ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF PUBLIC HEALTH

PREVALNCE OF WORK RELATED LOWER BACK PAIN AND ASSOCAIATED FACTORS AMONG WELDERS IN SELECTED METAL AND ENGINEERING INDUSTRIES IN ADDIS ABABA AND SURROUNDING TOWNS.

By:

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Advisor

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Acronyms and Abbreviations

ADLI- Agricultural Development Led Industrialization

AOR- Adjusted Odds Ratio

BMI- Body Mass Index

BOLSA- Bureau of Labor and Social Affairs

COR- Crude Odds Ratio

GDP – Growth Domestic Product

GTP- Growth and Transformation Plan

IMF - The International Monetary Fund

LBP- Lower Back Pain

MEDI- Metal and Engineering Development Institute

METEC - Metal & Engineering Corporation

MSDs- Musculoskeletal Disorders

NIOSH - National Institute for Occupational Safety and health

NORHED- Norwegian Program for Capacity Development in Higher Education and Research for Development

OHS- Occupational and Health safety

PPE- Personal Protective Equipments

RULA- Rapid Upper Limb Assessment

SPSS- Statistical Package for Social Science

WRLBP- Work Related Lower Back Pain

WRMSDs- Work Related Musculoskeletal Disorders

Abstract

Background: - Work related lower back pain is one of the commonest musculoskeletal disorders affecting all age groups including adults in work place. Welding Workers in Metal and engineering industry are commonly exposed to lower back pain. There is limited information on the prevalence and associated factors that leads to work related lower back pain.

Objective: -The aim of this study is to determine the prevalence of work related Lower Back Pain and to identify associated factors among welding workers

Methods:- - Cross-sectional study design was implemented from March – April /2017 among 422 welders in selected metal and engineering industries in Addis Ababa and surrounding towns. An Amharic version adapted and pre tested Standard Nordic Musculoskeletal questionnaire was used to collect data using four data collectors and two supervisors. Data was entered in EPI info version 7 and analyzed using SPSS version 21. Frequency tables, graphs and descriptive summaries were used to describe the study variables and co-linearity test were done. To control the effect of confounding variables, multivariate logistic regression models with hierarchical entry of core variables was done. Variables with p-value less than 0.05 under 95% CI in final model were considered as significant

Results: - The twelve month prevalence of work related lower back pain among this working group was 62.1 % with 95% C.I: (57.5, 66.7%). longer service years for more than 20 years [AOR (95% C.I): 3.58 (1.14-4.36), repetitive task within < 30 second [AOR (95% C.I): 2.26 (1.18-4.32)], not get training on OSHA [AOR (95% C.I): 4.4 (2.68 -7.20), not doing physical exercise regularly [AOR: 2.17, 95% CI ((1.36-3.46)], extended working hours for more than 8 hours [AOR (95% CI : 3.66 (2.06-6.51) were predictors for work related lower back pain.

Conclusion and Recommendation: -The prevalence of work related lower back pain was higher among welding workers. Working for longer years, not performing repetitive tasks, extended working hours, absence of training on OSHA and regular physical exercise, were the most contributing factors in increasing lower back pain. Therefore the factory managers should under gone job rotation for those with higher service years to less loaded area, workers should done regularly physical exercises, get training on OSHA for all existing and new hired workers and MOLSA should enforce factory management to stick to ILO proclamation on healthy working hours to reduce risk of developing low back pain among welders

Key words: - **Welders, Work related lower back pain, Ethiopia**

1. Introduction

1.1Background of the study

Work related Lower Back Pain is a general term used to explain health conditions caused by exposures in the work place (1). Work-related low back pain (WRLBP) is one of the musculoskeletal disorders and defined as any back pain originating in the context of work and considered clinically to have been probably caused, at least in part, or exacerbated by the job climates (2) . It was recognized by world health organization to be targeted by surveillance as one from the three major occupational Health problems (3). It can be acute, mild or chronic and identified as major health problem globally and most important source of disability that affect work performance and general health conditions (4).

Globally the prevalence of LBP is rising from 60-70% and the annual increment is estimated to be from15-45 % with incidence rate of 5% in industrialized regions (4) . Whereas in Africa the prevalence of LBP is 46.8%, the small difference between both nations , which shows this problem is emerging in developing countries (5). Lower Back Pain is the most common disorder and the prevalence is irregular across different types of industries and jobs. Particularly, the prevalence rate is increased among agricultural workers, carpenters, drivers both truck and tractor operators, nurses and nursing assistances, cleaners, domestic assistants (6). Welders are also the most affected group with this problem. Studies done in India and Nigeria reveled that the prevalence of these problem was 81.3% (7) and 60.2% (8) respectively from total Musclo Skeletal Disorders .

And also the leading complain among MSDs that affect from single individual to national level socially, economically and psychologically in both developed and developing countries (9) .

In some high income countries, various interventions (physical exercise, ergonomic chairs, awareness on the prevention and treatment) have been started to reduce the absenteeism due to LBP with positive results (4). In low- and middle-income countries where most of the expenditure on health is out of pocket by the patients with limited access to specialty care, this problem poses a huge burden at the household level. But there is a huge gap in terms of data suggesting burden of LBP from these countries.

Some of the prevention strategies were developed by government of Hungary to reduce work related musculoskeletal disorder among welders by giving them work shop on prevention and safety measurement should be taken in working Environment at individual level and at government level developed a curriculum for Vocational schools (13). Most of the developing countries including Ethiopia don't adopt these strategies.

The Ethiopian government has initiated a new push towards creating framework to ensure economic and social development. The International Monetary Fund (IMF) ranks Ethiopia as among the five fastest growing economies Ethiopia's economy is based on agriculture, which accounts 40.2 % of GDP, 60 % of the export earning, and 80 % of total employment. The industrial sector accounts 14.3% of GDP, 9.5 % of total employment, and 21.2 % of export earnings. While the service sector accounts for 46.2% of GDP.(14)

The government of Ethiopia liberalized the economy since 1991. The government has designed and adopted Agricultural Development Led Industrialization (ADLI) strategy to eradicate poverty. The Industry Development Strategy of the country has put in place the principles that primarily focus on the promotion of agricultural-led industrialization, export led development, and expansion of labor intensive industries (15, 16).

Metal and engineering industries are identified as one of the five priorities for existing industry investment to build capacity and upgrade performance in terms of utilization of capacity. The Ethiopian metal industry sector is classified into two categories: basic metal and engineering industries. Basic metal industries deal with production of metal from ore, scrap and conversion of billet, slabs etc. into primary metal products such as hot rolled ribbed and plain reinforcement

bars, wire rod, angles, cold rolled tubes of various profiles, cold rolled sheets, galvanized sheets and tubes whereas engineering industries convert primary metal products into secondary products such as metallic structures, tanks, pressure vessels, machine parts, components, machineries, transport equipment, electrical and electronic equipment, measuring and control instruments and others. The total of more than 60 large scale metal and Engineering industries are found in different places of country and more than half are located in Addis Ababa with various types of human resource working on different tasks. Recorded employment in the subsector estimated to be more than 13,000 workers according to CSA report of 2012/2013(2005 E.C.) (15) and various working groups are available in these sectors skilled production workers and technicians are both accounted for 50% of the total population (31.5% and18.3%) respectively (16).

A country has also revised the policy towards rapid industrial revolution and economic development. Although Minister of Labor and Social Affairs has established at country level to safe guard the workers health and safety, many industrial workers are facing occupational health related problem due to poor implementation of occupational health and safety activities in working environment (17). Considering high expansion of metal industries in Ethiopia, it is important to monitor the work related health problems like Lower Back Pain. Therefore this study will assess the prevalence work related lower back pain and associated factors among welders in metal industry workers of Addis Ababa.

1.2. Statement of the problem

Globally about 37% of Lower Back Pain was caused due to work related exposure. Work-related lower back pain is one of the most important occupational health problems among welding workers. That is responsible for long period disability; reduce performance at work, lost productivity and general well-being (18).

Work related lower back pain constitutes 52-65% of the burden in work related illnesses. In developed nations various interventions has been taken to reduce the impact, As a result the magnitude and burden of lower back pain is declining, absenteeism from work and expanse for medical care was reduced , working conditions and various factors that attributed to development of lower back pain were identified (19).

But in developing nations the magnitude and burden of lower back pain, working types, working conditions, and other factors contributing for development of lower back pain among different working groups including metal industry workers were unknown (20). Although limited studies has been done on assessment of prevalence of LBP among working groups such as nurses, teachers and Garment workers, no study has been addressed the metal industry workers such as welders.

Therefore, this study is aimed to identify specific factors contributing to work-related LBP among welders and assess its burden among welding workers in selected metal and engineering industries of Addis Ababa, Bishoftu and Gelan Towns.

1.3. Significance of the study

The government of Ethiopia is planning different activities to transform the country to middle income in the near future. The major focus of this plan is expansion of industrial sectors. Metal and engineering development industry is identified as one of the eight priority sub-sectors for medium and large industries development in the second Growth and Transformation Plan (GTP). These industries are rapidly growing across the country with various human resources including welding workers. Since human resources are the major fuel for work of these industries there healthiness are also not debatable (15).

Thus, understanding factors that influence the prevalence of Lower Back pain among welders working in metal and engineering industries will help to develop effective strategies to prevent and control work related lower back pains and disability. It could also assist in developing specific interventions for prevention of lower back pain among these workers. Interventions would minimize absenteeism from work, medical consultation time and cost due to this problem, and morbidity related to this problem.

As a result, this study will provide significant input for further detail study and valuable information for welders working in metal and engineering industry, the owners of industries, programmer, governmental organization such as (MOLSA and industry minister) and non-governmental organizations working on OHSA for further improvements in metal and engineering industry workers health and safety

2. Literature review

General Over View

Under this topic summery of accessible Findings literatures concerning the global burden and the determinants contributing to development of Lower Back pain was discussed**.**

2.1. Global prevalence of lower back pain

Lower Back pain is one of prevalent health problem affecting peoples worldwide and major cause of morbidity that affect individuals working ability at work place and general health condition (4). It is also one of the symptoms of Musculoskeletal Disorders any individual can have 80% risk of to affect throughout his life and almost 20-30% of all peoples at any time (2). Another study reveals that 60-90% Europeans peoples will at risk of developing LBP in their life and any one in time 15% - 42% (21) . It was report that LBP was the fifth ranked reason for hospital visit in USA (2) . The severity, relapse and incidence of LBP is increasing in comparisons with previous years and also more common among people who sit for long period of time and work manual activities and most at risk age is from 30-60 years and others age are rarely affected (22).Similarly one scholar stated that teachers who aged above 40 were two times more likely to develop LBP than below 30 years (10) . One study stated that globally, females are more likely to suffer from LBP than males in the age group of 40 years and older.(23)

Research from china reveals that the prevalence of LBP 45.6% among teachers which is lower than the result seen in Turkey teachers 43.8-74.9%. Similar study from Brazil indicated that the experience of this problem among elementary school teachers were 41.1% (23) . However, the prevalence of it in the United Kingdom (UK) accounts for a 40% prevalence in the general working population and that of Germany indicated that58.9% for LBP in the general population (24, 25). A research done among welders in India showed that the highest rate of WRMSDs reported were Lower Back Pain which was 81.3% of it, According to report from Nigeria most of the study done identified that 67% of the prevalence of lower back pain in urban area of Africa and concluded that the prevalence is increasing through time and becoming a public concern of occupational health (26). one of the study from south Africa indicated that workers who were with system of supervision on their job, good family and work place support were less likely to have LBP, statistically described as the prevalence was 15.3% in workers controlled and supported by their family while, the prevalence were 35.8% in workers with non controlled and

less supported by family which has a significant difference and positive association between LBP and negative perception of family support (27). Another study done in Nigeria reported that from 97.7% of prevalence of WMSDs among welders but the most frequent disorder were LBP this may be due to working Posture such as Awkward posture or working continuously by bending from their back (8). When comparing the prevalence of lower Back Pain in Africa with European Countries, the result of systematic review done in Africa showed the prevalence of Lower back pain was ranged 14% to 72% annually (26). European countries data from survey revealed that 30% of their workers suffer from back pain (28). Therefore the prevalence of Lower Back Pain in Africa is much higher than Europeans.

2.2. The prevalence of Lower Back pain in Ethiopia

Few studies were done in Ethiopia on the prevalence of lower back pain, study done among nurses who were working in Obstetrics and Gynecology Units (26.67%), and tutors (4.17%) with the difference of larger and identified tutors as less affected.(29). A cross sectional study done among teachers also reveled the prevalence of lower back pain was 57.5% throughout their job career (10). Similar study done among Taxi drivers of Addis Ababa also showed that the prevalence of lower back pain was 64.5% (30). And results from study among workers of garment industry of Addis Ababa indicated that the highest portion 44.5% of 66% of any part complains of WMSDs (31).

2.3. Associated factors for the development of lower back pain

Studies grouped associated factors of lower back pain in different ways. Some have categorized them as physical, psychosocial and individual factors (10, 11). Others have grouped in to (physical activities), psychosocial factors, and socio-economic factors (32). In this study the predisposing factors for lower back pain are categorized in the form of socio-demographic (age, sex, educational status, monthly salaries), personal (BMI, Wt, Ht) and behavioral (physical activities, Alcoholic, smoking), Organizational factors (employment status, payment methods, working hours, types of work,) and ergonomics factors (high loaded work, sitting and standing hours, policies, extended work hours, shift, etc,). But in reality the existence of this risk factor alone may not cause this problem unless interact to each other (32).

