rate of hand/wrist pain in female hairdressers [34].

A Study conducted among Egyptian female hairdressers to assess s occupational respiratory and musculoskeletal symptom found that Musculoskeletal disorders were associated with manual handling, prolonged standing, strenuous shoulder movements and awkward body posture [35].

A Study conducted in Nigeria showed that WMSDs are significantly associated with working in the same position for long periods and attending to a large number of customers in 1 day [16].

A study conducted in Sweden to describe Upper Arm Postures and Movements in Female Hairdressers indicated musculoskeletal disorders in the neck and shoulders significantly associated with highly elevated arms and posture variability, especially during customer task [36]. Another study in Iran found ergonomics factors like Uncomfortable working posture and working with shoulders raised were associated with WMSDs [15].

A study conducted South West Nigeria to assess self reported occupational Hazards and Illnesses among Hairdressers indicted that long working hours in a physically demanding job are associated with low back which was one of the most prevalent health problems in this study [37]. Other study conducted in Taiwane found taking sufficient break was significantly associated with lower leg discomfort [30].A Nigeria study confirmed that taking sufficient rest break were significantly associated with WMSDs [16].

Individual factor

The study conducted in Taiwan indicated that prevalence of musculoskeletal disorder was higher among hair dressers who reported an ever physician diagnosis of a Systemic illness and no clear association of physical activity and BMI. The habit of doing less physical activity was strongly associated with neck pain. [30]

Study conducted in UK among hair dressers showed there is clear association of Work related musculoskeletal disorders with smoking habit [29]. Another study In, Iran among hair dressers showed that BMI of the participant was significantly associated with elbow, hip and thigh disorders [15].

Psychosocial and environmental factor

A study conducted in Taiwan among hair dressers indicated that using a bottle of water when washing clients' hair and longer working hours significantly increases the level of discomfort in the upper arm of the hair dressers [30].A study in Iran found working environment factor like unsuitable chair, blow-dryer, and scissors, and hair washing basin were associated with WMSDs [15]

A Greece study among Cosmetologist also found psychosocial factors such as, low skill discretion, decision authority, Low co-worker support and perceived general health were significantly related with occurrence of MSD in a study group [38].

A cross-sectional study of Sao Paulo, Brazil indicated that, psychosocial factors like lack of acknowledgement of worker was associated with prevalence of WRMDs and work fatigue among hair dressers[14]. A Greece study showed that significant relationships were found between co-worker support and skill discretion seem to be the most important reflecting organizational problems and cognitive-behavioral aspects. [38]

Generally, hair dressers occupational exposure to work related musculoskeletal disorders is prevalent. The factors that are attributable to this are categorized as socio-demographic, ergonomics, psychosocial or organizational and individual factors. Among those the most common determinant factors are year of working experience, total working hours, age and BMI of the workers, prolonged standing and break time. These factors and burden of work related musculoskeletal disorders have been broadly studied in different occupational groups. However, information about the magnitude and associated factor of WMSDs among hair dressers were little in developing country as compared to the developed one. Build research about these conditions is a great contribution to fill the information gap and to compare these work force to the other somewhere else and essential in the designing of effective prevention and control mechanism towards the problem.

3. Conceptual Framework

The conceptual frame is adopted with some modification from the literature designed to investigate the status of work-related musculoskeletal disorder in Taiwanese hairdressers [39].

These frame work showed that independent factors such as, socio demographic factor, psychosocial factor, ergonomics factor, environmental and individual factor are important for the occurrence of WMSDs among hair dressers.

The socio demographic factor affects WMSDs directly and indirectly through the psychosocial and individual factors. Psychosocial related factors either affecting the individual characteristics or directly determine the occurrence of WMSDs. Working environment and Ergonomics factor affects WMSDs directly or through with individual factor. The following figure shows the relationship between WMSDs and independent variables (figure1).

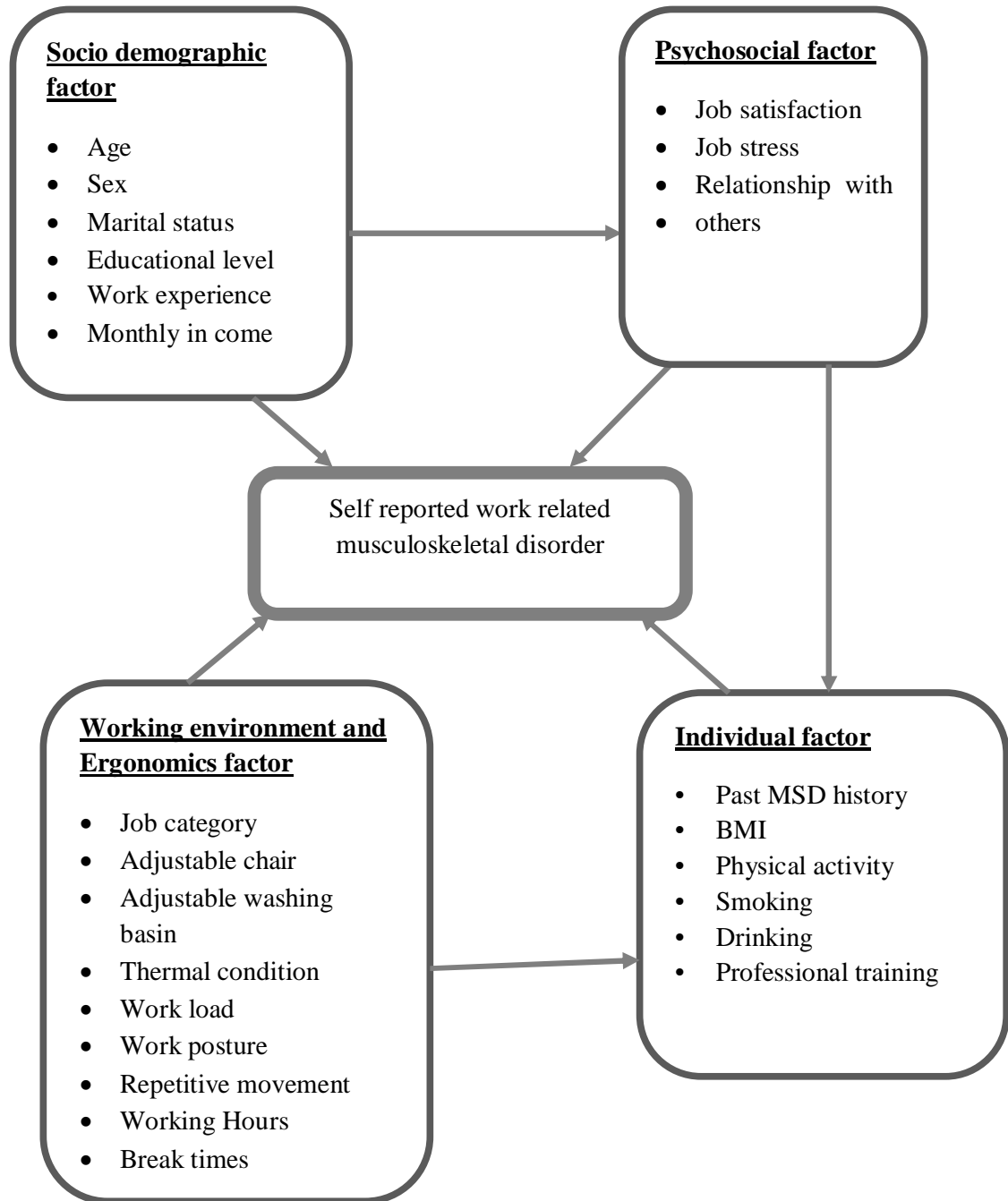


Figure1: conceptual framework on musculoskeletal disorder and associated factor , Adopted and modified from Hsiao-Lin Fang 2010 [39].

4. Objective

4.1 General objective

- To assess the prevalence and associated factors of self-reported work related musculoskeletal disorder among female beauty salon hair dressers in Addis Ababa, Ethiopia.

4.2 Specific Objectives

- To determine the prevalence of self-reported work related musculoskeletal disorder among female beauty salon hair dressers in Addis Ababa, Ethiopia.
- To identify the factors associated with self-reported work related musculoskeletal disorder among female beauty salon hair dressers in Addis Ababa, Ethiopia.

5. Methods

5.1 Study design

A cross-sectional study design was used to assess musculoskeletal disorder among hair dressers in Addis Ababa, Ethiopia

5.1 Study area and period

The study was conducted in Addis Ababa the capital city of Ethiopia. According to population projection value for 2014 the city had an estimated population of 3,195,000 the proportion of male counts 1,515,000 and female counts 1,680,000 with an area of 540 square kilometers (54000hectares) [40].

The city administered by a city council and organized in 10 sub city and 116 districts. Any hair dressing salon should be registered and licensed in Addis Ababa City administration trade and development bureau. In Addis Ababa there are 112 small enterprise salons and 3393 micro enterprise salons registered formally and have legally certified from trade office. This study was conducted February to March 2016.

5.3 populations

5.3.1 Source population

The source population of the study was all hair dressers working in Addis Ababa city, Ethiopia.

5.3.2 Study population

The study population was the selected hair dressers working in Addis Ababa city, Ethiopia.

5.3.3 Inclusion criteria

- Both male and female hair dressers who are working in female beauty salon
- Hairdressers who had at least one year experience
- Full time workers
- Engaged in hair dressing activity

5.3.4 Exclusion criteria

- Hair dressers who had major accident in any part of the body was exclude

5.4 Sample size Determination

The sample size for objective one and two was calculated separately using a formula for single population proportion for first objective and double population for second objective considering different assumptions.

For objective one:

The sample size for the first objective is calculating using the prevalence of 76.3% lower back pain and 43.3% shoulder pain which was reported from the study conducted in Nigeria among hairdressers [16].The single proportion formula $n =$

$1.5 * \frac{(z\alpha/2)^2(p(1-p))}{d^2}$ was used by considering the following assumption.

- Confidence level = 95%
- Critical value $Z\alpha/2 = 1.96$
- Degree of precision $d = 0.05$ and
- Design effect=1.5

$$n \text{ (For lower back pain)} = 1.5 * \frac{2(p(1-p))}{d^2}$$

$$= 447 + 10\% \text{ non response rate}$$

$$= 458$$

$$n(\text{Shoulder pain}) = 1.5 * \frac{2(p(1-p))}{d^2}$$

$$= 554 + 10\% (\text{non-response rate})$$

$$= 609$$

Therefore the sample size for the shoulder pain was the largest; it is taken as appropriate sample size for the first objective.

For the second objective to assess associated factors for the occurrence of work related musculoskeletal disorder the formula for double population proportion was used.

$$\frac{Z_{\alpha/2} \sqrt{(1 + 1/r)p(1-p)} + z_{\beta} \sqrt{p_1(1-p_1) + p_2(1-p_2)/r}}{(P_1 - P_2)^2}$$

p_1 = the probability of event in the unexposed

P_2 = the probability of event in the exposed

P = pooled proportion

r = ratio of exposed to unexposed

$Z_{1-\alpha/2}$: 95% confidence levels

Z_{β} : Power of study to detect difference between the two groups

This was calculated using Epi info version 7, assuming OR of 2, 10% non response rate, design effect of 1.5 and different factors based on similar study done in Brazil among hairdressers as shown below in (Table1)[41].

