ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

# ASSESSMENT OF TEMPORARY HEARING LOSS, ASSOCIATED FACTORS AND MEASURING NOISE LEVELS AMONG WORKERS IN AYKA ADDIS TEXTILE FACTORY (TEXTILE FACTORY Q) IN OROMIA REGION, ETHIOPIA, 2019.

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SCHOOL OF GRADUATE STUDIE

**ASSESSMENT OF TEMPORARY HEARING LOSS, ASSOCIATED FACTORS AND MEASURING NOISE LEVELS AMONG WORKERS IN AYKA ADDIS TEXTILE FACTORY (TEXTILE FACTORY Q) IN OROMIA REGION, ETHIOPIA, 2019.**

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OCTEBER, 2019

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## Abbreviations & Acronyms

| | |
|---|---|
| dB(A) | A weighted decibel |
| ERC | Ethics Review Committee |
| ETB | Ethiopian Birr |
| HEGs | Homogenous Exposure Groups |
| HPDs | Hearing Protective Devices |
| Hrs. | Hours |
| LAeq, 8 | Equivalent sound levels, measured over an exposure time of 8 h |
| MoLSA | Ministry of Labor And Social Affairs |
| NIHL | Noise Induced Hearing Loss |
| NIOSH | National Institute for Occupational Safety and Health |
| OR | Odds Ratio |
| PEL | Permissible Exposure Level |
| PPDs | Personal Protective Devices |
| SD | Standard Deviation |
| SLM | Sound Level Meter |
| TTS | Temporary Threshold Shift |
| KHz | Kilo Hertz |
| SPSS | Statistical Package for Social Sciences |
| USA | United States of America |
| WHO | World Health Organization |

# Abstract

**Introduction:**-Development of modern automated machines in industries has considerably decreased the physical burden of workers in addition to increasing the productivity of the industries resulting in noise pollution. Noise exposure above the limit value of 90 dB (A) is known to cause temporary hearing loss among exposed workers.

**Objective: -** To assess temporary hearing loss, associated factors and measuring noise levels among workers in textile factory Q.

**Methods and materials: -** A cross-sectional study design was employed from January 15 to April 30, 2019. The data collection methods were observational checklist, self-administered questionnaire and aerial and personal noise level measurements. Department heads and environmental health proffesionals was participated for data collection. A total of 406 using computerized simple random sampling and 27 individuals using Homogenous Exposure Groups were included respectively for the self-adminstered questionnaire and personal noise exposure measurements. Data was entered using Epi-data version 4.2 and analyzed using SPSS version 21. Also 95% confidence interval was calculated for the independent variables and P value $\leq$0.05 had included to show the significance of the association.

**Results: -** The questionnaire was completed by 388 (95.6% response rate) production section workers, of which 254 (65.5%) were females and 134 (34.5%) were males. About One hundred ninty (49.0%, COR=1.53; 95% CI= [1.15-2.03]) workers reported that they have at least one temporary hearing loss problems during working time in the textile factory. None of the participants reported the use of hearing protective devices and maximum $LAeq_{8hr}$ noise levels were recoeded in spinning II, 89.1$\pm$5.9 dBA and knitting, 89$\pm$4.3dBA. There was significant association between working departments and temporary hearing loss of workers.

**Conclusion: -** The presented study demonstrated that work force in the spinning and knitting departments of the textile factory had high prevalence of temporary hearing loss.

**Recommendations: -** The textile factory should implement control measures such as engineering and administrative (rotation of workers) controls with providing hearing protective devices to reduce the noise exposure among workers.

# 1. INTRODUCTION

## 1.1. Background of the study

Development of modern automated machines in industries has considerably decreased the physical burden of workers in addition to increasing the productivity of the industries. But one of the most undesirable and unavoidable by-product of these operations and machines is noise-pollution (1). The word noise is derived from the Latin word “nausea” meaning seasickness. Noise has many definitions depending on where the sound exists and its effect on the recipient. Noise pollution may be defined as unwanted sound which gets damped into the atmosphere without regarding the adverse effects it may have. Noise is an unwanted sound that exposure to high level can lead to temporary hearing loss among workers (2).

Noise exposure is defined as “the environmental disturbance caused by noise or noise resulting in feeling unrested for living in the vicinity and is one of the most widespread occupational and environmental hazards in the world (3). Average noise exposures >90 dBA have been linked to a variety of adverse auditory effects including noise induced temporary hearing loss, which may interfere with workers ability to hear warning signals or monitor work place equipments (4).