2.3.1. Socio- demographic Factors

A study conducted in Botswana showed gender and age has significant association with development of lower back pain, being female and increase in age can aggravate the this problem. Economic and Educational status were also identified as predisposing factors for lower back pain, studies proved that younger individual who spent many years on education and with higher economic status was susceptible for this problem. This is due to access for transportation means like car and motor vehicles rather walking which attributed to low physical activity. Another Study done among welders also identified age and duration as welder for more than 15 years has been contributing factor for development of Lower Back Pain. A cross-sectional study done among teachers in Ethiopia also reveled males as the most susceptible group than females, which is contraindicated with the same study done in Botswana (3, 33).

2.3.2. Personal and Behavioral factors

Physical Exercise has significantly associated with LBP, as exposure time to physical exercise most of the time more than 5 hour will reduce odd of having this problem when comparing with non and less than this time exposed, additionally individual and behavioral /life style factors such as, body mass index, cigarette smoking and previous low back injury were also identified as significantly associated with LBP disability (7). Similar study done on welders also identified smoking status, and feeling exhausted at end of the day, and having had a previous illness has significant association with Lower Back Pain with (OR 3.0, 95% CI 1.1 to 8.4) (2).this study also reported the association between nutritional status and lower back pain, most of females developed lower back pain were obsessed with high BMI (3).

2.3.3. Working Environment Factors

Studies suggested that Lower back pain has been associated with a number of occupational factors (34, 35). Musculoskeletal disorders were developed majorly due to poor work place design and when workers try to perform activities above their power as a result the musculoskeletal system will disturbed or become at risk. Organizational factors such as Work place environment, equipment layout and furniture characteristics are contributing for LBP, for instance the type of chair on which worker use may influence an alignment of lumbar spine that will lead to LBP (34).

Other risk factors identified for development of MSD were physical ergonomic features such as imbalanced body posture, vibration, forceful exertion and repetitive motions .Some of studies came with evidence of an association between LBP and work-related lifting and forceful movements (36-38). One of the studies done among welders using RULA showed MSDs due to physical exposure was 52% that boldly demonstrated the relation between job and working conditions and as exposure increase risk also increases (8). From Organizational factors awkward arm positions at work contributed more cases of LBP than who did not adopt awkward arm positions (7).

2.3.4. Psychosocial factors

According to the European Agency for Safety and Health at Work (2000) report a considerably smaller number of epidemiological studies paid attention to psychosocial risk factors at work. One study reported that there is a strong association between work related psychosocial and Factors such as high workload, high perceived stress level, low job satisfaction, depression, distress and boring work are most likely to cause lower back pain among teachers in schools and also ensure people with LBP are likely to have fair or poor health and are four times more likely to experience psychological distress compared to people without LBP (39, 40).

2.4. Conceptual Framework of Contributors to Lower Back Pain

The Conceptual frame work is adopted from different literatures in this study to show an interaction of various work related factors and outcome variable. It is also help to examine factors identified within different literatures and its association with development of Lower Back Pain. Work related lower back pain can result from different factors. Factors that identified in this study to assess an association with Work related Lower Back Pain is listed as follow from proxy to distal. Socio - demographic factors (like age, sex, marital status, education status, service year), life style and psychosocial factors (such as high perceived stress level, low job satisfaction, depression , physical exercise, smoking behaviors, drinking alcohol and chewing chat and organizational factors (like, employment status, payment methods, working hours, working department, work place environment, ergonomic factors such as high workload, heavy lifting, awkward back postures and repetitive training repetitive task within less than 30 seconds and heavy work load. The interaction of socio-demographic factors and life style and psychosocial factors affects the lower back indirectly (distally) through organizational factors. Organizational and ergonomics factors are primary (proxy) factors that directly link with the development of work related lower back pain among welders of metal and engineering industries. Organizational related factors either affecting the workers life style or directly determine the occurrence of work related lower back pain. The detailed of description of lower back pain and association factors are expressed as follow on fig. below (Figure 1).

Conceptual frame work for WRLBP among welding workers

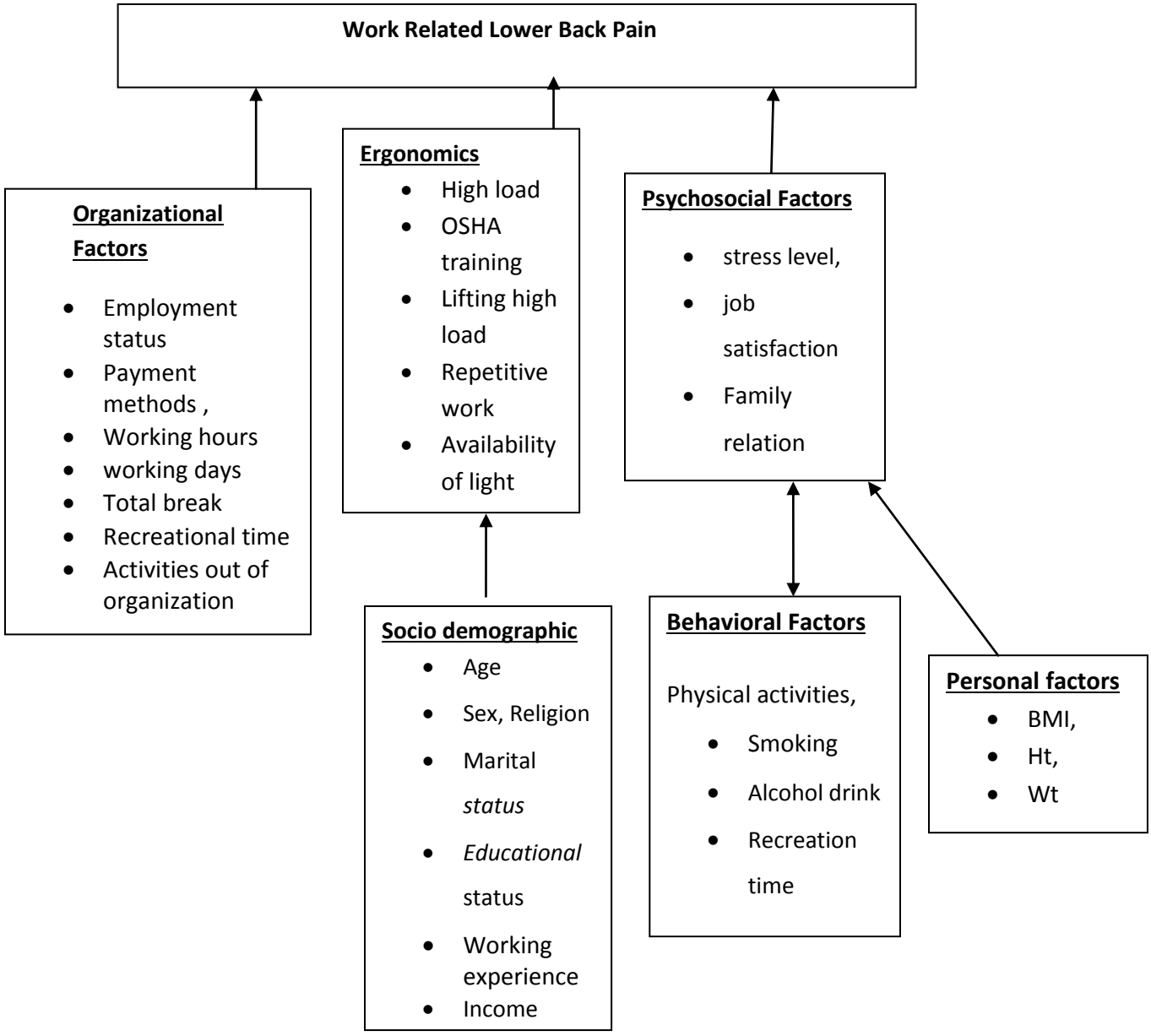


Figure 1: The Adopted Conceptual framework of work related lower back pain.

3. Objectives

3.1. General objective

- The aim of this study is to assess the prevalence of work related lower back pain and to identify associated factors among welding workers in selected metal and engineering industries of A.A and surrounding towns.

3.2. Specific Objectives

- To determine the Prevalence of Work Related Lower Back Pain among welding workers.
- To identify work related factors that associated with lower back pain among welding workers.

4. Methods

4.1. Study design and period - A cross-sectional study design was used to assess the prevalence of work related lower Back Pain and identify associated factors among welders working in metal industries of Addis Ababa and surrounding towns, Ethiopia from March to April/2017.

4.2. Study Area: -

This study was conducted in Addis Ababa, capital city of Ethiopia and surrounding towns. Geographically, the city is located at 901'48'N latitude and 380 44'24'E longitudes. More than 80% of metal and engineering industries of the countries are locating in Addis Ababa. Currently 43 metal and engineering industries are available in the city and surrounding towns (Bishoftu, Gelan and sebeta). Most of the industries are private owned and few are government owned, though the state owned industries are small in number, the capacity of production and numbers of employees are higher than that of in the private. The total number of employees in this sector was estimated at more than 13,000 that works in different job categories, welding workers are the second leading human power in this sector (18.3%), which is preceded by unskilled production workers and managers (38%) (41). This study was conducted in thirteen metal and engineering industries ten of them selected from capital city and the rest two from Bishoftu and Gelan town.(15, 16) . (Tabel-1)

Table 1: The description of workers distributions and department

Sr. no	Name of industries	Working department Vs workers distributions			
		Welding	Cutting	Assembling	Management
1	OCFA metal and Engineering	26	4	8	4
2	Maru metal and Engineering	32	5	10	12
3	Akaki Basic Metal and Engineering	102	21	28	75
4	Mesfin Industrial and Engineering	58	12	11	24
5	NA metal and Engineering	69	15	13	12
6	AMCE metal and industrial Engineering	36	6	8	32
7	Bishoftu Automotive Industrial	289	35	45	115
8	Nehemiah Metal and Engineering	46	6	8	25
9	Hibret building machine and manufacturing industry	68	18	12	18
10	KASMA Engineering	34	8	12	25
11	AMIO Engineering	26	5	7	12
12	KG Engineering	28	4	8	10
13	Ferrus belt Engineering	51	9	5	18
Total		865	148	175	382

Source: - Metal and Engineering Development Institute (MEDI)

4.3. Source Populations: - All welders who are working in large scale metals and engine. industries

4.4. Study populations: - All welders who participate in this study from selected metal and engineering industries.

4.5. Study subject: - all welding workers that are randomly selected and from whom the data was collected for this study

4.6. Eligibility criteria

4.6.1. Inclusion criteria:

- Subjects in the age of 20-60 years consider as productive age.
- Subjects who had minimum 2 years of service year was included in the study,

4.6.2. Exclusion criteria:-

Subject who was unable to communicate and subjects who had lower back pain history before employed to the metal industries

4.7. Sample size determination

The sample size for the first specific objective was calculated with the help of "Epi-info 7" or using single population formula .The base line prevalence for this study has been taken based on other similar studies, done in Nigeria which showed the prevalence of lower back pain among welders was 60.2% (2). And by considering the following assumptions of 95% confidence level, 5% margin of error and 80% power, the sample size for this study is mentioned below.

Groups	One year Prevalence of LBP	Statical figures	Study area	Ref. No
Welders	60.2%	At Alpha error of 5% and 80% power	Nigeria	(42)

Using Single population formula, $n = \frac{(Z\alpha/2)^2\, p(1-P)}{(d)^2}$

Where, n= Initial sample size

P1- % of probability of event in the (exposed) which is 60.2% (42).

Z α/2= critical value of 95% level is 1.96, using level of significance of α=0.05 at power of 80%, d = margin of error to be tolerated = 5%

Justification!

Since no studies were done to assess the prevalence of LBP among welders in our context, taking directly the base line prevalence from Nigeria which is 60.2% may affect the representativeness of this research due to reasons such as working setup, individual variations, working condition and etc the maximum sample size assumption was considered.

Thus, in order to increase precision of the study result, decided to use prevalence among un-exposed 50% and the sample size for this study is 422 by considering 10% non-response rate**.**

For objective two: - To identify associated factors for work related Lower Back pain

Sample size was calculated using double population proportion formula based on the following assumptions.

Identified Common Risk Factors for sample size calculation

$$n1 = \left[\frac{Z\alpha/2\sqrt{\left(1+\frac{1}{r}\right)p(1-p)} - Z\sqrt{p1(1-P2)+p2(1-p2)/r}}{(p1-p2)2}\right]^2$$

P1- % of probability of event in the (exposed) which is 43% (10)

P2- % of probability of event in the (non-exposed) which is 62.6% (10)

p- Pooled proportion - α- is type 1 error with a value of 5%

r- ratio of exposed to unexposed -Odd ratio- 0.45

Zα/2= critical value of 95% level of significant - Z : power =80%

Sample size was calculated using the stat calc for sample size and power for cohort and cross sectional studies of Epi Info version 7, assuming the above criteria. According to the calculation the sample size yields 212. When considering 10% non- response rate 253 participants was included. The decision was done by comparing the sample size in objective one 422 and sample size in objective two 253 in terms of representativeness. Therefore, the 1st objective sample size 422 is the total population that was participated on this study.