Table 1: sample size calculation for second specific objective

Factors	Power (80%)	95%CI	P1	P2	OR	r	n1	n1+n2
Comfortable body posture	0.84	1.96	0.56	0.8	2	1	314	517
Physical effort in tasks	0.84	1.96	0.57	0.75	2	1	318	524

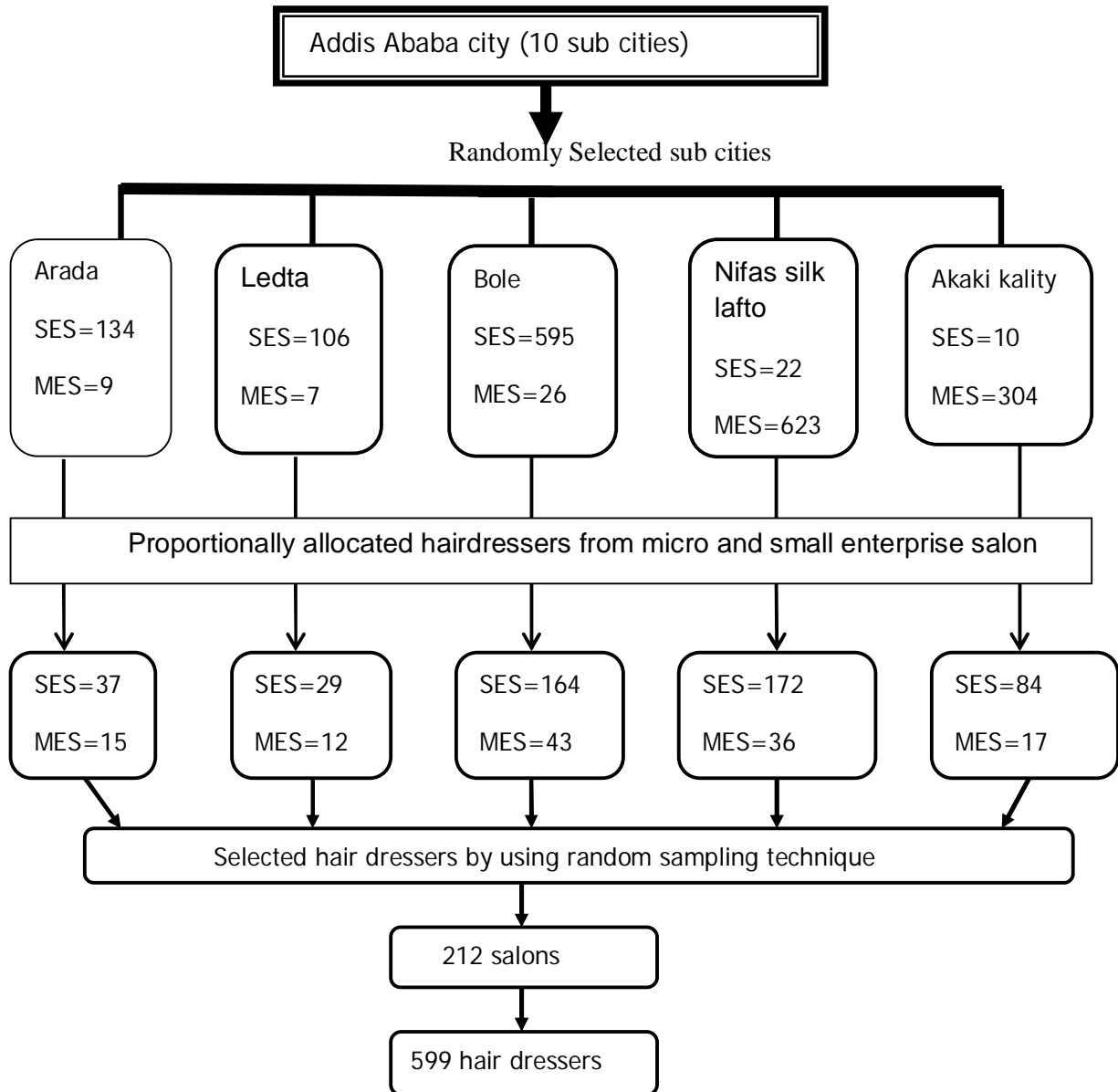
The decision was made comparing the sample size in objective one (609) and objective two (524). The first objective was yield the largest sample size which was 609; it was representative for both objectives. Therefore, by taking into consideration time and other resource it was considered as appropriate sample size for this study.

5.5 Sampling Technique

A multi stage sampling method was used to select sub cities and the hair dressing salon in the selected sub cities. From the total of 10 sub cities five sub cities (Nifas silk lafto, Lideta, Akaki kality, Bole and Arada) were selected randomly using lottery method considering the representativeness of the sample and logistical reasons. Assuming that self reported musculoskeletal disorder vary between small and micro enterprise salons because of the difference in the working condition and the materials that are found in the two enterprises, in order to include hairdressers from all types of hairdressing salons, the salons were stratified into micro and small enterprise salon. A micro enterprise is one which operates with up to five hair dressers including the owner and a small enterprise is one that has between 6 and 30 hair dressers [42]. The minimum number of hair dresser for micro enterprise salon and the maximum number of hair dresser in the small enterprise salon were required to estimate the maximum number of hair dressing salons to be include in this study but there was no registered data about this required number. So, Simple survey was conducted on 10 micro enterprises and 5 small enterprise salons in Akaki kality sub city and resulted minimum of 1 hair dresser for micro enterprise and a maximum of 6 hair dressers for small enterprise salon. Therefore, 1 hair dresser for micro enterprise salon and 6 hairdressers for small enterprise salon were assumed as minimum and maximum expected number to calculate the maximum hairdressing salon required in micro and small enterprises respectively. Based on these assumption 486 hairdressers from 486 micro enterprise salon and 123 hairdressers from 21 small enterprise salons were assumed to be required.

The sample (609) was proportionally allocated in to micro and small hair dressing salons in the selected sub city and salons were randomly selected from the list of Micro and small enterprise salon in the Addis Ababa trade industry bureau list. All hairdressers in the selected salon who were present in the data collection time and full fill the inclusion criteria were interviewed until the allocated sample was reached.

Finally, 117 hairdressers from 16 small salons and 482 hairdressers from 196 micro salons were interviewed which yields a total of 599 hairdressers. Eight (1.3%) hairdressers were refused to participate and two questionnaires were excluded from analysis because more than half of important information was not filled out so non respondents rate was 1.7%.



MES: Micro enterprise salon

SES: Small enterprise salon

Figure 2: Schematic presentation of sampling procedure

5.6 Data Collection Tools and Procedures

The questions to detect WRMDs were adapted from Standardized Nordic questionnaire it is a standard questionnaire developed from a project funded by the Nordic council of ministers. It was not developed for clinical diagnosis [43]. These Questionnaire was used as an instrument for gathering neck, shoulder, upper back, lower back, hip /thigh, knee/leg, ankle/foot and wrist /hand musculoskeletal symptoms and it is available in English and translated to Amharic and then back to English to check its consistency. WMSDs in the past twelve months asked for each one of 9 body parts. Responses to any of the question are either a "Yes" or a "No". If a respondent answers "NO" to the first question, he/ she may not proceed to answer the next questions of the same body part. Another questioner adopted from similar study with some modification was used to assess the socio demographic, working environment and psychosocial status of the participants.

After getting ethical clearance from responsible bodies and informed verbal consent from study participants and salon owners the data was collected by face to face interview from study participants on the salon using a structured questionnaire. Four BSc environmental health and two health officers' professionals as a data collector and two MPH student as a supervisor were involved in this data collection. Both the data collectors and Supervisors took a two days training before the actual data collection time about all aspects of data collection tools, questioning techniques and ethical issues.

5.7 Variables

5.7.1 Dependent variable

- self-reported work related Musculoskeletal disorder

5.7.2 Independent variables

- Socio demographic factor: age, sex, marital status, educational level ,work experience , monthly in come
- Individual factor :Past MSD history, BMI, physical activity smoking drinking and Professional training

- Working environment and Ergonomics factor: Job category, adjustable chair, adjustable washing basin, thermal condition ,work load ,work posture repetitive movement , working hours and break times
- Psychosocial factor: job satisfaction, job stress, and relation with others.

5.8 Operational definition

Hairdresser: Female or male workers who are directly engaged in hair washing, cutting, rolling, hair blow waving and hair styling activity in the salon.

Work related musculoskeletal disorders: is a self reported pain, ache or discomfort for at least 2-3 work days during the past week or the last 12 months in any part of neck, shoulder, upper back, lower back, hip /thigh, knee/leg and ankle/foot and wrist /hand. These symptoms often appear at work that disappears during rest and symptom continues after work ends [44].

Awkward postures (AP): working with the neck bent more than 30 degrees without support, working with a bent wrist, working with the back bent without support, squatting and kneeling for two or more hours [41].

Highly repetitive work (RW): Work involving repeating the same motion with less than 30 seconds or no variation every few seconds for two or more hours [41].

Static postures (SP): Sitting or standing in a restricted space for two or more hours without changing positions [41].

Job satisfaction: A score measured using the job satisfaction scale as yes (32 - 50) and no (10 - 31) [11].

Job stress: A score measured using the workplace stress scale as yes (16 to 40) and no (lower than or equal 15) [45].

Body mass index: weight in kilograms divided by the square of the height in meters (kg/m²) [46].

Underweight= BMI <18.50

Normal range= BMI b/n 18.50-24.99

Overweight = BMI b/n 25.00-29.99

Obese= BMI \geq 30.00

Cigarette Smoking: It is practice of smoking cigarette by hair dressers for at list one sticks of cigarette per day [47].

Alcohol drinking: it is a consumption of any kind of alcohol by hair dressers at least for two times per week for different purpose [48].

Doing physical exercise: exercising any kinds of sport activity at list two times per week with duration of 30 minutes [21] .

Micro enterprise salon: a salon operates with up to five hair dressers including the owner [12].

Small enterprise salon: a salon that has between 6 and 30 hair dressers [12].

Adjustable washing basin: At least one wash basin must be installed in the service area with tap water and can have height adjustable system [49].

Adjustable chair: Chairs have wheels or castors suitable for the floor surface, have adjustable seat height and available within a distance of at least 1.5 meter [49].

Un-Comfortable thermal environment: at least two or more “yes” response in the thermal comfort factor question that may be a risk of thermal discomfort [50].

5.9 Data managements

The collected data was cleaned, coded and entered to Epi Info version 7. When the entry of questioner was completed, cleaning was made to avoid missing value, outliers and other inconsistencies by running commands like frequencies and sort on the same software. Cleaned data was exported to the statistical Package for Social Sciences (SPSS) version 20.0 for analysis.

5.10 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, working environment, psychosocial and individual) variables.

For first specific objective - descriptive findings was presented by frequency tables, graphs, percentage and proportion with 95% C.I.

For second specific objective- to determine the independent factors associated with WRMSDs was used cross tabulation, Bivariate logistic regression was used to explore presence of statistical association between different independent variables and outcome variables using crude odds ratio with 95% C.I. Bivariate logistic regression analysis and chi-square test was 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 was considered as having significant association with dependent variable and was reported using both p-value and Adjusted ORs in the Bivariate analysis part. Variables which showed significant association on the bivariate analysis were entered in to multivariate logistic regression analysis to identify their independent effects on the outcome variable. To avoid an excessive numbers of variables and unstable estimates in the multivariate analysis variables reached a p-value less than 0.3. Model fitting was checked using log likelihood, Hosmer and Lemeshow goodness of fit test. Finally, variables with $P < 0.05$ in the multivariate analysis were considered significant, and presented by Adjusted Odds Ratio (AOR) with 95% C.I

5.11 Data quality assurance

To assure the quality of the data, properly designed data collection tool was prepared and 5% (30 hairdressers) of the questionnaire was pre tested in one of the districted hair dressers other than the selected district one week before the actual data collection period.

Based on the pretest necessary modification was done on the questions and participants who were involved in the pretest were excluded in the actual data analysis.

The supervisors and data collectors were adequately trained for 2 days on the rules and regulations during data collection and closer supervision was undertaken during data collection in a way that bias could not occur. Additionally, after data collection, questionnaires were reviewed and checked for completeness and relevance by supervisors and principal investigator and the necessary feedback was given to data collectors in the next morning.

5.12 Ethical Consideration

Ethical clearance and approval was obtained from the Institutional Review Board of the, Addis Ababa university, College of Health Science School of public health. Addis Ababa city administration was informed about the objective of the study through a support letter from the College of Health Science, Scholl of public health, Addis Ababa University (AAU) and a written permission was obtained from Addis Ababa city administration to the respected sub cities. In addition, the owner of each beauty salon was asked permission to interview the hairdressers working in their

business. Up on agreement of the owner, the data collectors introduced themselves, explained the objectives and benefits of the study, informed the respondents there is no any direct finical benefit and risk and also they were inform that they can participate or refuse at any time they want and they have a right to ask anything about the study. Data was collected anonymously after obtaining verbal consent from each respondent by assuring confidentiality throughout the study period. Privacy was maintained by arranging quite place in the hairdressing salon or separate place for interviewer.

5.12 Dissemination and utilization of the result

The study result will be presented to Addis Ababa University, College of Health Science School of public health. The result document will be disseminated and utilized to all responsible bodies. Further efforts will be made to publish the findings on national or international journal.

6. Results

Six hundred nine hairdressers (609) were planned to participate in this study, 599 were included in the analysis making with a response rate of 98.3%.

6.1 Prevalence of self reported work related musculoskeletal disorder among hair dressers

Out of 599 hairdressers 460 (76.5%) were reported they had pain or ache in any part of neck, shoulder, upper back, lower back, hip /thigh and knee for the past 12 months. The three most body parts that the respondents reported pain were, lower back pain 428(71.5%)shoulder pain 309(51.6%) and hand pain 279(46.6 %) while the three least body parts that the respondents reported pain were, knee pain 155(25.9%), upper back pain 141(23.7%) and hip pain 113(18.9%) (Figure 3).