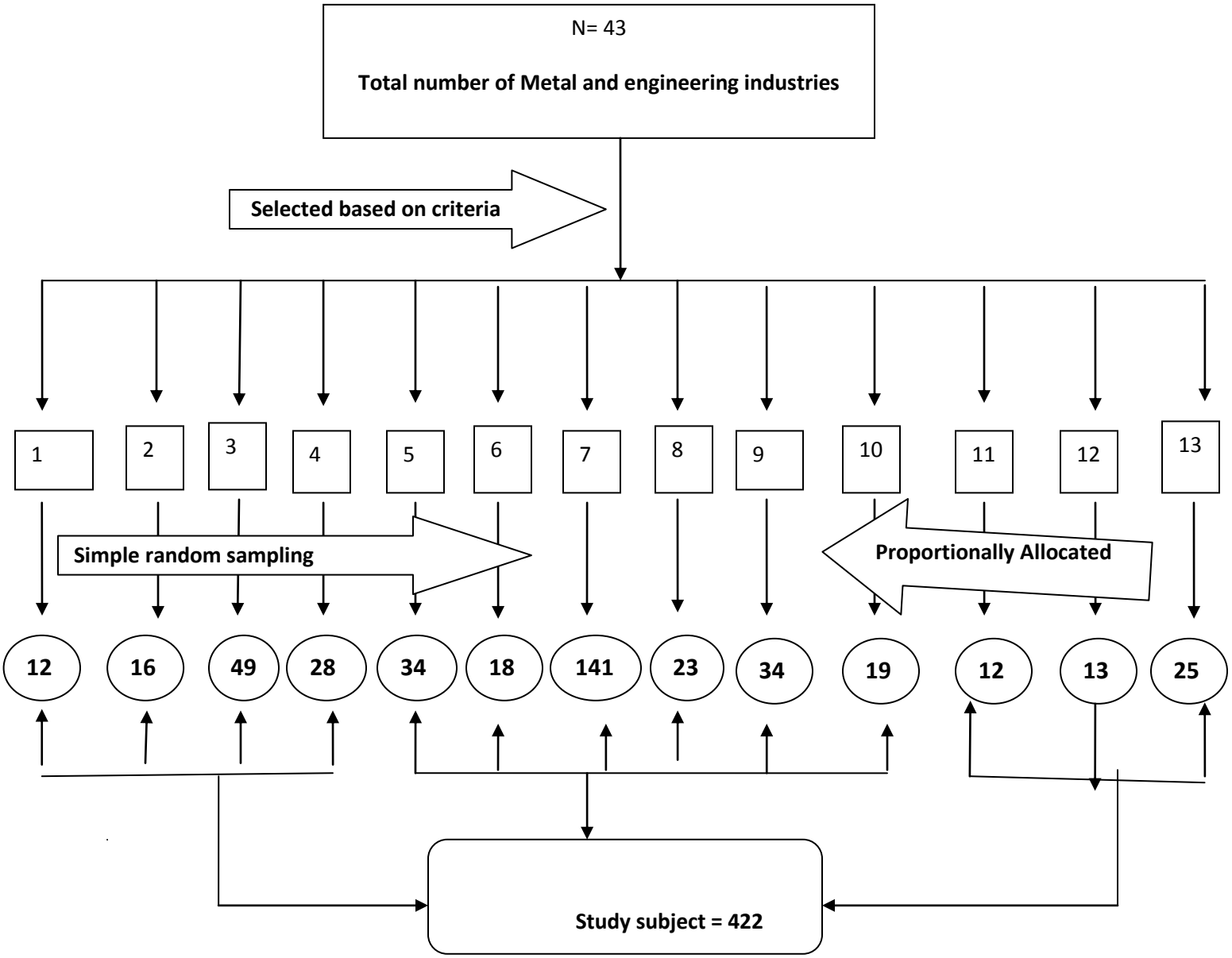
4.8. Sampling techniques and Procedure

The thirteen metal and engineering industries was selected from 43 industries in the city based on defined criteria like permanent/continues production time, year of establishment (at least 2 years and above) and types of product they produce (only related to welding). The study samples that have been determined in the sample size determination were distributed proportionally based on total welding workers in the selected industries.

Finally, simple random sampling technique was applied to select the study participants from list of their payment sheet that prepared only for welding workers and distributed according to their proportional number to the thirteen metal and engineering industries. To select the study participants, Microsoft excel 2010 was used to generate random numbers from their payment sheet from each metal and manufacturing workers. (Table 2 below)

Table 2: Proportional allocation of welding workers in selected metal and engineering industries

Sr.no.	Name of selected industries	Total number of welders	Selected and interviewed	Proportional Allocation
1	OCFA metal and Engineering	26	12	0.49*26
2	Maru metal and Engineering	32	16	0.49*32
3	Akaki Basic Metal and Engineering	102	49	0.49*102
4	Mesfin Industrial and Engineering	58	28	0.49*58
5	NA metal and Engineering	69	34	0.49*69
6	AMCE metal and industrial Eng.	36	18	0.49*36
7	Bishoftu Automotive Industrial	289	141	0.49*289
8	Nehemiah Metal and Engineering	46	23	0.49*46
9	Hibret building machine and indu.	68	34	0.49*68
10	KASMA Engineering	34	19	0.49*34
11	AMIO Engineering	26	12	0.49*26
12	KG Engineering	28	13	0.49*28
13	Ferrous Belt Engineering	51	25	0.49*51
	Total	865	424	



Keys: Numbers in the above diagram represents the following industries.

1. OCFA metal and Engineering	7. Bishoftu Automotive Industrial
2. Maru metal and Engineering	8. Nehemiah Metal and Engineering
3. Akaki Basic Metal and Engineering	9. Hibret building machine and manufacturing industry
4. Mesfin Industrial and Engineering	10. KASMA Engineering
5. NA metal and Engineering	11. AMIO Engineering
6. AMCE metal and industrial Engineering	12. KG Engineering
	13. Ferrous belt Engineering

Figure 2: Schematic presentation of sampling procedures of selected metal industries of Addis Ababa, Gelan and Bishoftu Towns, Ethiopia 2016/17 .

4.8. Data collection Methods and tools

4.8.1 Questionnaire

The data was collected by using adopted Standardized Nordic musculoskeletal questionnaires for assessing prevalence of work related lower back pain. This tool was not developed for clinical diagnosis. It is repeatable, sensitive and useful as a screening and surveillance tool for musculoskeletal disorders including Lower Back Pain (43, 44).

The questionnaire was used for assessing associated factors, which includes socio demographic characteristics, organizational factors, life style and psychological and ergonomic factors to determine prevalence of lower back pain among study groups (45, 46). Using a standard translation procedure, the questionnaire was translated from English to Amharic and back to English to insure the consistency. The data was collected by face to face interview using Amharic language structured questionnaire and was managed by trained data collectors.

4.8.2. Data collectors and supervisors

Data was collected by four degree Environmental Health Professional and supervised by two MPH graduates.

4.9. Study variables

4.9.1. Dependent: - Work related low back pain

4.9.2. Independent

- ✓ **Socio demographic Factors** (Age ,Wt ,Education ,income, marital status)
- ✓ **Organizational factors:** - (Employment status, payment methods, working hours, total break excluding lunch time, health and safety training, repetitive work, high loaded work, availability of light, types of setting chair, working department and fitness of working machine with sitting chairs).
- ✓ **Personal and life style factors** – Body mass index, physical exercise, smoking behavior, alcohol drinking, recreation activities, etc).

- ✓ **Psychosocial factors**: - job satisfaction and job stress, relationship with family, depression and etc.
- ✓ **Ergonomic factors: -** Repetitive tasks, Heavy work load, Availability of light, Training on OSHA and etc.

4.10. Operational definitions

Work related Lower Back Pain: **A**ny back pain originating in the context of work and common reported symptoms of low back problems (such as, pain spreading into the buttocks and thighs; pain radiating from buttocks to the foot; back stiffness and reduced range of motion;) in the leg, foot or toes at least in part, or exacerbated by the job climate and confirmed by medical records. (3)

- **Welders; -** are a tradesperson who specializes in fusing materials together. (2)
- **Body mass index**: weight in kilograms divided by the square of the height in meters (kg/m2). (46)
- **Underweight**= BMI <18.50 (46)
- **Normal range**= BMI b/n 18.50-24.99 (46)
- **Overweight** = BMI b/n 25.00-29.99 (46)
- **Obese**= BMI ≥30.00 (46).
- **Job satisfaction:** A score measured using the generic job satisfaction scale as yes (32 - 50) and no (10 - 31) (47).
- **Job stress:** A score measured using the workplace stress scale as yes (16 to 40) and no (lower than or equal 15) (27).
- **Work related musculoskeletal disorders:** is perceived pain, ache or discomfort for at least 2-3 work days in last week or last 12 months in any part of body segments (neck, shoulder, upper back, lower back, hip /thigh, knee/leg and ankle/foot and wrist /hand) caused, aggravated or exacerbated by work place exposures and to be confirmed by medical history (1, 33).
- **Occupational Health and safety training**: A worker who has got any kind of training in one year Period through any kind of media about health and safety rule implemented in metal industries (46).

- **Cigarette Smoking:** It is practice of smoking cigarette by welders for at list one sticks of cigarette per day (48).
- **Alcohol drinking:** it is a consumption of any kind of alcohol by welders at least for two times per week for different purpose.
- **Physical exercise**: Performing any kinds of physical exercise at list two times per week for 30 minutes (48).
- **Repetitive work** within less than 30 second- when workers exposed to repetitive task which repeat itself every 30 second in the same direction (49).
- **Availability of Lighting:** - The presence of visible light which allow workers to move about easily and to carry out their work effectively (4).
- **Permanent workers: -** welders who are assigned as permanent based on the industry criteria.
- **Temporary workers:-** welders who are assigned as temporary based on the industry criteria.
- **Workmate relation :**- worker relation in the work place and graded as
  Good – if he/ she had a good relation and got support in work place
  Not good – if he/ she had a relationship but no support in work place
  Poor – Neither good relation nor support from workmates.

4.11. Data Management

Data was checked for completeness in the questionnaires. Each questionnaire was coded, stored in appropriate area and checked for completeness by principal investigator during and after data collection. Data was entered in prepared EPI info. Version 7 templates and exported to SPSS.V.21 for cleaning and analysis.

Data was edited and cleaned by running frequency of each variables and Use Subject ID to identify the records with missing value and to ensure completeness And also checked for missing values and outlier's accuracy, data with an outliers and missing values were determined before analysis.

4.12. Data analysis procedures

After the data was edited, coded, and entered into SPSS version 21 software program for analysis, odds ratio with 95% confidence interval was used to measure the association between outcome variable (work related lower back pain) and the independent factors such as (socio demographic, organizational, psychosocial and life style, ergonomics) factors.

For first specific objective - descriptive findings was presented by frequency tables, graphs, percentage, proportion with 95% C.I was used summarize the socio-demographic, psychosocial factors, organizational factors, life style and ergonomics factor.

For second specific objective: - to identify associated factors with Work related lower back pain. **Bivariate logistic regression** was used to explore presence of significant association between independent variables and outcome variable using crude odds ratio (COR) with 95% C.I.

To reduce excessive number of variables and unstable estimate in the final model, only variables with P-value < 0.3 in the bivariate analysis were taken in the multivariate logistic analyses. Finally to determine the independent factors associated with work related lower- back pain, **multivariate logistic regression** models with hierarchical entry of variables were done. In the first step, the effect of socio-demographic characteristics on the work related lower back pain was assessed. Then, ergonomics factors were included and their effect was seen in the presence of socio-demographic characteristics.

Finally organization factor were added to explore their effect in the presence of socio-demographic, life style and psychosocial factor in final model. Finally, variables with P <0.05 in the multivariate analysis were considered significant, and presented by adjusted odds ratio (AOR) with 95% C.I.

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

4.13. Data Quality Assurance during data Analysis

The quality of data was assured before, during and after the data collection. The questionnaire was prepared first in English and then translated into Amharic finally retranslated back to English to check for consistency. Four days training were given for data collectors based on prepared training manuals and how to use field guiding, procedure of data collection and review of key terminologies and ethical issue of the study were discuss in detail by principal investigator and Prior to the actual data collection five percent 5 % of study participant was pre tested in one metal and engineering industry which was found in (sebeta).

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

4.14. Ethical Consideration

Ethical clearance was obtained from the Ethical Review Committee of Addis Ababa University School of Public Health. Formal letter for cooperation was obtained from school of public health, College of Health Sciences, Addis Ababa University. Permission was asked from the metal and engineering development institute. Verbal consent was obtained from respected participants after a necessary explanation about the purpose, benefit and risk of the study and also their right on decision of whether or not participating in the study. The study participants was briefly informed that there is no any direct financial benefit and risk from this study, and the privacy of any information given by the participant will be protected and all participants selected for interview were equally treated including with active cases, on the other hand the study findings would be used to design strategies for prevention and control lower back pain among workers working in metal industry. Concerning confidentiality rather than name of respondents' code was used in the questionnaire. Workers with active case were also interviewed equally with the others to reduce information bias.

4.15. Dissemination of the results

The finding of this study would be presented to Addis Ababa University College of Health Sciences School of Public Health, and NORHED. And it would be disseminated to industry minister, metal and engineering development institute and Ministry of labors and social affairs/ MOLSA.

5. Results

5.1. Socio demographic characteristics of the respondent

From 422 welding workers participated in this study, three hundred ten (73.5%) were males and two hundred thirty three (55.2%) were single marital status. 98.6% of the workers had primary and above level of school completed and only (1.2%) of them unable to read and write. Most of (78.5%) the respondents were in the younger age group (less than 30 years of age) and the median age of the study subject was 26 (25-29). Significant numbers of them were Orthodox Christian followers 266 (63%) and almost half of them were from Oromo ethnic groups 214 (50.2%). The Work experience of majority of them shows that, 159 (37.6%) had served from 1–5 years. Concerning monthly salary 239 (56.6%) of the workers had monthly income greater than 2001 Ethiopian Birr and 5.7 % had monthly income below 1000 Ethiopian Birr with the median of 2001 ETB (Tabele-3).

Table 3: Socio demographic characteristics of the welders working in metal and manufacturing industries of Addis Ababa and Surrounding Towns, Ethiopia May 2017

Categories of variables	Frequency (n=422)	Percent
SEX		
Male	310	73.5
Female	112	26.5
Age in completed years		
20-24	265	62.80
25-30	76	18.0
31-34	16	3.80
≥ 35	65	15.4
Marital status		
Married	175	41.5
Single	233	55.2
Divorced	5	1.2
Widowed	9	2.1
Educational status		
Unable to read and write	5	1.2
Primary Level Education (1-8)	40	9.5
Secondary Level Education (9 10)	34	8.1
Preparatory (11-12)	43	10.2
Higher Education	300	70.9
Religion	266	63
Orthodox	48	11.4
Muslim	97	23
Protestant	3	0.7
Catholic	8	1.9
Others		
Service Year		
<5 years	159	37.6
5–10 years	137	32.6
11–15 years	56	13.27
16-20 years	22	5.21
>20 years	48	11.37
Monthly Salary		
<1000	24	5.7
1001- 1200	31	7.3
1201-1500	48	11.4
1501- 2000	80	19
≥2001	239	56

5.2. Organizational characteristics

Majority of the participants were permanently employed 304 (72%), all the workers (100%) paid fixed monthly salary. Nearly all 413(98%) of them were worked for eight hours per day while only nine (2.1%) had worked less than eight hours per day. The year of working experience ranged between 2-38 years, with a mean of 6.31 year. Four hundred five (96%) participants were working for six days and seventeen (4%) were work for less than six days (Table-4).

Table 4: Organizational characteristics of the welders working in metal and manufacturing industries of Addis Ababa and Surrounding Towns, Ethiopia May 2017

Categories of variables	Frequency (n=422)	Percent
Employment status		
Temporary	118	28
Permanent	304	72
Working Hours per day		
<8 Hours	9	2.1
≥ 8 Hours	413	97.9
Working days per week		
< 6 days	17	41.5
≥ 6 days	405	55.2
Total break excluding for lunch		
None	264	62.6
< 15 minutes	105	24.9
≥ 15 minutes	53	12.6
Recreational time		
Watching Movies	126	29.9
Reading Books	97	23
Visiting for Family	68	16
Others(including religious place)	131	31
Activities done out of working time		
None	389	92.2
Similar	20	4.7
Others	13	3.1

5.3. Life style and Psychosocial characteristics of the worker

A total of three hundred fifty (82.9%) participants had normal BMI ranged from (18.5 – 24.9 $kg/m^{2)}$ according to WHO classification. Two hundred sixty two (62.1%) participants had no physical exercises while one hundred sixty (37.9%) of them had the habit of physical exercises at least twice per week. Equal numbers of participants 399 (94.5%) were not having habit of smoking and chewing chat for each, similarly majority of them 349 (81.9%) were not having habit of drinking alcohol.

Regarding psychosocial characteristics about 370 (87.7%) had a good relation with their workmates while, 41 (9.7%) and 11(2.6%) had intermediate and poor relation respectively. More than half (57.3%) of the welders were satisfied with their job and the rest 180 (42.7%) were not getting satisfaction. On the other hand 166 (39.3%) of the participants were perceived stress with their job (Table 5).

Table 5: Life style and Psychosocial characteristics of the welders working in metal and manufacturing industries of Addis Ababa and Surrounding Towns, Ethiopia May 2017

Category of variables	Frequency (n = 422)	Percent
BMI		
Under weight	33	7.8
Normal	350	82.9
Over weigh	39	9.2
Habit of physical exercise		
Yes	160	37.9
No	262	62.1
Habit of Alcohol drink		
Yes	73	17.3
No	349	82.7
Habit of smoking		
Yes	23	5.5
No	39	94.5
Habit of chewing chat		
Yes	23	5.5
No	399	94.5
High perceived stress level		
Yes	166	39.3
No	256	60.7
Low job satisfaction		
Yes	242	57.3
No	180	42.7
Family relation		
Good	370	87.7
Medium	41	9.7
Not good	11	2.6
Job break		
Yes	141	33.4
No	281	66.6
Heavy Work Load		
Yes	248	58.8
No	174	41.2

5.4. Ergonomics factor related to workers

Majority of participants 309 (73.2%) always lifted heavy objects at work while 119 (26.8%) never lifted heavy objects at work. More than 85 % of welders had experienced a repetitive task within less than 30 seconds and the rest 14.2% were not experienced it and one hundred forty nine (35.3%) of the participants had received training on occupational health and safety at least once in the past 12 months.(Table- 6)

Table 6: Ergonomics factors related to workers in metal and engineering industries of Addis Ababa and Surrounding Towns, Ethiopia May 2017

Category of variables	Frequency (n = 422)	Percent
Repetitive movement task within < 30 seconds		
Yes	362	85.8
No	60	14.2
Doing high loaded work		
Yes	309	73.2
No	113	26.2
Training on ergonomics issue		
Yes	149	35.3
No	273	64.7
Sufficient light		
Yes	386	91.5
No	36	8.5

5.5. Prevalence of work related lower back pain

A total of two hundred sixty two (62.1%) participants had work related lower back pain within the last twelve months. Among them majority of the participants 248 (94.7%) were remembered the cause of their complaints, lifting high loaded objects were covered more than fifty percent 130 (52.4%) of the causes, which was followed by bending forward 34.5% and twisting back at work.8.83% and majority 165 (63%) of the complaints were developed the pain gradually and nearly fifty percent of them had sever level of lower back pain.(Figure-3)

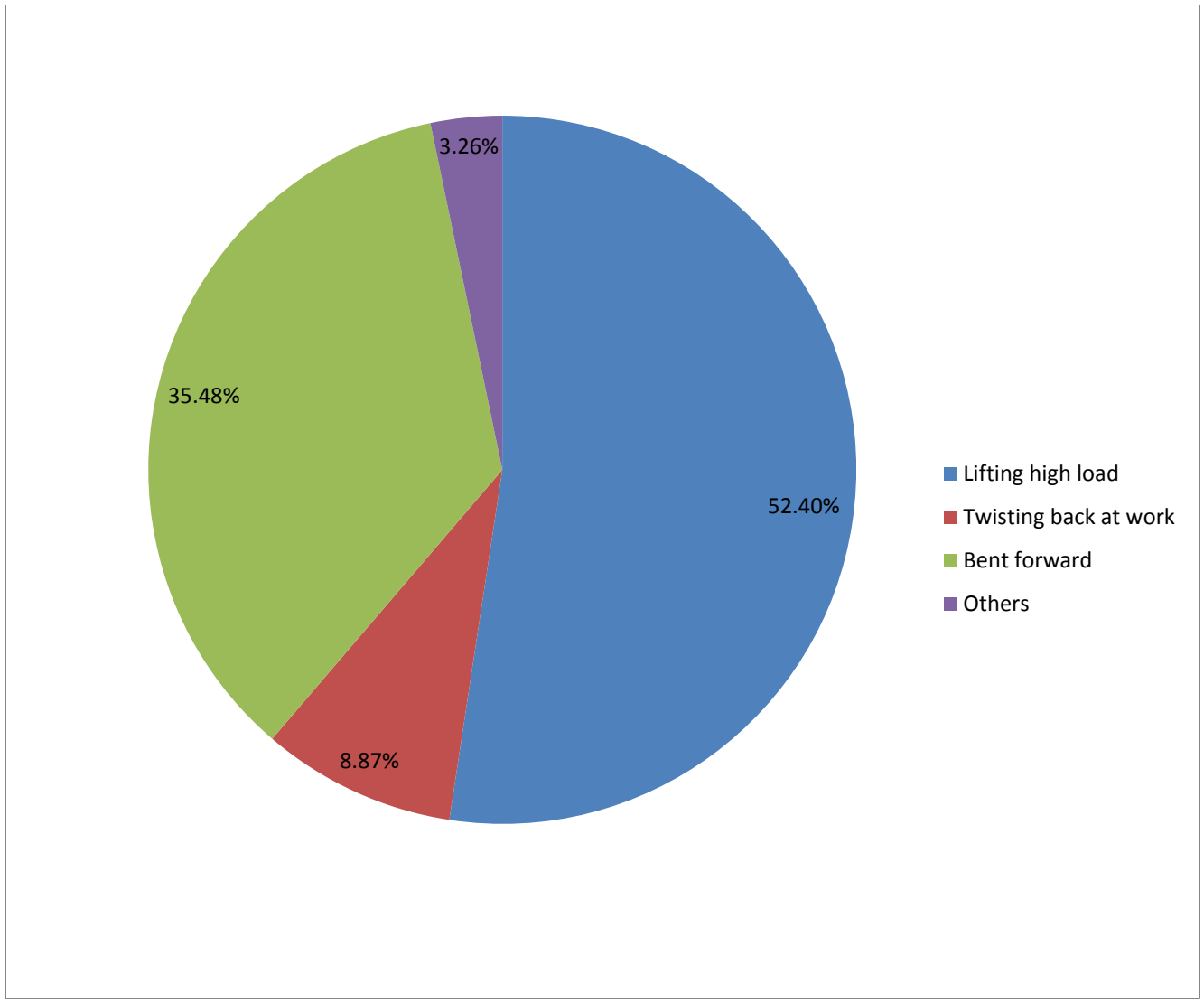


Figure 3: Pie chart 1: Self reported main causes of WRLBP in the last twelve months among Welding workers (n=422) at thirteen metal and engineering industries in Addis Ababa and surrounding towns May, 2017

6. Bi- variate Analysis

6.1. Socio demographic characteristics association with WRLBP

From socio demographic factors Service years, marital status and monthly salary were significantly associated with WRLBP. The overall annual prevalence of lower back pain among both male and female was 62.1% in the past 12 months. Although sex didn't show significant association with work related lower back pain, the twelve month prevalence was high among male than females.

Service years of the participants were showed an association with outcome variables and Welders who served for greater than 20 years had 3 times higher odds of developing WRLBP than those who served for less than 5 years [COR: 3.11, 95% CI (1.51-5.42). Educational status didn't show significant association with outcome variable. Marital status had significant association with lower back pain and Participants whose marital status of single was 39 % lesser odds of developing work related lower back pain than who had married [COR: 0.61, 95% CI: (0.40-0.92)]. Monthly salary had also significant association with work related lower back pain welders who earn monthly salary from 1001- 1200 ETB were 75 % lesser odds developing lower back pain than who earned monthly salary less than 1000 ETB. [COR: 0.247, 95% CI: (0.073-0.83)] (Table – 7)

Table 7: Bivariate analysis for socio demographic factors for WRLBP among welders working in metal and manufacturing industries of Addis Ababa and Surrounding Towns, Ethiopia, May 2017

Categories of variables	WRLBP		COR 95% CI	P-Value
	Yes	No		
SEX	195	115	1.14 (0.732-1.77)	0.565
Male	67	45	1.00	
Female				
Age in years	156	109	1.0	
20- 24 years	46	30	1.07 (1.04-1.907)	0.348
25-30 years	12	4	2.08(1.90-2.35)	
31-34 years	48	17	1.96(1.78, 2.17)	
≥ 35 years				
Marital status				
Married	120	55	1.00	
Single	133	100	0.61 (0.40-0.92)	*0.05
Divorced	2	3	0.31 (0.05-1.88)	
Widowed	7	2	1.60 (0.32-7.94)	
Educational status				
Unable to read and write	4	1	2.70 (0.29-24.5)	
Primary Level Education (1-8)	27	13	1.40(0.69-2.83)	0.44
Secondary Level Education (9 10)	25	9	1.88(0.85-4.16)	
Preparatory (11-12)	27	16	1.14 (0.59-2.20)	
Higher Educ. (Certificate& Above)	179	121	1.0	
Service years				
< 5 years	78	81	1.00	
6-10 years	100	37	2.81 (1.72- 4.58)	*0.0005
11- 15 years	31	25	1.28 (0.69 -2.37)	
16- 20 years	17	5	3.53 (1.24 -10.03)	
>20 years	36	12	3.11 (1.51- 6.42)	

6.2. Organizational characteristics

From identified organizational factors employment status, payment method and number of days the welders spent on the work per week didn't show significant association for outcome variable, the rest factors such as working experience on welding ,number of working hours per day and total break excluding lunch time has shown significant association to develop work related lower back pain. Welders who work for greater than 8 hour per day had 4.9 times odds of developing lower back pain than who work for less than 8 hours years [COR: 4.9 , 95% CI: (2.94-8.40)] . Similarly participants who didn't have break hour except lunch time had 45% lesser odds of developing lower back pain than who didn't have any break years [COR: 0.55 , 95% CI: (0.37-0.93)] (Table- 8).

Table 8:Bivariate analysis for Organizational factors for WRLBP among welders working in metal and engineering industries of Addis Ababa and Surrounding Towns, Ethiopia, May 2017

Categories of variables	WRLBP		COR 95% CI	P- Value
	Yes	No		
Employment status	68	50	1.0	*0.24
Temporary	194	110	1.29 (0.84-2.01)	
Permanent				
Working Hours per day				
<8 Hours	25	55	1.0	*0.005
≥ 8 Hours	237	105	4.96 (2.94- 8.40)	
Working days per week				
< 6 days	12	5	1.0	0.46
≥ 6 days	250	155	1.48 (0.51-4.03)	
Total break excluding for lunch				
None	177	87	1.0	
< 15 minutes	57	48	0.55 (0.37-0.93)	*0.25
≥ 15 minutes	28	25	0.55 (0.3-1.00)	
Activities Done outside organization				
None	240	149	1.0	0.83
Similar	13	7	0.72 (0.22-2.36)	
Others	9	4	0.83 (0.18- 3.67)	
Recreational Time				
Watching Movies	74	52	0.65 (0.39 -1.08)	0.75
Reading Books	52	45	0.53 (0.31 -0.91)	
Visiting Family	46	22	0.88 (0.95-0.51)	
Others	90	41	1.0	

*- eligible Variable for Multivariate Analysis

3. Life style and Psychosocial characteristics of the worker

From lifestyle and psychosocial characteristics of the workers physical exercise, job satisfaction, job stress and heavy workloads are significantly associated with work related lower back pain.