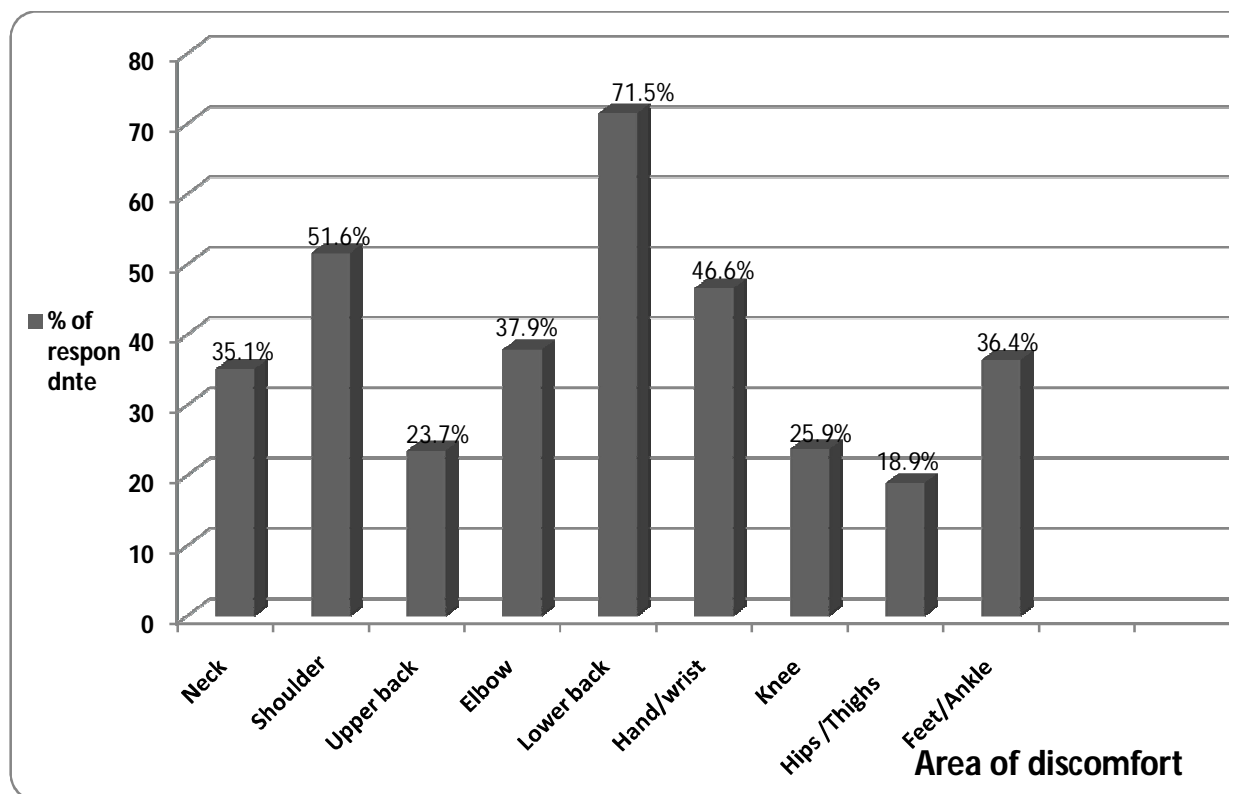


Figure3: The Frequency of Self-reported Work- Related Musculoskeletal Disorders among hairdressers in the Last 12 months, April, 2016

Regarding reported number of disorders 34(7.4%) hair dressers had WRMDs in one body segment, 60 (13%) in two segments, 79(17.2%) in three segments, 95 (20.7%) in four, 138 (30%)in five and 54 (11.7%)in six parts survey.

6.2 Multiple body parts (right and left side) WMSDs

Most hairdressers reported multiple body parts (right and left) pain in Shoulder, elbow, hand/wrist; knee and feet/Ankle, but only in hip/thigh symptom was reported in right side. Of the total participants who had pain in shoulder, 309(51.6 %) were 252(42.1%), 6(1%) and 51(8.5%) in both shoulder, left shoulder and right shoulder respectively (Table2).

Table 2: Multiple body parts WMSDs in body segments among hair dressers in Addis Ababa April, 2016 n= (599)

Body parts	Number	%
Shoulder		
Both	252	42.1
Left	6	1
Right	51	8.5
No	290	48.4
Elbow		
Both	180	30.1
Left	9	1.5
Right	38	6.3
No	372	62.1
Hand/wrist		
Both	223	37.2
Left	6	1
Right	50	8.3
No	320	53.4
Hips /Thighs		
Both	--	--
Left	--	--
Right	113	18.8
No	486	85.2
Knee		
Both	142	23.7
Left	6	1
Right	7	1.2
No	444	74.1
Feet/Ankle		
Both	209	34.9
Left	2	0.3
Right	7	1.2
No	381	63.6

6.3. Self reported work related musculoskeletal disorder by the type of hair dressing salon

Among the hairdressers they had pain in the last 12 months, 382(79.3%) were working in micro enterprise salon and 78(66.7%) were working in small enterprise salon. Majority of hairdressers 364(75.5%) from Micro enterprise salon and 64(54.7%) from small enterprise salon were reported pain in lower back. Two hundred and fifty eight (53.5%) respondents from Micro enterprise salon and fifty one (43.6%) hairdressers from Small enterprise salon were reported pain in shoulder, followed by hand or wrist pain 233(48.3%) in Micro enterprise salon and 46(39.3%) from Small enterprise salon. The smallest portion of respondents 93(19.3%) from Micro enterprise salon and 20(17.1%) from Small enterprise salon reported pain in hips (Figure 4).

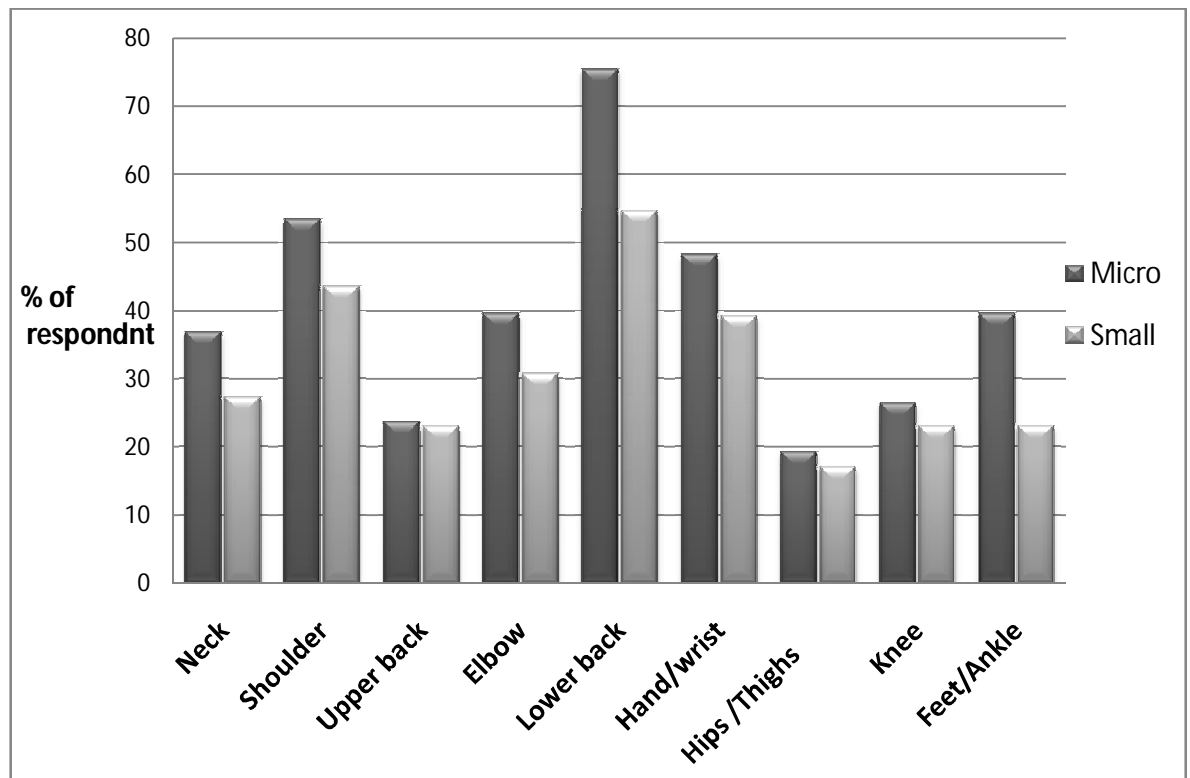


Figure4: The Frequency of WMSDs among hairdressers by the type of salon, April, 2016

6.4 Socio demographic characteristics of respondents

Of the total study participants, 472(78.8%) were females and 127 (21.2%) were males. Majority of the hairdressers were single 362(60.4%) and orthodox Christianity follower 478(79.8%).Regarding educational status of the study participants, 382 (63.8%) attended secondary school. The median monthly income for the participants was 2000 Eth birr with a range of 700 to 6000birr. Majority of the participants,458(76.5%) were served from 1-5 years and 141 (23.5%) were served 6 and above years and the median year was 3 with A minimum and maximum of 1 and 29 respectively (Table3).

Table 3: Socio-demographic characteristics of hair dressers in Addis Ababa Ethiopia, April 2016(n=599)

T	Variables	Number	%
Sex			
e	Male	127	21.2
	Female	472	78.8
Marital Status			
e	Married	222	37.1
d	Single	362	60.4
i	Divorced	8	1.3
a	Widowed	3	0.5
n	Cohabited	4	0.7
Religion			
a	Orthodox	478	79.8
g	Muslim	35	5.8
e	Protestant	58	9.7
	Catholic	17	2.8
o	Others(Adventist, Juba)	11	1.8
Educational level			
	Able to read/write	27	4.8
	Primary (1-8)	94	15.7
	Secondary (9-12)	382	63.8
	Higher education	96	61.0
Monthly income(Birr)			
	<1500	182	30.4
	1500-2500	236	39.4
	>2500	181	30.2
Work experience(yrs)			
	<5	458	76.5
	≥6	141	23.5

The median age of participants, was 25 with the minimum and maximum age of 17 and 65, respectively.

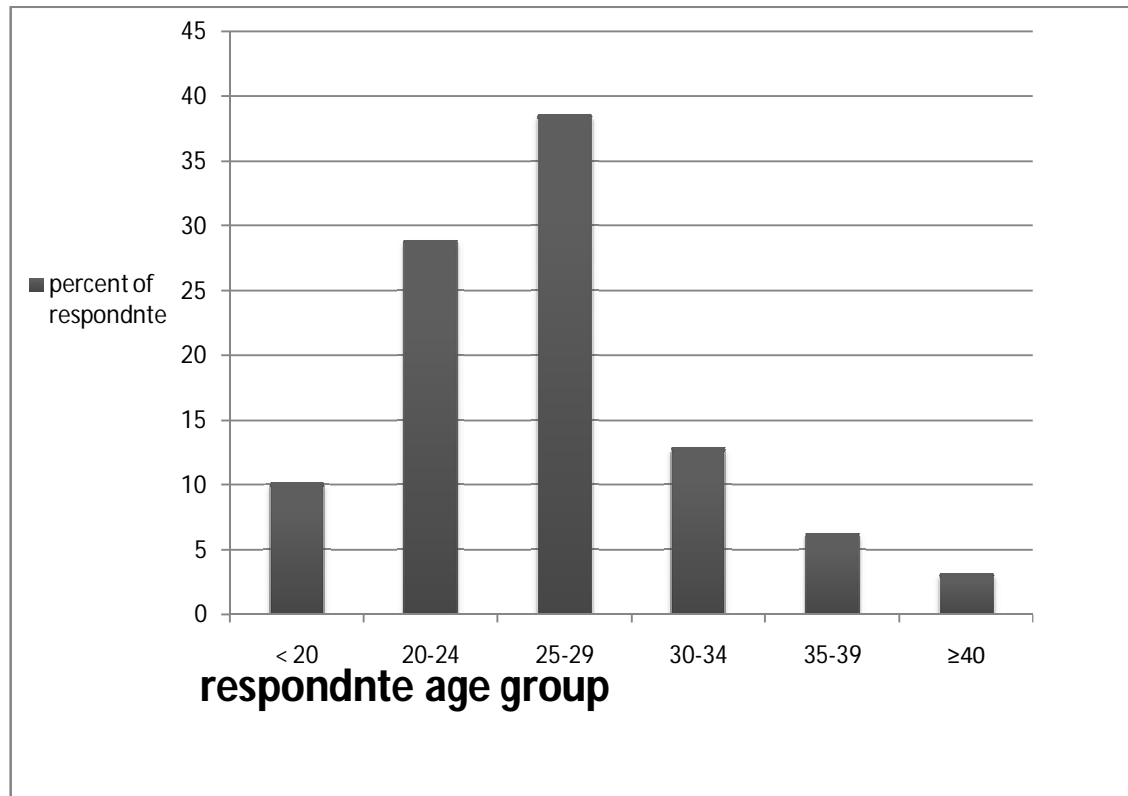


Figure 5: Age Category of hair dressers in Addis Ababa, April 2016

6.2 Personal Characteristics of hair dressers

The result showed that only 47(7.8%) of hairdressers were practicing physical exercise at least two days per week. Regarding Body mass index of the hairdressers 448(74.8%) were normal and 6 (1%) were obese. Only 6(1%) of the hairdressers were Left handed person. More than half of the hairdressers 363 (60.6%) were attended professional training on hairdressing. Five hundred ninety four (99.2%) and 582 (97.2%) of the hairdressers were non - cigarette smokers and non alcohol drinkers respectively. Hairdressers were also asked about musculoskeletal disorder symptoms they had before being hairdressers, 38(6.3%) had the symptoms (Table 4).