The odds of work related lower back pain among those workers not having physical exercise is about 3 times that of workers having physical exercise [COR: 3.11, 95% CI: (2.06-4.68)]. Also worker who perceived stress by their job had 1.6 times more odds to develop WRLBP than with no stress [COR: 1.62, 95% CI: (1.06-2.05)]. Similarly, worker who didn't satisfied by their job had more than 1.5 times more odd to have WRLBP compared to those satisfied by their job [COR: 1.53, 95% CI: (1.02-2.29)] and welders who had heavy work load had more than 1.6 times more odd to develop WRLBP than who had no heavy work load [COR: 1.65, 95% CI: (1.10-2.45) (Table -9).

Table 9: Bivariate analysis for life style and psychosocial factors for WRLBP among welders working in metal and engineering industries of Addis Ababa and Surrounding Towns, Ethiopia, May 2017

Category of variables	WRLBP		COR 95% CI	P- Value
	Yes	No		
BMI				
Under weight	18	15	1.0	0.64
Normal	219	131	1.40 (0.68-2.68)	
Over weight	25	14	1.48 (0.57 -3.84)	
Habit of physical exercise				
Yes	93	101	1.0	*0.0005
No	169	59	3.11 (2.06-4.68)	
Habit of Alcohol drink				
Yes	16	7	0.79 (0.476-1.32)	0.447
No	246	153	1.0	
Habit of smoking				
Yes	42	31	1.0	0.378
No	220	129	1.422 (0.57- 3.57)	
Habit of chewing chat				
Yes	13	10	1.0	0.52
No	249	150	0.873 (0.34- 1.82)	
job satisfaction				
Yes	140	102	1.0	*0.038
No	122	58	1.53 (1.02-2.29)	
Family relation				
Good	229	141	1.0	0.771
Medium	27	14	1.18 (0.6- 2.34)	
Not good	6	5	0.739 (0.22- 2.46)	
perceived Job stress				
Yes	77	64	1.62 (1.06-2.046)	*0.025
No	185	96	1.0	
Heavy Work Load				
Yes	166	82	1.65 (1.10- 2.45)	
No	96	78	1.0	*0.014

***- eligible variable for Multivariate Analysis**

6.4. Ergonomics factors related to workers

Almost all of the selected ergonomics factors such as (Repetitive movement within < 30 seconds, lifting high loaded objects and Training on OSHA) except availability of light were significantly associated with outcome variable. Welding worker who exposed to repetitive work within < 30 second for always had 3 times odds of developing lower back pain compared those didn't exposed to repetitive task [COR: 2.88, 95% CI: (1.64-5.04)].lifting high loaded objects for always was another factors significantly associated with work related musculoskeletal disorders, participants who always lift high loaded objects had two times odds of developing outcome variable than not lifted. [COR: 2.06, 95% CI: (1.31-3.15)].

The presence of work related lower back pain was 5 times higher among welders who didn't attained occupational and safety related training than got training [COR: 4.76, 95% CI: (2.97-7.62)]. And the presence of sufficient light in working area was not significantly associated with WRLBP (Table -10).

Table 10: Bivariate analysis for Ergonomic factors related to workers for WRLBP among welders working in metal and engineering industries of Addis Ababa and Surrounding Towns, Ethiopia, May 2017

Category of variables	WRLBP		COR 95% CI	P- value
	Yes	No		
Repetitive movement within < 30 seconds				
Yes	238	124	2.88 (1.64- 5.04)	*0.005
No	24	36	1.0	
Lifting high loaded work				*0.01
Yes	206	103	2.06 (1.314 -3.15)	
No	56	57	1.0	
Training on occupational Health and Safety				
Yes	82	67	1.0	*0.0005
No	180	93	4.76 (2.97-7.62)	
Sufficient light				
Yes	242	144	1.34 (0.65-2.68)	0.398
No	20	16	1.0	

***- eligible variable for Multivariate Analysis**

7. Multivariate logistic regression

The multivariate analysis was continued by considering conceptual framework (Figure1) and enter method was used hierarchically to assess the relative effect of the descriptive factors on the outcome variable (work related lower back pain).

From the socio-demographic factors service years was the only variable which was eligible for Multivariate logistic regression. whose served between 6-10 years were more than 2 times and participants who served for more than 20 years were also more than 3 times odds of developing WRLBP than who served for less than 5 years [AOR (95% C.I): 2.28 (1.24-4.20) and 3.58(1.14-4.36)] respectively .

Repetitive work with in less than 30 seconds and OSHA training were sustained significant association with WRLBP in both second and third model from ergonomics factors. Welding worker who exposed to repetitive work within < 30 second for always had more than 2 times odds compared to those didn't exposed to repetitive task [AOR (95% C.I): 2.26 (1.18-4.32) and participants who was not trained on OSHA had more than 4 times developing work related lower back pain than who got training [AOR (95% C.I): 4.40 (2.68 -7.20)

Related to organizational factors, only total working hours per day were only significantly associated but others such as (employment status, total working days per week, and total breaks excluding lunch time) didn't keep their significance in model 3. Workers who spent their time by working with more than 8 hrs Per day had 3.66 times more probable to develop WRLBP than working 8 hrs and less by adjusting all factors [AOR: 3.66, 95% C.I (2.06- 6.51)].

Among life style and psychological factors the only variable which sustainably significant was physical exercise others lost their significance through model 3. Workers who had no habits of doing physical exercise were about 2 times more likely to develop WLBP than workers doing physical exercise at least two times per week by adjusting all factors [AOR:2.17, 95% CI (1.36-3.46)]. (Table 11)

Table 11: Multivariate logistic regression analysis of the adjusted effect of selected socio-demographic, life style and psychosocial, organizational factors and agronomical factors of participants associated with WRLBP in the thirteen metals and engineering Industries.

Variables	Adjusted OR with (95% C.I)			Condensed model AOR (95% CI)
	Model 1	Model 2	Model 3	
Model 1. Socio-demographic variables				
Service years (RG-<5 years)				
(6-10 years Vs RG)	2.266 (1.59- 4.46)*	2.8 (1.65-4.9)**	2.28 (1.24-4.20)*	
(11-15 years Vs RG)	1.17 (0.595 -2.28)	1.28(0.65-2.57)	0.6 (0.26-1.38)	
(16-20 years Vs RG)	2.92 (0.95-8.911)	3.01 (0.97-9.34)	1.72(0.42-7.05)	
(>20 Vs RG)	3.37 (1.41-8.072)*	2.55(1.13-5.73)*	3.58(1.14-4.36)	
Marital status (RG-Married)				
(Single Vs RG)	0.77 (0.47-1.25)			
(Divorced Vs RG)	0.157 (0.02-1.08)			
(Widowed Vs RG)	1.65(0.32-8.56)			
Monthly salaries (RG- <1000)				
(1000–1200 ETB Vs RG)	0.28 (0.082-1.02)			
(1201–1500 ETB Vs RG)	0.41 (0.12-0.13)			
(1501–2000 ETB Vs RG)	0.33 (0.11-1.03)			
Above 2001 ETB	0.34 (0.12- 1.01)			
Model 2: Socio-demographic +(Ergonomics) variables				
Repetitive work with in less than 30 second				
Yes Vs No (RG)		2.26 (1.18-4.32)*	2.52 (1.27-4.99)*	
Lifting high loaded objects				
Yes Vs No (RG)		1.35 (0.80-2.26)		
Training on OSHA				
No Vs Yes (RG)		4.40(2.68-7.20)*	3.65(2.17-6.14)*	3.39 (2.02-5.72)**
Model 3: Socio-demographic + Ergonomics + organizational s + (Life style and psychosocial) factors				
Employment status				
(Permanent Vs Temporary (RG))			1.06(0.63-1.77)	
Working hours per day				
(≥8 hours Vs < 8hours (RG))			3.66(2.06-6.51)**	3.38(1.89-6.06)**
Total breaks excluding lunch time				
None Vs ≥15 minutes (RG)			1.29 (0.65-2.57)	

(< 15 minutes Vs ≥15 minutes [RG])			1.16 (0.53-2.51)	
Habit of physical Exercise				
(No Vs Yes [RG])			2.17 (1.36-3.46)*	2.05(1.28-3.19)**
Job stress				
(Yes Vs No [RG])			1.01(0.62-1.65)	
Job satisfaction				
(No Vs Yes [RG])			0.57(0.299-1.09)	
Heavy Work load				
(Yes Vs No [RG])			1.37(0.77-2.20)	

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

8. Discussion

The main aim of this study was to determine the role of work-related activities in the prevalence of lower back pain (LBP) among welding workers in metal and engineering industries. The finding from study showed the twelve month prevalence of self reported work related lower back pain among welding workers was 262 (62.1%), which is in line with the result of study done in rural area of Nigeria (60.1%) (2, 3, 7). This is in the range one-year LBP prevalence among Africans ranged from (14% to 72%) that reported by systematic review and in line with the upper bound of one year prevalence of LBP in the western society (20%- 62 %) (26). However, the working condition is different, the finding of this study was also agreed with the studies done in Ethiopia among teachers (60.1%) (10). Which is higher than the prevalence of WRLBP among garment industry workers (44%) and almost half higher than among garment workers done in Dhaka city Bangladesh and India 37.7% and 31.1 % respectively (10, 31). These finding indicated that the problem was vary through different working conditions, and the highest prevalence among welding workers, which shows need for advocacy and awareness creation activities and strategies adopted on compacting the expansion of this problem. One of the possible reasons causing the highest in the prevalence of LBP could be the sample size variation, the facility provided at their institution, the way in which work was organized, or social and economic differences between the study settings. The finding from this study was significantly lower than that of from Iran (81.3%) this could be due to different in sample size (participated only 70 workers), different in study design (case- control) and etc (2, 3, 7).

The fact that low back problems occurred most frequently among the participants could be attributed to ergonomic factors (work postures), as most of them either being in awkward posture or working with their back bent repetitive tasks. Factors such as socio demographic characteristics, ergonomic, organizational, life style and psychosocial factors were also identified as responsible for development of lower back pain.

From socio demographic characteristics gender didn't show significant association but the prevalence of work related lower back pain in this study was much higher in males (46.2%) as compared to females (15.8%), which shows wide variation, there was study evidence that

estimated 70% of males will have at least one episode of lower back pain throughout their lifetime (26). This difference was ascribed to men being more involved in physical activities, lifting and heavy work than women.

The result of this study indicated that service year has significantly associated with the occurrence lower back pain, the trend of problem increased with service. Welders who served for 6 to 10 years had more than two times more likely to develop LBP in compression with who served for less than 5 years [AOR (95% C.I): 2.28 (1.24-4.20)].And also participants who served for more than 20 years were more than 3 times more likely to develop the problem when compared to those who served for less than 5 years [AOR (95% C.I): 3.58 (1.14-4.36). This result is consistence with the finding from studies done among Iranian welders (2). The possible reason for the service year difference among these workers could be as the service year of the welders increase exposure to other factors for LBP will also increase. (24). The other possible reason could be the naturally service year increased with age and resulted in the disk between the vertebrae wear away and shrink, causing pain and stiffness as the bone start to rub against each other.

The previous studies indicated that there is a significant association between marital status and income, Even though salary and marital status was not significantly associated with lower back pain in this study.

Physical exercise was one of life style factor which was significantly associated with the occurrence work related lower back pain. Welding workers who didn't have regular physical exercise habit were more than two times more likely to develop WRLBP than who didn't [AOR=2.17, 95%CI: 1.36- 3.46]. This result has an agreement with studies done in Ethiopia among garment workers, teachers and from abroad with Athens Greece (physical education teachers) (10, 31, 34). The reason for difference between exposed to physical exercise and not could be due to physical exercise can help to build muscles, making them better able to support spin for proper functioning and reduce risk of developing lower back pain. Habit of smoking didn't show any significant association with occurrence of lower back pain in this study, but different study came with evidence that show significant contribution for development of lower

back pain. Body mass index (BMI), as the ratio of weight to height squared, was identified as a contributing factor for lower back pain (50) .
However, a study previously conducted in Nigeria found no significant relationship between lower back pain and BMI (2, 5). This is in line with the current study where no significant relationship between lower back pain and body mass index (BMI) where found.

There is strong evidence that psychosocial factors like, workers satisfaction, job stress have association with development of lower back pain but this study didn't show association with this factors. In this study ergonomic factors showed significant association with development of lower back pain, welders who had repetitive task with in less than 30 seconds for always were 2.52 times more likely to develop LBP when compared with who didn't [AOR=2.52, 95%CI:(1.27-4.99)].
The reason for this could be repetitive motion jobs include performance of identical motions again and again, but also include repeating multiple tasks, where the motions of each task are very similar and involve the same muscles and tissues, therefore joints and muscles are susceptible to repetitive motion injuries and there may not be adequate time for muscles to recover from the effects of the exertion before the motion must be repeated. There is also evidence that show repetitive work and lower back pain has strong association.