Table4: Personal characteristics of hair dressers by type of salon in Addis Ababa, April 2016(n=599)

Variables	Micro enterprise salon(N=482)		Small enterprise salon(N=117)		Total	
	Number	%	Number	%	Number	%
Regular physical activities						
None	100	85.5	425	88.2	525	87.6
Two times per week	12	10.3	33	6.8	47	7.8
≥ Three times per week	5	4.3	4	5	27	4.5
BMI						
Underweight	51	10.6	12	10.3	63	10.5
Healthy	369	76.6	79	67.5	448	74.8
Overweight	57	11.8	25	21.4	82	13.7
Obese	5	1	1	0.9	6	1
Dominant hand						
Right hand	115	98.3	475	99.2	593	99
Left hand	2	1.7	4	0.8	6	1
Professional training						
Yes	73	62.7	290	60.2	363	60.6
No	44	37.6	192	39.8	236	39.4
Smoking behavior						
Non-smoker	115	98.3	479	99.4	594	99.2
Smoker	2	1.7	3	0.6	5	0.8
Drinking behavior						
Never	115	98.2	467	96.9	582	97.2
Two times per week	1	0.9	8	1.7	9	1.5
≥ Three times per week	1	0.9	7	1.5	8	1.3
Previous history of MSD						
Yes	5	4.3	33	6.8	38	6.3
No	112	95.7	499	93.2	530	93.7

6.3. Working environment and psychosocial characteristics and of hair dressers

The study showed that one hairdressers engage in different tasks , 489(81.6%) ,respondents were perform hair washing tasks followed by,479 (79.8%) hair rolling tasks ,447(74.6%)straightening or styling tasks, 363(60.6%) hair cutting tasks ,139(23%)hair designing ,255(42.6%)hair coloring tasks and 45(7.5%) perform other tasks like facial make up, nail care trimming eye brow etc.

Hairdressers were asked about the type of tools used in the salon where 266, (44.4%) were using an adjustable chair, 239(39.9%) were using an adjustable washing basin and 217(36.2%) were using finger supported scissors. None of the hairdressers were attained formal training related to ergonomics. Two hundred fifty five (42.6%) of hairdressers were work in thermally comfortable condition.

Regarding psychosocial factors, 496(82.8%) of hairdressers reported that they had good work relationship with their colleague and 362(60.3%) hairdressers had good work relationship with their customer. Of the total study hairdressers 408 (68.1%) were had boss on their work, out of these 282(47.1%) had good work relationship with their boss. About work satisfaction and stress, 317(52.9%) of the hairdressers satisfied in their current job, while 236(39.4%) of hairdressers had work stress (Table5).

Table5: Working environment and psychosocial characteristics of hair dressers in Addis Ababa, April 2016(n=599)

Variables	Micro enterprise salon(N=482)		Small enterprise salon(N=117)		Total	
	Number	%	Number	%	Number	%
Job category						
Hair washing	394	81.7	95	81.2	489	81.6
Hair rolling	376	78.0	103	87.2	479	79.8
Hair straightening	352	73	95	81.2	447	74.6
Hair cutting	283	58.7	80	68.4	363	60.6
Hair coloring	204	42.3	51	43.6	255	42.6
Hair design /Shuruba	109	22.6	54	46.2	139	23
Others#	34	7.1	11	9.4	45	7.5
Adjustable wash basin						
Yes	161	33.4	78	66.6	239	39.9
No	321	66.6	39	33.4	360	60.1
Adjustable chair						
Yes	188	9	78	33.3	266	44.4
No	294	61	39	66.7	333	55.6
Finger supported scissors						
Yes	139	71.2	78	66.7	217	36.2
No	343	8.8	39	33.3	382	63.8
Thermal comfort						
Comfortable	164	4	91	77.8	255	42.6
Non comfortable	318	66	26	22.2	344	57.4
Colleague relationship						
Good	400	83	96	82.1	496	82.8
Fair	79	16.4	21	17.9	100	16.7
Poor	3	0.6	--	--	3	0.5
Customers relationship						
Good	285	9.1	76	65	362	60.3
Fair	192	9.8	41	35	233	38.9
Poor	5	1	--	--	5	0.5
Boss relationship						
Good	214	4.4	68	58.1	282	47.1
Fair	73	15.1	23	19.7	96	16
Poor	26	5.4	4	3.4	30	5
Have no boss	169	35.1	22	18.8	191	31.9
Job satisfaction						
Yes	258	5.6	69	59	317	52.9
No	214	44.3	48	41	282	47.1
Job stress						
Yes	190	39.4	46	39.3	236	39.4
No	292	60.6	71	60.7	363	60.6

Note: percent exceeds 100in job category because one respondent give more than one answer. Others# (facial make up, nail care trimming eye brow)

6.4 Ergonomic Risk factor of hairdressers

Majority of hairdressers 405(67.6%) were performing their hairdressing activity in standing position for four to six hours per day and 215 (35.9%) of the hairdressers were bending or twisting in uncomfortable way to perform their tasks. Three hundred and two(50.4%) of the hairdressers work the same position (standing, bend over, sitting) for 2 hours and 350 (58.4%) of the hairdressers were exposed to repetitive task repeating the same task within less than 30 seconds. Regarding working hours per week 368(61.4%) of hairdressers reported that they were at work for more than 48 hours while 231(38.6%) were less than or equals to 48 hours per week with the median of 54hrs. Four hundred seventy five (79.3%) of the hairdressers worked for less than or equal to 6 days per week and 494 (82.4%) have less than 10 number of customers per day with the median number of 8 customers. More than 95% of the hairdressers did not have break within a day (Table6).

Table6: Ergonomic factor of hair dressers by type of salon in Addis Ababa, April 2016(n=599)

Variables	Micro enterprise salon(N=482)		Small enterprise salon(N=117)		Total	
	Number	%	Number	%	Number	%
Standing position in hour						
1-3	80	16.6	19	16.2	99	16.5
4-6	327	67.8	78	67.8	405	67.6
>6	75	15.6	20	15.6	95	15.9
Bending or twisting in an awkward way						
Yes	182	37.8	33	28.2	215	35.9
No	300	62.2	84	71.8	384	64.1
Work in constant position						
Yes	240	49.8	62	53	302	50.4
No	242	50.2	55	47	297	49.6
Repeating motion						
Yes	287	40.5	63	53.8	350	58.4
No	195	59.5	54	46.3	249	41.6
Working hours per week						
≤48	186	38.6	45	38.5	231	38.6
>48	296	61.4	72	61.5	368	61.4
Working days in a week						
≤6 days	381	79	94	80.3	475	79.3
7 days	101	21	23	19.7	124	20.7
customer per a day						
<10	410	85.1	84	71.8	494	82.4
10-19	70	14.5	31	26.5	101	16.9
≥20	2	0.4	2	1.7	4	0.7
Total working break						
≤15 minutes	14	2.9	2	1.7	16	2.7
>15 minutes	4	0.8	8	6.8	12	2
None	464	96.3	107	91.5	571	95.3

6.8. Factors associated with self reported WMSDs

6.8.1 Bivariate analysis

Socio demographic factors

The bivariate analysis of socio-demographic variables, age and work experience had statistically significant association with Self reported work related Musculoskeletal Disorder. However, sex, marital status, educational level and monthly income did not show significant association.

Hair dressers whose aged group between 25-29[COR:2.2,95%CI(1.3-3.6)],30-34 COR:2.3,95%CI:(1.0-3.3)and 35-39 COR:5.1,95%CI: (1.5-16) had 2.2 times,2.3 times, and 5 times more likely to develop self reported work related musculoskeletal disorder respectively as compared to hair dressers aged 24 and less. Those who had longer year of experience (year >6) were 2.8 times more likely to develop back disorders than had short year of service (1-5 years) [COR: 2.8, 95%CI (1.6-5) (Table7).

Table 7: Bivariate analysis of socio demographic factors of Hairdressers associated with WMSD, Addis Ababa April 2016(n=599)

Variables	Self reported work related musculoskeletal disorder		COR (95%CI)	p-value
	Yes(%)	No (%)		
Sex				
Male	365(77.3%)	107(22.7)	1.149(0.7-1.8)	0.549
Female	95(74.8%)	32(25.2)	1.00	
Age				
< 25	210(69.3%)	90(30.7)	1.00	
25-29	136(83.4%)	27(17.6)	2.2 (1.3-3.6)*	0.002
30-34	64(84.2)	12(15.8)	2.3 (1.0-3.3)*	0.047
35-39	35(92.1)	3(7.9)	5.1 (1.5-16)*	0.009
≥40	15(78.9)	4(21.1)	1.6 (0.5-5.1)	0.43
Marital Status				
Single	271(74.9%)	91(25.1%)	1.00	
Married#	179(79.3%)	46(20.7%)	1.2(0.85-1.9)	0.23
Divorced#	10(75%)	2(2%)	1.02(0.2-5)	0.9
Educational level				
Able to read/write	24(88.9)	3(11.1)	2.5(0.6-9.1)	0.2
Primary (1-8)	73(77.7)	21(22.3)	1.1(0.5-2.1)	0.79
Secondary (9-12)	290(75.9)	92(24.1)	0.9(0.5-1.6)	0.97
Higher education	73(76.0)	23(24)	1.00	
Work experience (yrs)				
1-5	335(73.1)	123(26.9)	1.00	
≥6	125(88.7)	16(11.3)	2.8(1.6-5.0)*	P<0.0001
Monthly income(Birr)				
<1500	132(72.5)	42(27.5)	0.67(0.4-1.1)	0.2
1500-2500	184(78)	52(22)	0.9(0.5-1.4)	0.69
>2500	144(79.6)	32(20.4)	1.00	

*- significant association

COR; crud odds ratio

#Married including cohabited and divorced include widowed

Personal Characteristics

Among the personal characteristics of the hairdressers only body mass index of the participant was significantly associated with self reported work related musculoskeletal disorder, while, the other characteristics didn't show significant association.

Hair dressers whose BMI was overweight had 2.25 times more odds of having self reported work related musculoskeletal disorder as compared to hairdressers who had normal BMI [COR: 2.25, 95%CI, (1.15-4.3)] (Table8).

Table 8: Bivariate analysis of Personal Characteristics of Hairdressers associated with WMSD, Addis Ababa April 2016(n=599)

Category of variable	Self reported work related musculoskeletal disorder		Crude OR (95% CI)	p-value
	Yes	No		
physical activities				
None	402(76.6%)	123(23.4%)	1.04(0.43-2.4)	0.93
Two times per week	36(80%)	9(20%)	1.2(0.41-3.9)	0.673
≥ Three times per week	22(75.9%)	7(24.1%)	1.00	
BMI				
Healthy (18.6-24.9kg/m ²)	339(75.5%)	109(24.3%)	1.00	
Underweight (<18.5kg/m ²)	44(69.8%)	19(30.2%)	0.74(0.41-1.33)	0.31
Overweight [#] (25-29.9kg/m ²)	77(87.5%)	11(12.5%)	2.25(1.15-4.3)*	0.017
Dominant hand				
Right	455(76.7%)	138(23.3%)	1.00	
Left	5(83.3%)	1(16.7%)	1.5(0.1-13)	0.70
Professional training				
Yes	276(76%)	87(24%)	1.00	
No	184(78%)	52(22%)	1.1(0.7-1.6)	0.58
Smoking behavior				
Non-smoker	4(80%)	1(20%)	1.00	
Smoker	456(76.8%)	138(23.2%)	1.2(0.1-10)	0.86
Drinking behavior				
Never	448(77%)	134(23%)	1.00	
Two times per week	7(77.8%)	2(22.2%)	1.04(0.2-5)	0.95
≥ Three times per week	5(62.5%)	3(37.5%)	0.4(0.1-2)	0.3
Previous history of MSD				
Yes	25(65.8%)	13(34.2%)	1.00	
No	435(77.5%)	126(22.5%)	0.5(0.2-1)	0.1

*- significant association

COR; crud odds ratio

#-overweight include obesity

Working environment and psychosocial factors

Among working environment factor, availability of height adjustable chair, height adjustable washing basin and thermal condition of the salon had significant association with self reported work related musculoskeletal disorder. Out of psychosocial factors only good relationship with colleague was significantly associated with self reported WMSDs, while, the rest didn't show significant association (Table9).

The odds of WMSDs was 40% and 30% times lower in hairdressers who used height adjustable chair and height adjustable washing basin respectively as compared to their corresponding [COR: 95%CI 0.6(0.5-0.9) and 0.7(0.4-0.9)]. Similarly hairdressers who were worked in non comfortable salon temperature were 1.5 times more likely to develop WMSDs as compared to those who work in comfortable temperature. [COR: 95%CI 1.5(1.0-2.2)].

Table 9: Bivariate analysis of Working environment and psychosocial factors of Hairdressers associated with WMSD, Addis Ababa April 2016(n=599)

Category of variable	Self reported work related musculoskeletal disorder		Crude OR (95%CI)	p-value
	Yes	No		
Job category				
Hair washing (yes Vs no [#])	382(78.1%)	107(21.9%)	1.4(0.9-2.3)	0.107
Hair rolling(yes Vs no [#])	375(78.5%)	103(21.5%)	1.5(0.9-2.4)	0.06
Hair straightening (yes Vs no [#])	350(78.3%)	97(21.7%)	1.3(0.9-2.0)	0.13
Hair cutting(yes Vs no [#])	286(78.8%)	77(21.2%)	1.3(0.9-1.9)	0.2
Hair coloring (yes Vs no [#])	197(78%)	56(22%)	1.1(0.7-1.8)	0.53
Hair construction /shruha (yes Vs no [#])	110(79.1%)	29(20.9%)	1.1(0.7-0.1)	0.45
Adjustable chair				
Yes	187(70.6%)	78(29.4%)	0.6(0.5-0.9)*	0.017
No	273(81.7)	61(18.3%)	1.00	
Adjustable Wash basin				
Yes	173(72.4%)	66(27.6%)	0.7(0.4-0.9)*	0.038
No	287(79.7%)	73(20.3%)	1.00	
Finger supported scissors				
Yes	162(74.7%)	55(25.3%)	0.8(0.5-1.2)	0.4
No	298(78%)	84(22%)	1.00	
Temperature of the salon				
Comfortable	184(72.2%)	71(27.8%)	1.00	
Non comfortable	276(80.2%)	68(19.8%)	1.5(1.0-2.2)*	0.021
Colleague relationship				
Good	374(75.4%)	122(24.6%)	1.00	
Fair	84(84%)	16(16%)	1.7(0.99-3)	0.06
Poor	2(66.7%)	1(33.3%)	0.6(0.059-7.2)	0.7
Customers relationship				
Good	269(74.5)	92(25.5%)	1.00	
Fair	187(80.3%)	46(19.7)	1.39(0.9-2)	0.21
Poor	4(80)	1(20)	1.3(0.15-12)	0.78
Boss relation ship				
Good	207(73.4%)	15(26.6%)	1.00	
Fair	72(75%)	24(25%)	0.6(0.3-1.0)	0.22
Poor	26(86.7%)	4(13.3%)	1.5(0.4-4.0)	0.46
Have no boss	155(81.2%)	36(18.8%)	0.6(0.4-1.0)	0.85
Job satisfaction				
Yes	234(74.1%)	82(25.9%)	1.00	
No	226(79.9)	57(20.1%)	1.3(0.9-2.0)	0.93
Job stress				
Yes	189(80.1%)	47(19.9%)	1.3(0.9-2.0)	0.125
No	271(74.7%)	92(25.3%)	1.00	

* Significant association # Reference group COR; crud odds ratio

Ergonomic Risk factor

Among ergonomic factors ,time spent in standing position, bending or twisting in an awkward way working hours per week and number of customer in a day had significantly associated with self reported work related musculoskeletal disorder (Table10).

The odds of self reported work related musculoskeletal disorder were 2.8 times more in hair dressers who spend greater than 6 hours in standing position per day as compared to hair dressers whose standing position time were 1-3 hours per day [COR:2.8,95%CI (1.5-5)]. Hairdressers working in bending and twisting in awkward way working posture were 1.5 times more likely to have self reported work related musculoskeletal disorder [COR: 1.5, 95%CI 1.7(1.0-2.2)].Similarly, hair dressers who were engaged to work more than 48 hours per week were 1.7 times more likely to develop work related musculoskeletal disorder as compared to those who were work for less than 48 hours per week[COR: 1.7,95%CI(1.1-2.5)].

Table 10: Bivariate analysis of ergonomics risk factor of Hairdressers associated with WMSD, Addis Ababa April 2016(n=599)

Category of variable	Self reported work related musculoskeletal disorder		COR (95%CI)	p-value
	Yes	No		
Time spent standing position				
1-3	52(52.5%)	47(47.5%)	1.00	
4-6	336(83%)	69(17)	4.4(2.7-7)*	P<0.0001
>6	72(75.8%)	23(24.2%)	2.8(1.5-5)*	0.001
Bending in an awkward way				
Yes	175(81.4%)	40(18.6%)	1.5(1.0-2.2)*	0.047
No	285(74.2%)	99(71.2%)	1.00	
Work in the same position				
Yes	240(79.5)	62 (20.5)	1.3(0.9-1.9)	1.18
No	220(74.1%)	77(25.9%)	1.00	
Repeating motion				
Yes	277(79.1%)	73(20.9%)	0.7(0.5-0.11)	0.1
No	183(73.5%)	66(26.5%)	1.00	
Working hours per week				
≤48	163(70.6%)	68(29.4%)	1.00	
>48	297(80.7%)	71(19.3%)	1.7(1.1-2.5)*	0.004
Working days in a week				
≤6 days	375(75.2%)	118(24.8%)	1.6(0.9-2.7)	0.65
7 days	103(83.1%)	21(16.9%)	1.00	
Number of customer in a day				
<10	373(75.5%)	124(24.5%)	1.00	
10-19	84(83.2%)	17(16.8%)	1.6(0.9-2.8)	0.09
≥20	3(75%)	1(25%)	0.9(0.1-9.4)	0.9
break in minutes				
None	440(77.1%)	131(22.9%)	0.6(0.14-3.1)	0.61
>15	10(62.5%)	6(37.5%)	0.3(0.05-2.0)	0.23
≤15	10(83.3%)	2(16.7%)	1.00	
* Significant association			COR; crud odds ratio	

6.8.2 Multivariate Logistic regression

After the Bivariate logistic regression was done for each variable to limit the number of number of variables and unstable estimate in the final model, only variables with P-value less than 0.3 in the bivariate analysis were taken in to the multivariate analysis.

The multivariate binary logistic regression analysis identified that time spent in standing position, temperature of the salon, working hours per week and BMI had significant association with WMSD. Although the others that are show significant association in Bivariate but they did not show association after adjustment was done (Table11).

hair dressers with ≥ 6 years experiences were 2.5 times more likely to develop self reported WMSD compared to hair dressers with less than 6years of experiences[AOR: 2.5, 95% CI(1.2-5.4), similarly odds of self reported work related musculoskeletal disorder were 2.6 times more in hair dressers spent greater than 6 hours in standing position per day as compared to hair dressers whose standing position time were 1-3 hours per day[AOR:2.6,95%CI (1.6-7)]. Hairdressers who were engaged to work more than 48 hours per week were 1.5 times more likely to be injured as compared to those who were engaged to work for 48 and less hours per week [AOR: 1.5, 95%CI (1.06-2.4)].Likewise hair dressers worked in a salon that have not comfortable temperature had odds of 1.6 to develop WMSDs [AOR: 1.6, 95%CI (1.0-2.4)].Similarly over weighted participants were 2 times more likely to develop WMSDs as compared to the normal weighted hair dressers [AOR: 2, 95%(1.1-4.1)].

Table 11: The Adjusted effect of factors among hair dressers associated with self reported work related musculoskeletal disorder, Addis Ababa April , 2016(n=599)

Category of variable	Self reported work related musculoskeletal disorder		AOR (95%CI)	p-value
	Yes	No		
Work experience (yrs)				
1-5	335(73.1)	123(26.9)	1.00	
≥6	125(88.7)	6(11.3)	2.5(1.2-5.4)*	0.08
BMI				
Healthy (18.6-24.9kg/m ²)	339(75.5%)	109(24.3%)	1.00	
Underweight (<18.5kg/m ²)	44(69.8%)	19(30.2%)	0.74(0.41-1.33)	0.31
Overweight [#] (25-29.9kg/m ²)	77(87.5%)	11(12.5%)	2(1.1-4.1)*	0.05
Time spent standing position				
1-3	52(52.5%)	47(47.5%)	1.00	
4-6	336(83%)	69(17)	5.7(3.3-9.8)*	P<0.0001
>6	72(75.8%)	23(24.2%)	2.6(1.6-7)*	0.004
Working hours per week				
≤48	165(71.4%)	66(28.6%)	1.00	
>48	295(80.2%)	73(19.8%)	1.5(1.06-2.4)*	0.047
Temperature of the salon				
Comfortable	184(72.2%)	71(27.8%)	1.00	
Non comfortable	276(80.2%)	68(19.8%)	1.6(1.0-2.4)*	0.044

* - significant association AOR adjusted odds ratio #-overweight include obesity

6.9. Self-adopted management strategies for musculoskeletal complaints

The three major coping strategies employed by the hair dresser to prevent musculoskeletal disorders were sufficient rest, homemade treatment and Modifying the position so as to be comfortable but majority of the hairdressers responded that didn't do anything to prevent work related musculoskeletal disorder (Table 12).

Table 12: Self-adopted management strategies for musculoskeletal complaints

s.no	Coping strategy	Number	%
1	Didn't do any things	225	48.9
2	Taking sufficient rest during	146	31.7
3	Reduced working hours	41	8.9
4	Visited a physician	40	8.7
5	stop attending to customers if it causes or worsens discomfort	22	4.8
6	Modifying the position so as to be comfortable	114	24.8
7	Take homemade management	155	33.7

7. Discussion

In this study the prevalence of work related musculoskeletal disorder within the past 12 months was 76.5%, which is comparable with studies done at Brazil (71%), Nigeria (75.6%) and Egypt (69.5%) hairdressers [14, 16, 33] But, it is lower relative to a study done in Korea(94.4%) [31] . The disparity in the Korean study might be due to different sample size, definition, different study area, difference in workload and difference in assessment tools. On the other hand, in terms of types of hairdressing salon the prevalence of WMSD was 79.3% in micro enterprise salon and 66.7% in small enterprise salon in this study. This difference might be due to the difference in availability of ergonomic tools, work load and difference in settings. Although, we were unable to compare this finding with other studies because studies done based on the level of salon are scarce until the completion of this study.

The prevalence of WMSD in this study was further compared with studies done among other professions like nurses and garment industry workers in which the magnitude of WMSD in 12months in Ethiopia. The result in this study was higher than the prevalence of the WMSDs among nurse professionals that was 57% [2, 17]. But ,WMSDs in neck area is lower than garment industry workers which was 51%[19] . This discrepancy could be resulted from the variation in nature of activities performed at different work sectors and the difference in the availability of ergonomics tool in their working area.

The three most body parts that the respondents reported pain or discomfort in this study were, lower back pain or discomfort 71.5%, shoulder pain 51.6% and wrist or hand pain 46.6%,elbow pain 37.9%and ankle or feet pain 36.4% .This was consistent with the study done in Taiwan, United Kingdom and India [11, 29, 30, 51]. The possible explanation could be hair dressing tasks require repetitive and forceful movement of the hand ,elevated shoulder and bending at the back, these working posture induce pain of upper body parts .In addition, hairdressers perform tasks in standing position and this can bring a static load on leg muscle causing pain on this area . The least symptom reported by hairdressers was on hip or thigh area 18.9% which is comparable with a study done in Iranian hair dressers[14].