The other ergonomic factor which lost association with development of lower back pain in this study but significantly associated in other studies is heavy work load. Lifting high loaded objects are also another ergonomic factor which didn't show significant association in this study, but previous study showed that lifting high load objects are significantly associated with LBP(50). Training on Occupational health and safety issue is also one among significantly associated with occurrence LBP among welding workers from ergonomic factors. Welders who didn't take training on OSHA were more than three times more likely to develop LBP than who got training. [AOR= 3.65, 95% CI :((2.17-6.14)]. these variations were happened as results of welders who get training behave well on safety issues, recommended safety rules and better awareness on prevention of lower back pain.

Organizational condition is also contributing factor for development of work related lower back pain, variables defined under this factors are payment method, total break excluding lunch time, length of working hours per day and total working days per week. Length of working hours per day was only significantly associated with occurrence work related lower back pain.

Welding workers who worked for greater than eight hours were more than three times odds of developing than who worked for less than or equal to eight hours. [AOR= 3.6, 95% CI: (2.06-6.51)]. This could be when the workers working time longer and longer (above limited length of hours which is 8 hours), the exposure of workers to different movement such as standing, bending forward and etc will increased, this will result with unbalanced support of muscles, joints, and discs. The finding of this study was also an agreement with studies done in India and Thailand which was conducted on garment worker.(47) This group of workers are working more than 48 hours , which is against the standard set in Ethiopian labor proclamation number 377/2003 that stated as “The time during which a worker actually performs work or avails herself/himself for work should not be exceed 8 hour”.(51)

9. Strengths and Limitations of the study

9.1. Strengths of the study

The following is strength of this study.

- Using of Medical expense of records as confirmatory for self reported lower back pain cases.

9.2 Limitation of the study

This study could have the following limitation

- Being cross sectional study doesn't allow the study to establish causal relationship between factors and lower back pain.
- The one year work related lower back pain prevalence may be under or over-estimated due to recall bias.

10. Conclusions and Recommendations

10.1. Conclusions

In conclusion, this study showed high prevalence of low back pain among welding workers. Working for longer years, performing repetitive tasks, extended working hours, absence of training on OSHA and regular physical exercise, were the most contributing factors in increasing lower back pain. Doing regular physical exercise, unexpended working hours and training on occupational health and safety were among the factors in reducing low back pain. Whereas, longer service years and repetitive work with in less than 30 seconds were factors that increased the development of lower back pain among welders.

10.2. Recommendations

Based on the given results of this study the following recommendations are made**:**

Industry Managers and workers

- Minimize extra working hour duties
- Better to use job ration for those with high work experience to less exposure area (Assembling).
- Welding workers should be responsible for their own health by maintaining a healthy lifestyle in terms of physical fitness

To Bureau of labor and social affairs (BOLSA) and Metal Engineering Development Institute (MEDI)

- Occupational health and safety training which will majorly focus on ergonomics issue should be given for welding workers.
- Planed and continues supervision should be undergone.
- Inter sectorial collaboration should established as well strengthening (Federal Minster of Health)
- Enforce to employee safety officers in all industries.

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Annexes

Annex I: ENGLISH VERSION PARTICIPANT'S INFORMATION SHEET

Hello my name is ----------.I am here on behalf of Tamirat Assefa, post graduate student from AAU, School of public health. I am member of research team on cross sectional study of the prevalence of Work Related Lower Back Pain and Associated Factors among these industry workers, requesting you to participate in this study which would require your response to an interview on some related issues.

Title of the study: Assessment of the prevalence of Work Related Lower Back Pain and Associated Factors among Welders in three selected Metal Industries in Addis Ababa, Ethiopia.

Introduction: Metal industry workers are exposed to different hazards, welders are the most affected group as indicated in different literatures and work related lower back pain is one type of musculoskeletal disorder, which is prominent public Health problem that affects workers of this sector. This problem is increasing from time to time in developing countries including Ethiopia in which the expansions of metal industries are increasing exponentially. Due to low work place occupational health and safety practice, the occurrence of work related Lower Back Pain among Welders will be high.

Objective: The objective of the study is to assess the prevalence of work related Lower back Pain and associated factors among welders working in selected metal industries of Addis Ababa, Ethiopia, 2015/16.

Duration of interview: This interview will take about 15 minutes

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

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

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

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

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

Annex II: INFORMED CONSENT FORM

Title of the study: **Assessment of the prevalence of Work Related Lower Back Pain and Associated Factors among Welders** in selected Metal Industries in Addis Ababa, Ethiopia. I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate investigator is Tamirat Assefa. I have been fully informed in the language I understand about the research project objective is to assess prevalence of work related lower back pain and its association factors among welders. I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the metal factory.

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

Investigator: Mr. Tamirat Assefa Tel: 0913 67 68 34 (Mobile)

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

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

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

Signature _____ (if written consent)

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

Signature _____ Date_____

ANNEX III- QUESTIONNAIRE- ENGLISH VERSION

Code /__/ /__/__/_ /

Instruction for interviewer please fills correctly this part.

Part 0: Address

S.No	Question	Answer
001	Interview Date	/__/__/ /__/__/ /__/__/__/__/ Date Month Year
002	Interviewer's code	
003	Supervisor's code	
004	Address of Institution (Sub city)	
005	Institution settlement Area/Village	
006	starting time	

Part 1: Respondent's personal information

Next I would like to ask you about your demographic information. Please provide your genuine response.

S.no	Question	Answer	Skip
101	How old are you in a completed year ?	1._____ years	
102	Sex of the selected person?	1. Male 2. Female	
103	What is your current marital status?	1. Married 2. Single	

		3. Divorced **4. Widowed** **5. living together**	
104	**What is Educational status of the respondent?**	**1. Illiterate/can't read and write** **2. Can read and write** **3. Primary level education (1-8)** **4. Secondary level education(9-10)** **5. Preparatory (11-12)** **6. Higher Education (certificate, Diploma, Degree)** **7. I don't know**	
105	**What monthly <u>gross incomes</u> do you earning?**	1. ---------- birr	
106	**What is your <u>religion</u>?**	**1. Orthodox Christian** **2. Muslim** **3. Protestant** **4. Catholic** **5. If other (specify) _____**	
107	**What is your <u>ethnicity</u>?**	**1. Oromo** **2. Amhara** **3. Tigre** **4. Gurage** **5. Specify other_____**	

Part 2: Personal and life style factors associated with WRLBP among welders

Next I would like to take your Anthropometric Measurements.

Instruction for Interviewer: Be sure you were used materials needed for this activity and all scales are functional.

2.1. ANTHROPOMETRIC MEASURMENTS

S.no	Question	Answer	Skip
201	**Height** in meter?	1._____meter	
202	**Weighing** in kg?	1. _____ kg	
203	What is your **BMI** (body mass index)? Hint : (Wt-in Kg/(Ht-m)^2	1. Underweight (<18.5 kg/m2) 2. Healthy (18.5–24.9 kg/m2) 3. Overweight (25–29.9 kg/m2) 4. Obese (≥30 kg/m2)	

2.2. Next I would like to ask you information about your personal and life style. Please provide your genuine response

S.no	Question	Answer	Skip
204	Do you have Habit of doing physical exercise **at least twice per week for 30 minutes**? (planned and Scheduled physical exercise activities)	1. Yes 2. No →	Q.206
205	If yes for **Q. 204** how **often**?	1. Two times per week 2. ≥Three times per week	
206	What type of work do you **mostly** practice **after leaving** in this compound?	1. Not at all 2. The same types of work 3. Others specify _____	

207	**How do you mostly pass your recreation time?** **(Circle only one response)**	**1. Watching movies** **2. reading books** **3. visiting Family** **4. Others specify _____**	
208	**Are you currently Smoking cigarette?**	**Yes** **No ⟶**	**Q. 210**
209	**If your answer for question number 208 is yes, How many cigarette of stick/packet do you mostly smoke per day?**	**1. ----------sticks** **2. ----------packet**	
210	**Do you currently drink alcohol?**	**1. Yes** **2. No ◀ ⟶**	**Q 212**
211	**If Quest. Number 210 is yes, how often do you drink alcohol per week?**	**1. _____ days.**	
212	**Are you currently chewing chat?**	**1. Yes** **2. No ⟶**	**Q 301**
213	**If Quest. Number 212 is yes, how often do you chew the chat per week?**	**1. _____ days**	

Part 3: Organizational and Occupational factors associated with WRLBP among welders

The following few questions are focusing on your occupational factors. Please give your genuine response.

S.no	Question	Answer	Skip
301	**What is your Employment status?**	**1. Temporary** **2. Permanent**	

302	**What is your Payment method?** **(More than one options are possible)**	**1. Hourly payment** **2. Fixed monthly payment** **3. Per production payment** **4. specify others _____**	
303	**Overall, how-many- years have you been worked in welding department/?** **(including other organization but with similar working department)**	**1. ---------- years**	
304	**How many hours do you mostly work per day?**	**1. _____ hours**	
305	**How many days do you mostly work per week (from Monday to Sunday)?**	**1. ---------- days**	
306	**What is your mostly total working breaks excluding lunch time per day?**	**1. None** **2. less than 15 minutes** **3. above or Equal to 15 minutes**	

Part 4: Psychosocial factors associated with WRLBP among welders

4.1. Questions to measure job stress and satisfaction related Questions (Q 401-404)

S.no	Question	Answer	Skip
401	**How do you define your current relationship with your workmates?**	**1. Good** **2. Fair**	

		3.Not good	
402	**Does <u>your current job</u> give you <u>personal satisfaction</u>?**	**1. Yes** **2. No**	
403	**Do you think you have <u>enough rest breaks</u>?**	**1. Yes** **2. No**	
404	**Do you think you <u>have heavy work load</u>?**	**1. Yes** **2. No**	
405	**Do you think you have a <u>stressful job</u>?**	**1. Yes** **2. No**	

Part 5: Ergonomics factors associated with WRLBP among welders

The following few questions are focusing on <u>ergonomics</u>. Please give your genuine response.

S. No	Questions /variables	Possible answer	Skip to
501	**Have you <u>often</u> done Repetitive work within <30 seconds?**	**1. Yes** **2. No**	
502	**Do you <u>often</u> lift high loaded objects?**	**1.Yes** **2. No** →	Q 504
503	**If above Quest. Yes, How <u>long</u> do you <u>often lift</u> an object?**	**1._____minutes**	
504	**Is <u>sufficient light</u> available in your working area?**	**1. Yes** **2. No**	
505	**Have you got <u>any training</u> related to occupational Health and safety in <u>the past 12 months</u>?**	**1. Yes** **2. No**	

	(Trainings that given on job, workshops but specifically for the objective of OHS)		

Part 6: Health History

The following few questions are focusing on your history of health. Few Questions may be that happened before some years back, Please give your genuine response.

Instruction for Interviewer: - Please probe for this part of questions

6.1. Is about prevalence of lower back pain in the past 7 days.

S. No	Questions /variables	Possible answer	Skip to
601	Have you had lower back pain in the area between 12th ribcage and pelvic region during the past 7 days which lasts a day?	1.yes 2. No	→ 609
602	If your answer for question no. 601 is yes, for how many days it lasts in total during the past 7 days this lower back pain?	1. _____ days	
603	How do you grade the level of your pain?	1. sever 2. Medium 3. Low	
604	For how many days in total have you absent from work in the past 7 days due to low back pain?	1._____ days	
605	Has the pain spread down your leg to blow your knee during past 7 days?	1. yes 2. No	

606	**How was the nature of lower back pain, when started you for the first time?**	**1. Gradually** **2. Suddenly** **3.suddenly outside of work**	
607	**Have you remembered the immediate cause of lower back pain on first onset?**	**1. yes** **2. No** →	609
608	**If the answer for Qust.607 is yes, What was the main cause?** **(More than one option is possible)**	**1. lifting load** **2. twisting at work** **3.Bent forward** **4. Specify other._____**	

Q (609-615) is about prevalence of lower back pain in the past 12 months.

609	**Have you had lower back pain in the area between 12th ribcage and pelvic region during the past 12 months which lasts a day?**	**1.yes** **2. No** →	619
610	**If your answer for question no. 609 is yes for how many days it lasts in total during the past 12th month this lower back pain?**	**1. _____ days**	
611	**How do you grade the level of your pain?**	**1. Sever** **2. Medium** **3. Low**	
612	**For how many days in total have you absent from work in the past 12 days due to low back**	**1._____ days**	

	pain?		
613	**Has the pain spread down your leg to blow your knee during past 12th month?**	**1. yes** **2. No**	
614	**How was the nature of lower back pain, when started you for the first time?**	**1. Gradually** **2. Suddenly** **3.suddenly outside of work**	
615	**Have you remembered the immediate cause of lower back pain on first onset?**	**1. yes** **2. No** →	617
616	**If the answer for Qust.615 is yes, What was the main cause?** **(More than one option is possible)**	**1. lifting load** **2. twisting at work** **3.Bent forward** **4. Specify other._____**	
617	**Which factors mainly increase the lower back pain in your activities?** **(More than one option is possible)**	**1. Walking** **2.prolonged standing** **3. sitting** **4. laying down backward** **5. side sleep** **6. Specify others. _____**	
618	**Which factors mainly relieving back pain in your activities?** **(More than one option is possible)**	**1. Walking** **2. sitting** **3. lay down backward** **4. side sleeping** **5. specify others _____**	

619	Have you got health care for your lower back pain **by trained health professional** in the past 12 months? **Trained health professional (MD, HO, Nurses)**	1. yes 2. No	
620	**If Q. 619 is yes, the majority of medical expanse was spent by whom?**	**1. Privet** **2. Organization/Insurance** **3. specify others ----------**	
621	**In the past 12 months how many was the total Birr you spent for this medical cost?** **(If the expanse was covered by private)**	**1. _____ Birr**	
622	**In the past 12 months how many was the total Birr an organization/Insurance spent for the medical care?** **(If the expanse was covered by organization/ insurance)**	**1._____ Birr**	
623	**End of interview Thank you very much**		

I have finished. Thank you very Much!!