Hairdressers reported work related musculoskeletal disorder in one or more than one body segments. In this study the highest number of symptom reported by hair dressers were five 138(30%), followed by three symptom 95(20.7%). This result is not in line with the study conducted among Brazilian hairdressers among which the highest number of symptom reported were in one body segment [41]. This difference might be due to differences among the hairdressers in terms of reporting pain or discomfort or might be the difference in sample size.

Most studies showed that several factors were related to the occurrence of work related musculoskeletal disorder Socio-demographic factors, working environment factor personal factor, ergonomic factor and psychosocial factor are the possible factor for workers to develop WMSDs.

Some researchers showed that age was significantly associated with WMSDs in which majority showed that older aged hairdressers had the greater chance to develop MSDs [29, 30, 32]. However, this study showed that age is not significantly associated with WMSD among hairdressers when it is adjusted for other variables. This could be when age increase , joint mobility and muscular strength decrease this leads increase the pain in different body parts but the difference might be in this study majority of the hairdressers were young and the tolerance to report pain could be high among them.

This study found out that hairdressers who had experience greater than 6 years were 2.5 times more likely to develop WMSDs compared to those who had short years of experience This might be due to lower job duration did not have enough exposure for risk factors as compared to long period experience. This is supported by study conducted among Iranian hair dressers, UK hairdressers and Egyptian hairdressers [29, 32, 33]. On the contrary, there was no significant difference in WMSD by work experience in the study conducted among Taiwanese hairdressers[39].

Some studies conducted among hairdressers showed that personal factors bear on hairdressers vulnerability towards WMSDs in different extent. In this study hairdressers, whose body mass index were over weighted had significance association with WMSDs as compared to those body max index was normal. This due to whenever the body gets overweight, mechanical stress and inflexibility on the body will increase and causes WMDs. This finding was consistent with study conducted in Iran[15] However, there is no significant difference in WMSDs by hair dressers personal characteristics like drinking alcohol and smoking. But, the study conducted among Cosmo technologists who are working in salons in china and United Kingdom showed that there is a significant association between WMSDs and smoking behavior [29, 38]. This difference might be because of very small number of hairdressers who have smoking and drinking behavior in this study and workers may not want to express this personal behavior during data collection time .

Regarding ergonomic related factor, time spent in standing position (>6 hours per day) was significantly associated with WMSDs. This is in agreement with the two Nigerian studies among hairdressers[16, 37]. Bending or twisting in awkward way during hairdressing activity did not show significant difference when it is adjusted for all variables .However, this result is not consistent with other findings[14, 35] This might be the difference in hairdressing style in different settings and variation in hairdressers awareness towards comfortable body posture when performing tasks. Similarly, attending a large number of costumers per day also did not show significant association with WMSDs. This result is inconsistent with a study done in Nigerian hair dressers [16]. This difference might be due to the fact that hair dressers respond not honestly by considering it has relationship with the income of the salon it might cause majority of the hairdressers in this study attend less than10 costumer per day.

Regarding working hours per week, in these study hairdressers who are working more than 48 hour per week had 1.5 times more odds of WMSDs as compared to those who are working 48 and less hours. The possible explanation could be when the length of working hours per week exceeds 48 hours the hairdressers were repeatedly exposed to prolonged standing position and increase workload .This resulted muscle tiredness, decrease fitness and pain or discomfort in musculoskeletal system. This finding is in agreement with different studies conducted among hairdressers [30, 37, 44].

Different studies conducted in hair dressing salon showed that availability of sufficient break within a day decrease the like hood of WMSDs. [30, 37] but in this study there is no significance difference in WMSDs by availability of break time , which may be due to very small hair dressers had break within a day that may not create difference between those who didn't have break within a days .

Regarding working environment factor, after adjusted variables only temperature of the salon showed significant association with WMSDs. Hair dressers who are working in the salon that had not comfortable temperature had 1.6 times chance to develop WMSDs as compared to hairdressers who are working in comfortable temperature. This result showed that thermal condition of hairdressing salon had a significant difference towards WMSDs. It is in agreement with study done in brazil among hairdressers to assess the magnitude of WMSDs [14].

Regarding Self-adopted management strategies for musculoskeletal disorder employed by hairdressers were sufficient rest, homemade treatment and Modifying the position so as to be comfortable. These results were comparable with the study conducted among Nigeria[16].

7. Strengths and limitations

Strengths

- Appropriate sampling procedure was followed to include hairdressers from various salons to avoid selection bias.
- Large sample size was taken to get more representative data to the source population
- Day to day supervision was undertaken in a way that bias could not occur during data collection time.
- To assure the quality of the data, standardized data collection tool was used and pre – testing was done.

Limitations

- As it is self reported pain or discomfort, there might be over and under estimation of the magnitude of the WMSDs and there might be recall bias.
- Ergonomics hazard assessment tools were not used to asses WMSDs in different body part
- Lack of using measurement for working environment variables like thermal condition of the salon.
- Lack of studies with similar methodology and similar topic in local context

8. Conclusion and recommendation

8.1 Conclusion

The result of this study showed that the prevalence of WMSD among hair dressers was higher. The three most body parts that the respondents reported pain or discomfort were lower back, shoulder and hand.

Work experience , the long hours they spend working in a standing position ,BMI, working hours per week and thermal condition of the salon were significant factors that contribute to the high prevalence of the WMSDs among them.

Taking sufficient rest, homemade treatment and Modifying the position so as to be comfortable were the three major coping strategies employed by the hair dresser to prevent musculoskeletal disorders.

8.2 Recommendation

Based on the finding from this study the following recommendations are forwarded

Addis Ababa city micro and small enterprise bureau

- should give integrated emphasis to reduce the current magnitude of work related musculoskeletal disorder have healthy hair dressers by creating in- service training opportunity and awareness creation program .
- should address this problem by creating rule and regulations on working hours including break time and carried out supervision on this sector

Addis Ababa city Food, medicine and health care authority

- Should revise license renewal guide line and include the use of ergonomics tools as criteria during license renewal and the newly opened salons.

Addis Ababa technical vocational & educational training agency

- Should supervise the harassing teaching institute regarding the course taken by hairdresser and update the training manual by in clued ergonomics as a course.

Salon owners

- Should limit the length of working hour to the standard set by the Ethiopian labor law that is eight hour per day or forty eight hour per week.
- Should adjust break time within working hours.
- Should equip the salon by necessary ergonomic tools and promote safe work environment

Hairdressers

- Hairdresser should give emphasis on comfortable body posture when performing hair dressing tasks

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9. Annex

Data collection Tools

Addis Ababa university school of public health collage of health science Questionnaire for Assessment of prevalence and associated factor of work related musculoskeletal disorder among Addis Ababa sub city hair dressers in Addis Ababa,

Annex 1: English version participant's Information Sheet and consent

Addis Ababa University College of Health Science, School of public health environmental and occupational health specialty track

Questioner to assess prevalence and associated factor of self reported work related musculoskeletal disorder among Addis Ababa city hair dressers.

Hello, my name is _____ and I am here on behalf of woineshet bedru a post graduate student from AAU, Scholl of public health .I am here to collect information about general socio demographic and factors related from the study participants about WMSDs, and requesting you to participate in this study which would require your response to an interview on some related issues.

Title of the study: self-reported work related musculoskeletal disorders and determinant factors of hair dressers, in addis ababa, ethhiopia, 2015.

Back ground: hair dressers are one of the high risk professionals for WRMSDs, which might be due to the long standing work posture, repetitive tasks such as, hair washing, cutting, blow-drying, hair blow waving, rolling and hair designing .

Objective: The objective of the study to assess the prevalence and associated factors of self-reported work related musculoskeletal disorder among hair dressers.

Benefit of the study: there is no direct benefit for participating .however the study finding would be used to know the magnitude of the problem and important to improve the working setting.

Risk: There are no risk posed to the participant from the study

Right of participants: your participation is voluntary and you are not obligate to answer any question you don't wish to answer .if you fell discomfort with the interview, you can with draw any time after you get involved in the study .you can take time to understand and decide on your participation in the study.

Confidentiality: your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential.

Duration of the interview: This interview will take about 20 minutes.

Could I have your permission to continue?

1. If yes, continue the interview
2. If no, skip to the next participant by writing reason for his/her refusal .

Informed consent

I have read this form or it has been read to me in the language I understand all conditions stated above .Therefore,

1. I agree to participate
2. I do not agree

Name of PI: Woineshet bedru

Address: Tel +251913311191

E-mail: woinebedru14md@gmail.com

Supervisor address Tel -----

Date of interview -----time started -----time completed-----

Result of interview

1. Completed
2. Respondent not available
3. Refused
4. Partially completed

Checked by

Supervisor name -----signature -----date-----

If no, skip to the next participant by writing reasons for his/her refusal.

Annex; 2 English version questioners

Part one: Socio demographic characteristics'

No	Question	Possible response	Skip
101	Sex	1. Male 2. Female	
102	Age	-----in years	
103	Religion	1. Orthodox 2. Muslim 3 Protestant 4. Catholic 5. Others	
104	Marital status	1. Married 2.Single 3. Divorced 4. cohabited 4.Widowed	
105	Educational status	1.Illiterate 2.read and write 3.Primary school(1-8) 4.Secondary school(9-12) 5.Technical and vocational6. Degree or higher	
106	monthly Income	-----ETB/month	
107	Work experience	----- in years	

Part two: individual factors associated with work-related musculoskeletal disorders

201	Do you smoke cigarette?	1. Yes 2. No <input type="checkbox"/>	20
202	If your answer to Q 201 is "yes" how often and How many stick/packet of Cigarette do you Smoking at that time?	1. -----days per week 2. ----- cigarette	
203	Do you drink alcohol?	1. Yes 2. No <input type="checkbox"/>	205
204	If your answer to Q 203 is "yes" how often?	1. _____Days/wk 2. _____Days/month 3.other _____	
205	Do you practice physical exercise?	1.yes 2.No <input type="checkbox"/>	209
206	If yes, in question 207 How often doing physical exercise per week at least for 30 minute?	-----days	
207	How much you are weighing in kilograms?	-----kg	
208	How tall are you?	-----m -----cm	
209	BMI (body mass index kg/m ²)	1. Underweight (<18.50) 2. Normal 18.50-24.99) 3. Overweight (25.00-29.9) 4. Obese(≥30.00)	
210	Do you have any symptom related to WMSDs before engaged in this work?	1. Yes 2. No <input type="checkbox"/>	
211	What is your dominate hand?	1. Right 2. Lift	

Part three - ergonomics factor associated with work-related musculoskeletal disorders

No of ques.	Questions	Choice of answers	Skip
301	How much Time spent standing to make hair?	-----hours -----minutes	
302	Does your job involve Bending or twisting you're in an awkward way?	1. Yes 2. No	
303	Do you work in the same position for 2 hours (Standing, bend over, sitting etc)?	1. Yes 2. No	
304	Does your job require repeating motion with less than 30 second?	1. Yes 2. No	
305	How much time did you spend on this work per day?	-----hour	
306	How many days did you work per week?	----- days	
307	How much customer attending in a day?	-----customer	
308	Do you take breaks during your job per day excluding lunch time?	1. Yes 2. No	→ <u>401</u>
309	If yes in Q 308, How many time in a day and How long do you take a break each time?	-----in a day -----minutes	

Part four – working environmental and psychosocial factor associated with work-related musculoskeletal disorder

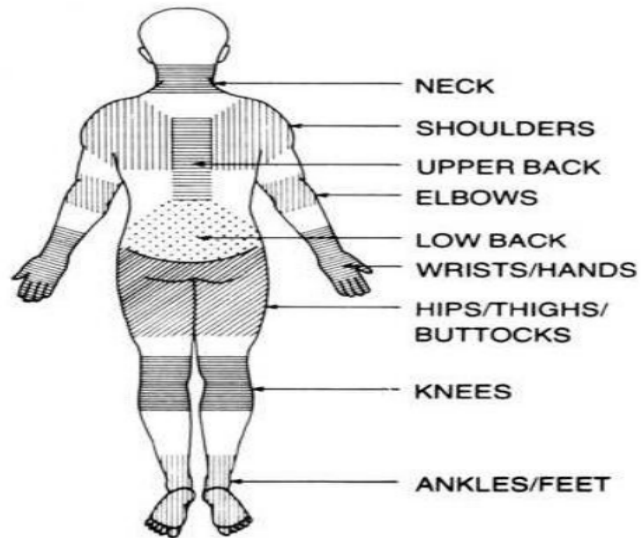
401	What is your Job category or responsibility?(multiple response is possible)	1. Hair washing 2. Hair straightening /styling 3. Cutting 4. Rolling 5. Designing 6. Colouring 7. other specify -----	
403	Do You have adjustable chair? (observe)	1. yes 2. no	
404	Do you have adjustable wash basin?(observe)	1. Yes 2. No	
405	How much customer attending in a day?	-----customer	
406	How do you define your relationship with other colleague?	1. Good 2. Fair 3. Poor	
407	How do you define your relationship with customers?	1. Good 2. Fair 3. Poor	
408	Do you have a boss on your job?	1. Yes 2. No	
409	If yes in Q 412 How do you define your relationship with your current boss?	1. Good 2. Fair 3. poor	
410	Did you attend formal training of hair dressing from hair dressing school?	1. Yes 2. No	
411	Did you receive any training related to issue of ergonomics?	1. Yes 2. No	
Thermal comfort assessment question (make tike on the option)		Yes	No
	Does the air feel warm or hot?		
	Does the temperature in the workplace fluctuate during a normal working day?		

	Is there a heat source in the environment?			
	Is there any equipment that produces steam?			
	Is the workplace affected by external weather conditions?			
	Is cold or warm air blowing directly into the workspace?			
	Can employees make individual alteration to their clothing in response to the thermal environment?			
	Is work rate moderate to intensive in warm or hot conditions?			
	Comfortable working environment temperature based on the above final result			

Questions to measure job stress (Q 413-408)						
	Questions /variables	Job stress score				
		Never	Rarely	Some times	Often	Very often
412	Conditions at work are unpleasant or sometimes even unsafe.	1	2	3	4	5
413	I feel that my job is negatively affecting my physical or emotional wellbeing	1	2	3	4	5
414	I have too much work to do and/or too many unreasonable deadlines.	1	2	3	4	5
415	I find it difficult to express my opinion or feelings about my job conditions to my superiors.	1	2	3	4	5
416	I feel that job pressures interfere with my family or personal life.	1	2	3	4	5
417	I have adequate control or input over my work duties.	5	4	3	2	1
418	I receive appropriate recognition or rewards for good performance.	5	4	3	2	1
419	I am able to utilize my skills and talents to the fullest extent at work	5	4	3	2	1
	Final score					

Questions to measure job satisfaction (Q 409-41)						
	Questions /variables	Job satisfaction score				
		Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
420	I receive recognition for a job well done.	1	2	3	4	5
421	I feel close to the people at work.	1	2	3	4	5
422	I feel good about working at this company.	1	2	3	4	5
423	I feel secure about my job.	1	2	3	4	5
424	On the whole, I believe work is good for my physical health	1	2	3	4	5
425	My wages are good.	1	2	3	4	5
426	All my talents and skills are used at work.	1	2	3	4	5
427	I get along with my supervisors.	1	2	3	4	5
428	I feel good about my job	1	2	3	4	5
	Final score					

Part five: Questioners to asses WMSD in neck, shoulder, upper back, lower back, hip /thigh, knee/leg, ankle/foot and wrist /hand. The diagram below shows the approximate position of the body parts referred to in the questionnaire.



	Have you at any time in the last 12 months had trouble (ache, discomfort and pain)in: (If no, go on to the next body region if yes, please continue)		During the last seven days have you had trouble	
501	Neck		1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
502	Shoulder	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
503	Upper back		1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
504	Elbows	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
505	Lower back		1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
506	Wrists/hands	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
507	Hips/thighs	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
508	Knees	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
509	Ankles/feet	Right	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>
		Left	1. Yes <input type="checkbox"/>	1. Yes <input type="checkbox"/>
			2. No <input type="checkbox"/>	2. No <input type="checkbox"/>

Part six: Coping strategies adopted by participants due to work-related musculoskeletal disorders (WMSDs)

	Coping strategy	Yes	No
601	Didn't do any things		
602	Taking sufficient rest		
603	Reduced working hours		
604	Visited a physician		
605	stop attending to customers if it causes or worsens discomfort		
606	Modifying the position so as to be comfortable		
607	Take home made mangment		

ANNEX3; Amhric version participant information sheet and consent

የተሳታፊዎች መረጃ ማረጋገጫና የፈቃደኝነት መጠየቂያ ቅጽ

መለያ-----

የፀገር ቤቱ ስም _____

የፀገር ቤቱ አድራሻ: ክ/ከተማ _____ ወረዳ-----የቤት.ቁ _____ ስ. ቁ _____

ጤና ይስጥልኝ

ስሜ-----እባላለሁ::እዚህ የመጣሁት በአዲስ አበባ ዩኒቨርሲቲ በህ/ጤ/የት/ት መስክ የድህረምረቃ ተማሪ የሆነችውን ወይንሸት በድሩን ወክሎ ሲሆን በአዲስ አበባ ከተማ ውስጥ የሚገኙ የጸገር ቤት ሰራተኞች በራስ አገለጽ የሚገለጹ በስራ ምክንያት ያጋጠሙ የጡንቻና የመገጣጠሚያ አካት ህመም መጠንና ተያያዥ መንስኤ ወችን ለማጥናት ነው :: ከዚህ ጥናት ጋር በተያያዘ ቢቃለ መጠየቁ እንዲሳተፉ እጠይቀውታለሁ :: ስለጥናቱ የሚከተሉትን ነጥቦች ከተገነዘቡ በኋላ ፈቃደኛ ከሆኑ ወደ መጠይቆች እናልፋለን::

የጥናቱ ርዕስ: በአዲስ አበባ ከተማ በጸገርስራ ላይ በተሰማሩ ሰራተኞች ላይ በራስ አገለጽ የሚገለጹ ከስራጋር በተያያዘ የደረሰ የጡንቻና የመገጣጠሚያ አካላት ህመምን መዳሰስ ::

የጥናቱ መነሻ: የጸገር ቤት ውስጥ የሚሰሩ ጸገር ሰራተኞች ከሌላው ሲነጻጸሩ ከስራጋር ለተያያዘ የጡንቻና የመገጣጠሚያ አካት በሽታ የተጋለጡናቸው ምክንያቱም እረጅም ሰዓት ቁመው ስለሚሰሩና ስራቸው ድግግሞሽን ስለሚፈልግ ነው ::

የጥናቱ አላማ : በአዲስ አበባ ከተማውስጥ የሚገኙ የጸገር ቤት ሰራተኞች በስራ ምክንያት ያጋጠሙአቸውን የጡንቻና የመገጣጠሚያ አካት ህመም መጠን ማጥናት ነው::

ጥቅም: ይህ ጥናት በቀጥታ ለተሳታፊዎች የሚሰጠው ጥቅም የለም :: ነገር ግን ከሰታፊዎች በሚገኘው መረጃ የችግሩ ክብደት እንዲታወቅ ይረዳል::

ጉዳት: እዚህ ጥናት ላይ በመሳተፍ ተሳታፊዎች ምንም አይነት ጉዳት አይደርስባቸውም ::

ሚስጥራዊነት : ተሳታፊዎች ስማቸውን እንዲጠቅሱ አይጠበቅም :: ማንኛውንም ተሳታፊዎች የሚሰጡትን መረጃ በሙሉ ሚስጥራዊነቱ እንዲጠበቅ የጥናቱ ስነምግባር ያስገድዳል በመሆኑም ተሳታፊዎች የሚሰጡት መረጃ ሚስጥራዊነቱ ይጠበቃል::

በጥናቱ መሳተፍ በራስዎ ውሳኔና ፍላጎት ብቻ የተመሰረተ ሲሆን ያልተመቸውን ጥያቄ ያለመመለስና ቃለ- ምልልሱን ከጀመሩም በኋላ ካልፈለጉ በማንኛውም ወቅት ማቋረጥ መብተውት ነው :: ቃለመጠይቁ በአማካይ 20 ደቂቃ ይወስዳል ::

የፈቃደኝነት መግለጫ ቅጽ

ዚህ በላይ ስለጥናቱ የተጻፈውን መግለጫ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ ተረድቻለሁ:: በመሆኑም በዚህ

- 1. እስማማለሁ 2. አልስማማም

መልሱ አልስማማም ከሆነ አመስግነው መጠይቁን ያቋርጡ:: ለጥናቱ ፈቃደኛ ያልሆኑበትን ምክንያት በመጠየቅና በማስታወሻላይ በመያዝ ለጥናቱ ተቆጣጣሪ ሪፖርት ያድርጉ::

ጥናቱ የሚካሄደው በወይንሸት በድሩ

ስልክ +251913311191 ኢሜል : woinebedru14md@gmail.com

የጠያቂው ስም -----ፊርማ-----

መጠይቁ የተሞላበት ቀን -----የተጀመረበት ሰአት -----የተጠናቀቀበት ሰአት-----

የመጠይቁ ውጤት

- | | |
|-----------------|---------------|
| 1. ተሞልቷል | 3. በከፊል ተሟልቷል |
| 2. ተጠያቂው አልተገኘም | 4. ተቃውሞ |

Annex 4; Amhric version questioner
 ክፍል አንድ : ማህበራዊ ና ስነህዝባዊ መጠይቆች

ተ.ቁ	ጥያቄዎች	መልሶች	ይሻገሩ
101	ጾታ	1. ወንድ 2. ሴት	
102	እድሜ በአመት	-----	
103	የጋብቻ ሁኔታ	1. ያገባ/ች 2. ያላገባ/ች 3. የተፋታች	4. የሞተባት 5. ሌላ ካለ ይገለጽ-----
104	ሀይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት	4. ካቶሊክ 5. ሌላ ካለ ይግለጹ
105	የትምህርት ደረጃ	1. ምንም ያልተማረ 2. ማንበብና መጻፍ 3. አንደኛ ደረጃ(1-8) 4. ሁለተኛ ደረጃ (9-12) 5. የቴክኒክና ሙያ ስርተፊኬት 6. ድግሪ	
106	ወርሀዊ ደመወዝ	-----	
107	የስራ ልምድ	-----	

ክፍል ሁለት፡ የግለሰብ ሁኔታን የተመለከቱ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	መልሶች	ይጻግ ሩ
201	ትምባሆ /ሲጃራ ያጨሳሉ ?	1. አዎ 2. አላጨሰም _____	ጥያቄ 203
202	ለተራቁጥር 201 መልሰዎ አዎ ከሆነ በሳምንቱ ለምን ያህል ቀን ና ምን ያህል ሺጃራ (በባኮ ወይም በነጠላ)ያጨሳሉ ?	1. -----ቀን በሳምንት 2. -----ሺጃራ	
203	አልኮል ይጠጣሉ ?	1. አዎ 2. አልጠጣም _____	ጥያቄ 205
204	ለተራቁጥር 203 መልሰዎ አዎ ከሆነ ምን ያህል ቀን በሳምንት ና በወር ይጠጣሉ ?	1. ____ ቀን በሳምንት 2. ____ ቀን በወር 3. ሌላ ካለ ይገለጽ _____	
205	የአካል ብቃት እንቅስቃሴ ያደርጋሉ?	1. አዎ 2. አላደርግም _____	207
206	ለተራቁጥር 205 መልሰዎ አዎ ከሆነ በየሳምንቱ ለምን ያህል ቀናት ቢያንስ ለ30 ደቂቃ ስፖርት ይሰራሉ?	-----ቀናት	
207	የሰውነትዎ ክብደት ስንት ኪሎግራም ይመዘናል?	-----ኪ.ግ	
208	ስንት ሴንትሜትር ይረዝማሉ?	-----ሴ.ሜ	
209	BMI (ክብደት/ቁመት ²)	5. ከክብደት በታች (<18.50) 6. ተመጣጣኝ (18.50-24.99) 7. ከክብደት በላይ (25.00-29.9) 8. የተጋነና ክብደት (≥30.00)	
210	ይህን ስራ ከመጀመርዎ በፊት የጡንቻ ና የመገጣጠሚያ እካህመም ሰማዎት ነበር?	1. አዎ 2. አይ	
211	ለስራ የሚጠቀሙት ቀኝ እጅነው ወይስ ግራ እጅ ?	1. ቀኝ እጅ 2. ግራ እጅ	
212	በጸጉር ስራ ከታወቀ ትምህርት ቤት ትምህርት ወስደዋል ?	1. አዎ 2. አይ _____	301
213	ስለምቹ የእቋቋምና የአሰራር ዘዴ ስልጠና ወስደው ያውቃሉ ?	1. አዎ 2. አይ	