Finishing Time: ---------- Duration of Interview _____

Name of Supervisor _____ Date _____

OBSERVATIONAL CHECK LIST

Part6. Prevalence of WRLBP among welders workers in selected metal industries of Addis Ababa by NORDIC LOW BACK PAIN QUESTIONAIRES

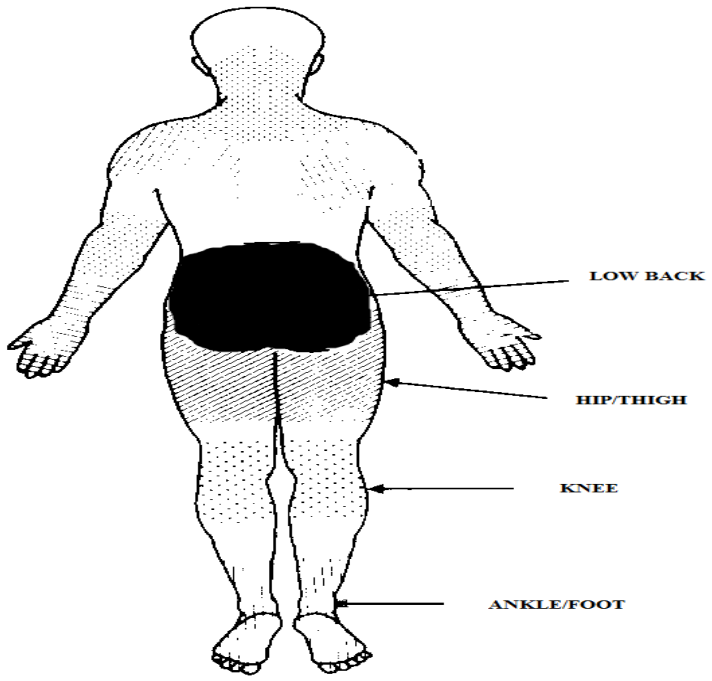
6.1. Have you experience pain in your lower back pain for period of seven (7) days?

Yes ( ) No ( )

6.2. Have you experience pain in you back for period of 12 months?

Yes ( ) No ( )

The shaded part on the picture below shows the lower back pain of the human body from behind. Answer the following question by putting a tick (√)



6.3. In which part of the body do you feel pain/ trouble?

Lower back pain ( ) Hips/thighs ( ) Knees ( )

Thank you!

Annex- IV: Amharic Version Participant's Information Sheet

በአዲስ አበባ ዩኒቨርስቲ ጤና ሳይንስ ኮላጅ የህብረተሰብ ጤና ትምህርት ቤት የጥናቱ መግለጫና የፍቃደኝነት መስጫየ አማርኛ ቅፅ ፡፡

መግቢያ፡ - ጤና ይስጥልኝ እንደምን አሉ ? እኔ ---------- እባላለሁ፡፡ እዚህ የመጣሁት ይህንን ጥናት የሚያካሄድ የአዲስ አበባ ዩኒቨርሲቲ የጤና ሳይንስ ኮሌጅ የሕብረተሰብ ጤና ትምህርት ክፍል የድህረ ምረቃ ተማሪ የሆነውን **ታምራት አሰፋን** ወክዬ ነው፡፡ በአዲስ አበባ ከተማ በሚገኙ የብረታብረት ኢንዱስትሪ ውስጥ በሚሰሩ ሠራተኞች በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው፡፡ ስለዚህ በጥናቱ ላይ ተሳትፎ ለማድረግ ወይምላለማድረግ እንዲወስኑ በቅድሚያ የተወሰነ መረጃ እንሰጥዎታለን ፡፡

የጥናቱ ርዕስ፡ በአዲስ አበባ ከተማ በሚገኙ የብረታብረት ኢንዱስትሪ ውስጥ በሚሰሩ ሠራተኞች በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው፡ ፡

የጥናቱ ጥቅም: ይህ ጥናት ለተሳታፊው ተሳታፊ በመሆናቸው በቀጥታ የሚያገኙት የገንዘብ፣ የጤና እንክብካቤም ሆነ ሌሎች ጥቅሞች የሉትም፡ ፡ ነገር ግን በሂደት የጥናቱ ውጤት ለሚመለከተው አካላት እንደ ግብዓትነት ያገለግላሌ፡ ፡ በተለይ በመስኩ እንደ መነሻ መረጃ በመሆን ያገለግላሉ፡ ፡

የጥናቱ ጉዳት፡ የቃለ መጠይቁ ተሳታፊ በጥናቱ የሚደርስባቸው ምንም ዓይነት ጉዳት አይኖርም፡ ፡

ሚስጥራዊነት ፡ ተሳታፊዎች ስማቸውን እንዲጠቅሱ አይጠበቅም ፡ ፡ ማንኛውንም ተሳታፊዎች የሚሰጡትን መረጃ በሞላ ሚስጥራዊነቱ እንዲጠበቅ የጥናቱ ስነ -ምግባር ያስገድዳል በመሆኑም ተሳታፊውየ ሚሰጠውመረጃ ሚስጥራዊነት ስለሚኖረውተሳታፊውከአስተዳደራዊ ጫና ነፃ ነው፡ ፡

የተሳታፉዎች መብት፡ -ተሳታፊውበዚህ ጥናት ላይ የመሳተፍ ወይምአለመሳተፍ መብቱ የተጠበቀ ነው፡ ፡

በመሳተፍ ላይ እያሉ ካልፈለጉ በማንኛውም ሰዓት ማቋረጥ ወይም ከጥያቄዎቹ ውስጥ የማይፈልጉትን ጥያቄ አለመመለስ ይቻላሉ፡ ። ቃለ-መጠይቁ በአማካይ 10-15 ደቂቃ ይወስዳል ። በቃለ መጠይቁ ወቅት ግልጽ ያልሆነን ነገር መጠየቅ ይቻላል፡ ።

መገናኘት የሚፈልጉ ከሆነ ፡ - የጥናቱ ተሳታፊ ስለጥናቱ ሁኔታ እና ይዘት ግልፅ ካልሆነለት በማንኛውም ሰዓት መረጃ የመጠየቅ ሙበት አለው። ። ለዚህም የዋናውአጥኚውስም ታምራት አሰፋ /0913 67 68 34 እና የጥናቱ አማካሪ ስም ዶ/ር አበራ ቁሜ 0911 88 29 12 ማግኘት ይችላሉ፡ ። በዚህ ሰዓት ስለ ቃለ መጠይቁ ዓላማ ወይም ይዘት የሚጠይቁኝ ነገር አለ? በጥናቱ ለመሳተፍ ፍቃደኛ ነዎት?

የ ፍቃደኝነ ት መግለጫቅፅ

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

1. እስማማለሁ 2. አሌስማማም (መሌሱ እስማማለሁ ከሆነ ወደሚቀጥለውገፅ ይሻገሩ፡ ። መልሱ አልስማማም ከሆነ አመስግነው ወደሚቀጥለውሠራተኛ ይሂዱ፡ ። የጥናቱ ፍቃደኛ ያሌሆኑበትን ምክንያት በመጠየቅና በማስታወሻ ላይ በመያዝ ለጥናቱ ተቆጣጣሪ ሪፖርት ያድርጉ፡ ።

መለያ ኮድ ቁጥር ---------- የተጀመረበት ሰዓት፡ ያለቀበት ሰዓት----------

የ ቃለ መጠይቅ አድራጊዉ፡ -ስም ---------- መለያ ኮድ ቁጥር ----------

ቃለ መጠይቁን ያረጋገጠዉ ሱፐርቫይዘር ስም_____ ፊርማ_____

የ አጥኚዉ ፊርማ 1 ፡ -_____ ቀን ----------

ANNEX V- QUESTIONNAIRE- Amharic Version

መለያ /__/ /__/__/_ /

የአማርኛ መጠይቅ በ ብየዳ ስራ ላይ በተሰማሩ ሰዎች ዙርያ የሚደረግ የጀርባ ህመም ደሰሳ ጥናት።።
አዲስ አበባ ዩንቨርሲቲ ።።
ክፍል 0 ፡ የድርጅቱ መገኛ አድራሻ እና አጠቃላይ ሁኔታ

ተ.ቁ	ጥያቄ	መልስ
001	መጠይቁ የተካሄደበት ቀን	/__/__/ /__/__/ /__/__/__/__/ ቀን ወር ዓ.ም
002	የጠያቂዉ መለያ	
003	የተቆጣጣሪዉ መለያ	
004	የድርጅቱ መገኛ ክ/ከተማ	
005	የድርጅቱ መገኛ ሰፈር ስም	
006	የተጀመረበት ሰዓት	

ክፍሌ 1፡- <u>ማህበራዊ መረጃዎችን</u> በተመለከተ የሚቀርብ መጠይቅ

ከዚህ ቀጥሎ ስለ እርሷ <u>ግላዊ መረጃ</u> አሁን እጠይቅዎታለሁ ።። እባክዎን ትክክለኛዉን ምላሽ ይስጡ ።።

ተ.ቁ	ጥያቄ ና ማጣሪያ	የመልስ አማራጭና መለያ	ይዘለላል
101	ሙሉ እድሜዎ ስንት ነዉ?	1. እድሜ በዓመት ----------	
102	የፆታ ሁኔታ	1. ወንድ 2. ሴት	
103	የጋብቻዎ ሁኔታ	1. ያገባ/ች 2. ያላገባ/ች 3. የፈታ/ች 4. የሞተባት/በት 5. አብረዉ የሚኖሩ	
104	የትምህርት ደረጃዎ ምን ያህል ነዉ?	1.መደበኛ ት/ት ያልተማረ/ች (ማንበብና መፃፍ የማይችል/ትችል 2. መደበኛ ት/ት ያልተማረ/ች ማንበብና	

		መግፍ የምትችል/የማይችል 3. የመጀመርያ ደረጃ የጨረሱ (1-8ኛ) 4. ሁለተኛ ደረጃ የጨረሱ(9-10) 5. የመሰናዶ ትምህርት (11-12) 6. ከፍተኛ ት/ት ተቁዋም (ኮሌጅ/ዩንቨርሲቲ የጨረሱ 7. አላዉቅም	
105	የ<u>ወር ገቢዎ</u> ምን ያህል ነው?	1. ---------- ብር	
106	<u>ኃይማኖትዎ</u> ምንድ ነዉ ?	1. ኦርቶዶክስ ክርስቲያን 2. እስልምና 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ ካለ ይግለጹ ----------	
107	<u>ብሄርዎ ምንድ</u> ነዉ ?	1.ኦሮሞ 2. አማራ 3.ትግሬ 4. ጉራጌ 5. ሌላ ከሆነ ይግለጹ……..	

ክፍል 2. የ <u>አንትሮፔትሪክ</u> መለክያ እና <u>ከግላዊ ባህሪ እና የአኗኗር ዘይቤ</u> ላይ ያተኮሩ ጥያቄዎች ::

2.1. የ አንትሮፔትሪክ መለክያ

ቀጥሎ ቁመቶን እና ክብደቶን እለካለሁኝ፡ እባኮትን እንድትተባበሩኝ ደግሜ እጠይቃሁኝ ::

ተ.ቁ	ጥያቄ ና ማጣሪያ	የመልስ አማራጭና መለያ	ይዘለላሌ
201	የሰውነት ቁመት በሜትር	1. ------- ሜትር	
202	የሰዉነት ክብደት በኪ.ግ	1. ------- ኪ.ግ	
203	የሰውነት ክብደት ከቁመት ጋር ሲነፃፀር <u>(BMI)</u> BMI= (ክብደት በኪ.ግ) /(ቁመት በሜትር)^2	1. ዝቅተኛ ክብደት (<18.5 ኪ.ግ/ሜ2) 2. ጤናማ ክብደት (18.5—24.9 ኪ.ግ/ሜ2) 3. ከፍተኛ ክብደት (25—29.9 ኪ.ግ/ሜ2) 4. ከመጠን በላይ ውፍረት(≥30 ኪ.ግ/ሜ2)	

2.2. ከግለሰባዊ ባህሪ እና የአኗኗር ዘይቤ ጋር የተያያዙ ጥያቄዎች፡፡

ከዚህ በታች የቀረቡ ጥያቄዎች በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠንና ከግለሰባዊ ባህሪ እና የአኗኗር ዘይቤ ጋር ተያይዞ ያሉ መንስኤዎች ላይ ያተኩራል፡፡

ተ.ቁ	ጥያቄ ና ማጣሪያ	የመልስ አማራጭና መለያ	ይዘለላሌ
204	የአካል ብቃት እንቅስቃሴ በሳምንት ቢያንስ 2 ቀን ለ30 ደቂቃ ያክል የመስራት ልማድ አለዎት ? **(በአግባቡ ፕሮግራም ወጥቶለት የሚደረግ ስፖርታዊ እንቅስቃሴ ማለት ነዉ)**	1. አዎ 2. የለም ⟶	206
205	**መልስዎ አዎ** ከሆነ **በአብዛኛዉ** በየስንት ቀን ነዉ የምትሰሩት?	1. በሳምንት ሁለት ቀን 2. በሳምንት ከሶስት ቀን በላይ	
206	ከስራ በኋላ ውጭ **በአብዛኛዉ** ምን አይነት ስራ ትሰራለህ/ሽ ? **(በማወጣጣት እንዲመልሱ አድርግ)**	1. ምንም 2. ተመሳሳይ ስራ 3. ሌላ ካለ ይገለፅ ----------	
207	**በአብዛኛዉ** የትርፍ **ጊዜዎን** እንዴት ያሳልፋሉ ?	1. መዝናኛ ፊልም በማየት 2. መፅሐፍት በማንበብ 3. ዘመድ በመጠየቅ 4. ሌላ ካለ ይገለፅ ----------	
208	**በአሁኑ ሰዓት ሲጃራ** ታጨሳለህ/ሽ?	1. አዎ 2. የለም ⟶	ጥ. 210
209	የጥያቄ ቁጥር 208 መልሱ **አዎ** ከሆነ **በብዛት በቀን** ምን ያክል ያጨሳሉ?	1. --------ፍሬ/በቀን 2. -------ፓክ/በቀን	

210	**<u>በአሁኑ ሰዓት</u>** ማንኛውንም ዓይነት **<u>የአልኮል መጠጥ</u>** ይጠጣሉ ?	1. አዎ 2. የለም ⟶	ጥ. 212
211	የጥያቄ ቁጥር 210 መልሱ **<u>አዎ</u>** ከሆነ **በሳምንት** ለምን ይህል ቀን ይጠጣሉ?	1. ---------- ቀን	
212	**<u>በአሁኑ ሰዓት ጫት</u>** ይቅማሉ?	1. አዎ 2. የለም ⟶	ጥ. 301
213	የጥያቄ ቁጥር **<u>212</u>** መልሱ **አዎ** ከሆነ **<u>በሳምንት</u>** ለምን ይህል ቀን ይቅማሉ?	1. ---------- ቀን	

ክፍል. 3. ከስራ እና ስራ አከባቢ ጋር የተያያዙ ጥያቄዎች

ቀጣዮቹ ተከታታይ ጥያቄዎች ትኩረት የሚያደርጉት ከስራ እና ስራ አከባቢ ጋር ተያይዘዉ ስላሉ ጉዳዮች ይሆናሉ፡፡ እባኮትን ትክክለኛዉን ምላሽ ይስጡን ::

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ	ይዘለላል
301	**<u>የቅጥርዎ ሁኔታ</u>** ምንድ ነዉ?	1. ጊዜያዊ 2. በቋሚነት	
302	**<u>የክፍያዎ ሁኔታ</u>** ምንድ ነዉ? **(ከአንድ በላይ መልስ ይቻላል)**	1. በሰዓት 2. በቋሚ ደሞወዝ 3. በምርት ልክ	
303	በዚህ ስራ ላይ ምን ያህል **<u>ዓመት የስራ ልምድ</u>** አለዎት ? **(በተመሳሳይ ስራ በሌላ መስርያቤትም ያሳለፉትን ጊዜንም ይጨምራል)**	1.---------- ዓመት	
304	በቀን **<u>በአብዛኛዉ</u>** ምን ያህል ሰዓት ይሰራሉ?	1.----------ሰዓት	
305	**<u>በአብዘኛዉ በሳምንት</u>** ዉስጥ ለምን ያህል **<u>ቀን</u>** በስራዎ ላይ ያሳልፋሉ?	1 ----------ቀን	

306	በቀን ዉስጥ ከምሳ ሰዓት ውጭ <u>በአብዘኛዉ</u> ለምን ያህል <u>ደቂቃ</u> እረፍት ያገኛሉ ? **(አንዱን ምርጫ ብቻ ይምረጡ)**	1. ምንም የለም 2. ≤ 15 ደቂቃ 3. ≥ 15 ደቂቃ	

ክፍል 4. ከ ስነ ልቦና ጋር የተያያዙ ጥያቄዎች ።።

በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠን ከስራ ድብርትና እርካታ ጋር ተያይዞ ያሉ መንስኤዎ።።

በስራ ድብርትና እርካታ ላይ የሚያተኩሩ ጥያቄዎች (ጥያቄ 401-405)			
ተ.ቁ	**ጥያቄ**	**የመልስ አማራጭና መለያ**	**ዝለል**
401	<u>በአሁኑ ሰዓት</u> ከመስርያቤትዎ የስራ ባልደረቦች (ተቆጣጣሪ፤ አለቃን ጨምሮ) ጋር ያልዎትን <u>ግንኙነት/ቀርበት</u>/ እንዴት ይገልጹታል?	1. ጥሩ 2. መጠነኛ 3. ጥሩ ያልሆነ	
402	አሁን እየሰሩ ባለዉ <u>ስራ እርካታ</u> የሰሞታል?	1. አዎ 2.አይደለም	
403	በስራዎ ላይ <u>በቂ የዕረፍት ጊዜ</u> አግንቼኋለሁ ብለዉ ያስባሉ?	1. አዎ 2.አይደለም	
404	በመስርያቤትዎ <u>ከፍተኛ የስራ ጫና</u> አለብኝ ብለዉ ያስባሉ?	1. አዎ 2.አይደለም	
405	የስራዎ ሁኔታ **ያጨናንቀኛል** ብለዉ ያስባሉ?	1. አዎ 2.አይደለም	

ክፍል 5፡ ከሰራተኞች የስራ ሁኔታ/ERIGONOMICS/ ጋር የተያያዙ ጥያቄዎች።።

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ	ይዘለላል

501	በመደበኛ ስራዎ ቦታ ላይ ድግግሞሽ የበዛበት ስራ (በየ30 ሴኮንድ የሚደጋገም ድግግሞሽ ስራ) ይገጥሞታል?	1. አዎ 2.አይደለም	
502	በብዛት በስራዎ ላይ እያሉ ከፍተኛ ክብደት ያላቸዉን ዕቃዎች ያነሳሉ?	1. አዎ 2.አይደለም →	ጥ. 504
503	ጥያቄ ቁጥር 502 መልሱ አዎ ከሆነ ለምን ያክል ደቂቃ ይዘዉ ይቆማሉ?	1. ---------- ደቂቃ	
504	በመደበኛነት የስራ ክፍሎት ላይ በቂ የሆነ ብርሃን አለ?	1. አዎ 2. የለም	
505	ከሙያ ደህንነት ጋር በተያያዘ በዚህ 12 ወራት ውስጥ የተሰጦት ስልጠና አለ?	1. አዎ 2. የለም	

ክፍሌ 6.ከጀርባ ህመም ጋር ተያይዘዉ ያሉ ህክምና ታሪክ ::

6.1. ባለፉት 7 ቀናት ውስጥ በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠን ለማወቅ የተዘጋጀ መጠይቅ:: ጥ(601-608)

ከዚህ በታች የቀረቡትን ጥያቄዎች **የእርሶን የጤና ታሪክ** የተመለከቱ ናቸዉ:: የተወሰኑ ጥቄዎች **ከጥቂት ቀናት በፊት** ለተከሰቱ ሁኔታዎች ሊሆኑ ይችላሉ::

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ	ዝለሉ
601	**ባለፉት 7 ቀናት (በአንድ ሳምንት)** ውስጥ **ቢያንስ ለአንድ ቀን የቆየ የታችኛዉ ጀርባዎ** ላይ የህመም ስሜት ተሰምትዎት ነበር?	1. አዎ 2. የለም →	609
602	ለጥያቄ ተራ ቁጥር 601 መልሱ **አዎ** ከሆነ የህመሙ ስሜት ለምን ያህል **ቀናት ነበር** የቆየቦት?	1.---------- ቀናት	
603	**በአሁኑ ሰዓት የጀርባዎን ህመም በደረጃ** እንዴት ይገልፁታል?	1. ከፍተኛ	

		2. መካከለኛ 3.ዝቅተኛ	
604	**<u>ባለፉት 7ቀናት</u>** በአጠቃላይ **ለስንት ቀን** ነበር **<u>በጀርባዎ እና ዳሌዎ ህመም</u>** ምክንያት **<u>ከስራዎ ላይ የቀሩት</u>**?	1.---------- ቀን	
605	**<u>ባለፉት 7ቀናት</u>** ውስጥ ከጀርባዎ እና ዳሌዎ በተጨማሪ **በእግር እና ጉልበትዎ** አከባቢ **የህመም ስሜት** ነበርዎት?	1. አዎ 2. የለም	
606	**ለመጀመርያ ጊዜ ህመሙ በጀርባዎ** አከባቢ **ሲጀምሮት የነበረዉን ሁኔታ የሚገጸዉ የቱነዉ?** **(ሁሉም አማራጫች ይነበብ ላቸዉ)**	1. ቀስ በቀስ 2. ድንገት ስራ ላይ 3. ድንገት ከስራ ዉጪ	
607	**<u>ለመጀመርያ ጊዜ</u>** የጀርባ ህመም ሲጀምርዎት **<u>ትክክለኛዉን መንስዔ</u>** ያስታዉሱ ነበር?	1. አዎ 2. የለም →	609
608	ጥያቄ ቁጥር <u>607</u> መልሱ **<u>አዎ</u>** ከሆነ **<u>በዋናነት ምክንያቱ</u>** ምን ነበር? **(ሁሉም አማራጫች ይነበብ ላቸዉ)** **(ከአንድ በላይ መምረጥ አይቻልም)**	1. ከባድ ዕቃ ማንሳት 2. ወደኋላ ዞሮ መስራት 3. ማጎንበስ 4. ሌላ ካለ ይጥቀሱ ----	
6.2. <u>ባለፉት 12 ወራት</u> ውስጥ በስራ ምክንያት የሚከሰቱ የጀርባ ህመም መጠን ለማወቅ የተዘጋጀ መጠይቅ:: ጥ(609-619) **ከዚህ በታች የቀረቡትን ጥያቄዎች የእርሶን የጤና ታሪክ የተመለከቱ ናቸዉ:: የተወሰኑ ጥቄዎች ከጥቂት ወራት በፊት ለተከሰቱ ሁኔታዎች ሊሆኑ ይችላሉ::**			
609	**<u>ባለፉት 12 ወራት</u>** ውስጥ **<u>ቢያንስ ለአንድ ቀን የቆየ</u>** የበታችኛዉ ጀርባዎ ላይ **<u>የህመም ስሜት</u>** ተሰምትዎት ነበር?	1. አዎ 2. የለም →	619
610	ለተራ ቁጥር 609 መልሱ **አዎ** ከሆነ **የህመሙ ስሜት <u>በጠአጠቃላይ</u>** ለምን ያህል **<u>ቀናት</u>** ነበር የቆየቦት?	1.---------- ቀናት	

611	**<u>በአብዛኛዉ</u>** የጀርባዎን ህመም ስሜት በደረጃ እንዴት ይገልፁታል? **(ሁሉም አማራጫች ይነበብ ላቸዉ)**	1. ከፍተኛ 2. መካከለኛ 3.ዝቅተኛ		
612	**<u>ባለፉት 12 ወራት</u>** በአጠቃላይ **<u>ለስንት ቀን</u>** ነበር በጀርባዎ ህመም ምክንያት **<u>ከስራዎ</u>** ላይ የቀሩት?	1.---------- ቀን		
613	**<u>ባለፉት 12 ወራት</u>** ዉስጥ ከጀርባዎ እና ዳሌዎ ህመም በተጨማሪ በእግር እና ጉልበትዎ አከባቢ የህመም ስሜት ነበርዎት?	1. አዎ 2. የለም		
614	**ለመጀመርያ ጊዜ ህመሙ በጀርባዎ** አከባቢ **ሲጀምሮት የነበረዉን ሁኔታ የሚገጸዉ የቱነዉ?** **<u>(ባለፉት 12 ወራት)</u>** **(ሁሉም አማራጫች ይነበብ ላቸዉ)**	1. ቀስ በቀስ 2. ድንገት ስራ ላይ 3. ድንገት ከስራ ዉጪ		
615	**<u>ለመጀመርያ ጊዜ</u>** የጀርባ እና ዳሌዎ ህመም ሲጀምርዎት **ትክክለኛዉን መንስዔ** ያስታዉሳሉ?	1. አዎ 2. የለም ⟶	ጥ. 617	
616	ጥያቄ ቁጥር <u>615</u> መልሱ **<u>አዎ</u>** ከሆነ **<u>በዋናነት ምክንያቱ</u>** ምን ነበር? **(ሁሉም አማራጫች ይነበብ ላቸዉ)** **(ከአንድ በላይ መምረጥ አይቻልም)**	1. ከባድ ዕቃ ማንሳት 2. ወደኋላ ዞሮ መስራት 3. ሳንነብስ 4. ሌላ ካለ ይጥቀሱ.---------		
617	የጀርባ እና ዳሌዎ አከባቢ ህመም **በዋናነት የሚያብስቦትን** ምክንያቶችን ይጥቀሱ?	1.የእግር ጉዞ 2. ለረጅም ጊዜ መቆም 3. መቀመጥ		

	(በአብዛኛዉ የሚጠቀሙበትን አንዱን ብቻ ምረጥ)	4. በጀርባ መተኛት 5. በጎን መተኛት 6. ሌላ ካለ ይጥቀሱ ----------	
618	**የጀርባ እና ዳሌዎ** አከባቢ ህመምዎን **በዋናነት** የሚያስታግሱልዎ **<u>እንቅስቃሴ</u>** የቱነዉ? **(ከአንድ መልስ በላይ አይቻልም)**	1. መራመድ 2.መቀመጥ 3.በጀርባ መተኛት 4. በጎን መተኛት 5. ሌላ ካለ ይጥቀሱ ----------	
619	**ጨርሻለሁ!!! ስለትብብርዎ እናመሰግናለን!!!!!!!!**		

ቃለምልልሱ ያለቀበት ሰዓት፡- ---------- ቀን.----------

የተቆጣጣሪዉ ስም እና ፊርማ ፡- ----------