ክፍል ሶስት፡ ከስራ ቦታው ፍ ከስራው አሰራር ሁኔታ ጋር ተያይዞ ያሉ መንስኤዎች

ተ.ቁ	ጥያቄዎች	መልስ	መለያ
301	ምን ያህል ሰዓት ጸጉር በመስራት ቆመው ያሳልፋሉ?	-----ሰዓት	
302	ስራዎ ምቹ ባለሆነ ሁኔታ ታጥፈው ወይም ተጠማዘው እንድሰሩ አድረጎቻል?	1. አዎ 2. አላረገኝም	
303	የአንድን ደንበኛ ጸጉር በተመሳሳይ ሁኔታ ለ2 ሰዓታት ቆመው ወይ ቁጭ ብለው ይሰራሉ?	1. አዎ 2. አልሰራም	
304	ከ30 ሰዓት በላይ ባህሪ ግዜ ውስጥ ድግግሞሽ ያለው ስራ ይሰራል?	1. አዎ 2. አልሰራም	
305	በዚህ ስራ በቀን ውስጥ ምንያህል ግዜ ያሳልፋሉ?	-----ሰዓት	
306	በሳምንት ውስጥ ምንያህል ቀን ይሰራሉ?	-----ቀን	
307	በቀን ውስጥ በአማካይ በቁጥር ምንያህል ሰው ይስተናገዳል ?	-----ደንበኛ	
308	በስራ ሰዓት በቀን ውስጥ ከምሳ ሰዓት ውጭ እረፍት አለዎት?	1. አዎ 2. የለኝም	401
309	ለተራቁጥር 308 መልስዎ አዎ ከሆነ ስንት ግዜ ፣ለምን ያህል ደቂቃ	-----ግዜ -----ደቂቃ	

ክፍለ 4:ከስራ አካባቢና ከሰነልቦና ጋር ተያያዥነት ያላቸው ጥያቄዎች

ተ.ቁ	ጥያቄዎች	መልስ	ይሻገሩ			
401	የስራ ድርሻወት ምንድንነው? (ከአንድ በላይ መልስ ይቻላል)	1. ማጠብመቁረጥ 2. መጠቅለል 3. ሌላካለ ይገለጽ----- 4. መተኮስ 5. ሹርባ መስራት				
402	በስራ ቦታዎ ላይ ቁመት መቀነሻ ና መጨመሪያ ያለው ወንበር አለዎት ?(ተመልክተው ምላሹን ያክብቡ)	1. አዎ 2. የለም 3. አወ ከሆነ ብዛት -----				
403	የጣት መደገፊያ ያለው የጸጉር መቁረጫ መቀስ አለዎት ? (ተመልክተው ምላሹን ያክብቡ)	1. አዎ 2. የለም 3. አወ ከሆነ ብዛት -----				
404	ከስራ ጻደኛዎ ጋር ያለውን ግንኙነት እንዴት ይገልጹታል ?	1. ጥሩ 2. መጠነኛ 3. ጥሩ ያልሆነ				
405	ከጸጉር ተሰሪዎች ጋር ያለውን ግንኙነት እንዴት ይገልጹታል ?	1. ጥሩ 2. መጠነኛ 3. ጥሩ ያልሆነ				
406	በስራዎ አለቃ አለዎት ?	1. አዎ 2. የለም	409			
407	በተራቁጥር 407 መልስዎ አዎ ከሆነ ከስራ አለቃዎ ጋር ያለውን ግንኙነት እንዴት ይገልጹታል ?	1. ጥሩ 2. መጠነኛ 3. ጥሩ ያልሆነ				
408	በስራ ቦታዎ ላይ የስራ ደህንነት ስልጠና ወይም ከጤና ጋር በጠያያዘ ስልጠናው ያውቃሉ?	1. አዎ 2. አላውቅም				
409	ሰዓት የውበት ሳሎኑ የሙቀት ሁኔታ መገምገሚያ ኘጥቦች(በአማራጮቹ ላይ ምልክት ያድረጉ)	አዎ	አይ			
	ቀዝቃዛ ወይም ሙቀት ያለው የአየር ንብረት በሳሎኑ ውስጥ ይሰማዎታል ?					
	በስራ ሰዓት የአየር ሙቀት በሳሎን ውስጥ ይለዋወጣል ?					
	ሙቀት ሊያመነጭ የሚችል ነገር አለ ?					
	እስቲም ሊፈጥር የሚችል መሳሪያ አለ ?					
	ሳሎኑ በውጫዊ የአየር ንብረት ይጠቃል ?					
	ቀዝቃዛ ወይም ሞቃት አየር በሳሎን ውስጥ ይዘዋወራል ?					
	ሰራተኞች ሙቀትን ለመከላከል አለባቸውን ያስተካክላሉ ?					
	የስራ ክብደት ሙቅ በሆነ አየር ይጨምራል ?					
የስራ-ቦርት የተመለከቱ ጥያቄዎች(ጥያቄ 414-408)						
ተ.ቁ	ጥያቄ	የስራ-ቦርት መለኪያዎች				
		በፍፁም	አልፎአልፎ	አንዳንዴ	ብዙጊዜ	ሁልጊዜ
411	የስራ ቦታ ሁኔታዎች ደስ የማይሉና አንዳንዴ ደህንነቱ ያልተጠበቀ ሆኖ ያውቃል?	1	2	3	4	5
412	ስራዬ አካላዊ ና ስነ-ልቦናዊ ጉዳት ያደርስበዎታል?	1	2	3	4	5

413	ብዙ የስራ ጫና አለበት ?	1	2	3	4	5
414	ስለ ስራ ሁኔታዎ ለአለቃዎች መናገር ይከብደዎታል?	1	2	3	4	5
415	የስራ ጫናው ከግልና ከቤተሰብ ህይወት አጋጭቶታል?	1	2	3	4	5
416	የስራ ድርሻዎችን በአግባቡ ማከናወንና መቆጣጠር ይቻላል??	1	2	3	4	5
417	በጥሩ ሁኔታ ለሰሩት ስራ እውቅና/ ሽልማት ተሰጥቶታል?	1	2	3	4	5
418	ችሎታዎችን ና ክህሎትዎን በስራዎ በደንብ ይጠቀማሉ?	1	2	3	4	5
	አጠቃላይ ውጤት					

የ ስራ እርካታን የተመለከቱ ጥያቄዎች (Q 409-418)

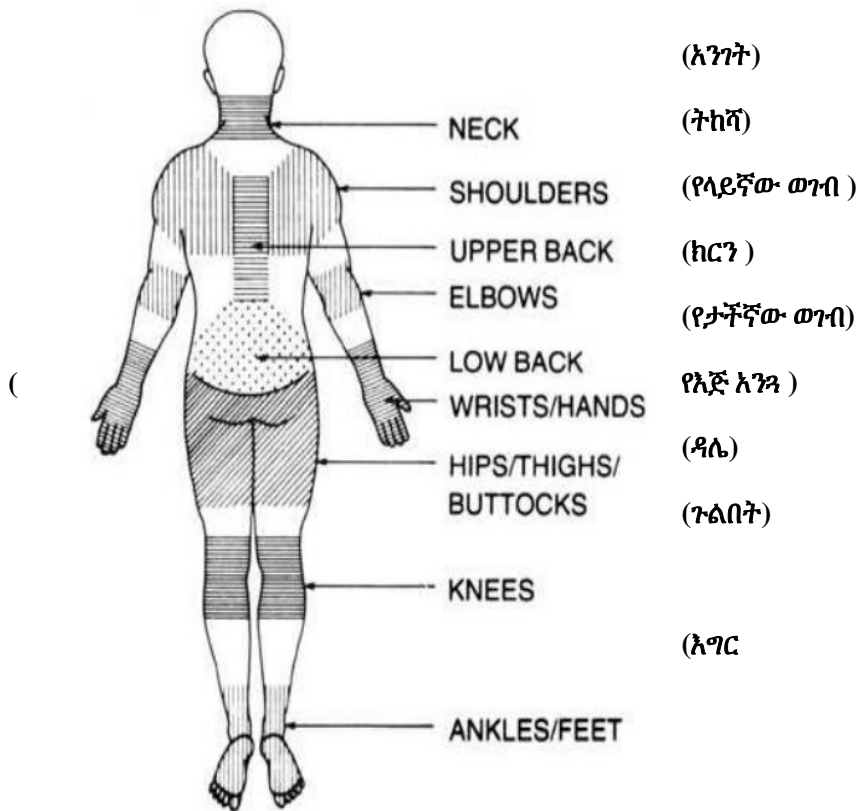
ተ.ቁ	ጥያቄዎች	የ ስራ እርካታ መለኪያ				
		በጣም አረካሁም	አረካሁም	ገለልተኛ	እረካቻለሁ	በጣም እረካቻለሁ
419	በጥሩ ሁኔታ ለሰሩት ስራ በተሰጥዎት እውቅና ምን ያህል እረክተዋል ?	1	2	3	4	5
420	ከስራ ባልደረሰችዎ ባለውት ቅርብ ምን ያህል እረክተዋል ?	1	2	3	4	5
421	እዚህ በመስራትዎ ምን ያህል እረክተዋል ?	1	2	3	4	5
422	በስራ ደህንነት ምን ያህል እረክተዋል ?	1	2	3	4	5
423	በአጠቃላይ ስራ በሚሰጠው አካላዊ ጤንነት ምን ያህል እረክተዋል ?	1	2	3	4	5
424	በሚከፈልዎት ደመወዝ ምን ያህል እረክተዋል ?	1	2	3	4	5
425	ችሎታና ክህሎትዎን በመጠቀም ምን ያህል እረክተዋል ?	1	2	3	4	5
426	ከተቆጣጣሪዎቹ ና ከአሰሪዎች ጋር ባለዎት ስምምነት ምን ያህል እረክተዋል ?	1	2	3	4	5
427	በስራዎ ደስተኝነት ምን ያህል እረክተዋል ?	1	2	3	4	5
	አጠቃላይ ውጤት					

ክፍል5:ባለፉት 12 ወራት ውስጥ በስራ ምክንያት አስቸጋሪ የሆነ የጡንቻ አጥንት ህመምን መጠን ለማወቅ የተዘጋጀ

ባለፈው 12 ወራት ውስጥ በጡንቻ ና በአጥንት ላይ አስቸጋሪ የሆነ ህመም(መቆርጠም፣መደንዘዝ) ስሜት ኢጋጥሞት ያውቃሉ?መልሱም የለም ከሆነ ወደቀጣይ የሠውነት ክፍል ይሻገሩ ፤አዎ ከሆነ ጥያቄውን ይቀጥሉ			ባለፈው 7 ቀናት ውስጥ አስቸጋሪየሆነህመም(ስሜት ኢጋጥሞት ያውቃል?)			
501	አንገት		1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
502	ትካሻ	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	3. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	2. አዎ <input type="checkbox"/>	3. የለም <input type="checkbox"/>
503	የላይኛው ወገብ		1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
504	ክርን	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
505	የታችኛው ወገብ		1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
506	የእጅ አንጓ	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
507	ዳሌ ና መቀመጫ	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
508	ጉለበት	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
509	እግር/አልቦ	በቀኝ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>
		በግራ	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>	1. አዎ <input type="checkbox"/>	2. የለም <input type="checkbox"/>

ጠይቅክፍል6:በስራ ምክንያት አስቸጋሪ የሆነ የጡንቻ አጥንት ህመም ምክንያት ተሳታፊዎች ከህመሙ ለመዳን የሚወሰዱ የመፍትሄ ዘዴዎች

	ዘዴዎች	አዎ	አይ
601	ምንም አላደርጉም		
602	በቂ የሆነ እረፍት ወስደዋል		
603	የስራ ሰዓት ቀንሰዋል		
604	ወደ ዶክተር ሄደዋል		
605	ህመሙ በሚሰማዎት ሰዓት ስራ አቁመዋል		
606	የስራ-በታዎ ምቹ እንዲሆንሁኔታዎችን አመቻችተዋል		
607	ህመሙ እንዳይባባስ የሚደርጉ ዘዴዎችን በቤት ውስጥ ተጠቅመዋል		



DECLARATION

I, the undersigned declared that this my original work, has not been presented for degree in this or other university and that all source of materials used for this thesis has been fully acknowledged.

Name: WOINESHET BEDRU

Signature _____

Date of submission _____

This thesis has been submitted for examination with my approval as university advisor.

Advisors name

Yifoker Tefera (Msc, PhD candidate)

Signature _____

Date _____

Samson Wakuma (Msc, PhD candidate)

Signature _____

Date _____