Hearing protection devices (HPDs) alone clearly have not proven to be a comprehensive solution to the problem of temporary hearing loss. Noise is sometimes unexpected and often occurs when HPDs are not inserted properly or are unavailable. Noise can also exceed the attenuation rating of the HPDs, can be transferred via air leaks, or can be transmitted via bone conduction through mechanical stimulation of the skull (5). Health effects of noise on individuals depend on the level of noise, individual susceptibility, duration of exposure, availability of hearing protective devices and awareness on use of these hearing protective devices.

Exposure duration of 40 hours per week of equivalent noise level <90 dB (A) is considered to be safe and noise level above this limit is bound to cause noise induced hearing impairment such as temporary hearing loss. In addition to the above standrads, here are also different standards stipulated by NIOSH (since 1971–Present) as follows: - for noise level of <90 dB A, no time limit, for 90dBA, 8hrs; for 95dBA, 4hrs; for 100dBA, 2hrs; for 105 dB A 1hr and for 110 dB A 0.5hr (6). In Ethiopia also exposure to noise with respected time or hours is sated with the Ethiopia occupational safety and health directives as the following: 90dBA for 8hrs, 92dBA for

6hrs, 95dBA for 4hrs, 97dB A for 3hrs, 100dB A for 2hrs, 102dB A for 1 and ½ hrs., 105dBA for 1hr, 110dBA for ½ an hr. and 115 dB A for ¼ hr (7).

Temporary hearing loss is when hearing level can be produced by a brief exposure of high level sound and recovered after resting time. It is also a threshold shift that recovers to pre-exposure or baseline levels in the hours, days or weeks following exposure to high noise levels. It is also related to ringing troube of ears and day to day interference to normal conversations of the exposed workers.

However, noise-induced temporary hearing loss produced by 10 years of daily exposure is approximately equal to the temporary threshold shift produced by the same noise level after an 8-hour exposure. Development of therapeutics that can reduce or prevent Noise Induced Hearing Loss (NIHL) is a goal for many research teams, and temporary hearing loss study designs have been the primary model to date for evaluating proposed otoprotective agents in humans (5).

Ethiopia is one of the developing countries which introduces different industrial settings and offers one of the largest domestic markets in Africa in terms of textile factory products, given its population size and rapid economic growth.

Although dangerous noise levels have been previously measured in Ethiopian factories, only one study has documented specifically about noise induced hearing loss and workers awareness on utilization of hearing protective devices.

The rationale for temporary hearing loss assessment is largely based on the assumption that demonstrating reduction of temporary hearing loss provides proof of concept for potential protection against permanent hearing loss; that is, it has some predictive value. Most agents shown to reduce temporary hearing loss have also been shown to reduce permanent hearing loss, although some other agents that reduce temporary hearing loss have had less consistent effects in temporary hearing models (8).

Thus, this study was designed to assess personal noise exposure and temporary hearing loss among textile factory Q. The study had also assessed the awareness of workers on the health effect of noise and purpose of utilization of hearing protective devices during working time (9).

## 1.2. Statement of the problem

Noise exposure is ubiquitous in many occupational and non-occupational settings, with an estimated 22.4 million workers in the United States (US) exposed to hazardous noise on the job (10). Recent statistics shows that approximately 600 million workers are exposed to occupational noise. Besides; according to previous studies, approximately 5% (or 360 million) of worlds population has a disabling hearing impairment. Exposure to excessive noise is one of the major causes of hearing problems (11).

Now a day, the majority of industrial workers are engaged with unsafe conditions in most developing countries such as Ethiopia, where textile industries and construction projects are highly expanded without considering the health and economic impacts of different occupational hazards. One of these hazards is excessive noise exposure in textile factory and this can lead to serious health problems among the workers (12). If excessive noise exposure and its health effects remain undetected and neglected, they may lead to impairment of an individual's ability to function, temporary hearing loss and prone to other occupational injuries.

Generally, workers are exposed to high noise level in industrial settings; may be due to absence of hearing protective devices, lack of knowledge and negligence to use these hearing protective devices. And also lack of strong monitoring and supportive supervision including poor implementation of occupational health and safety programmes and systems are explained as the reasons for workers high noise level exposure at their work places (13, 14).

In Ethiopia, occupational diseases in particular and occupational safety and health issues in general haven`t, so far, been given attention due probably, to lack of awareness and absence of strong legal enforcements with weak monitory and supportive services (15). According to Ethiopian Ministry of Labor and Social Affairs (MoLSA); textile factory workers should always be engaged in activities with limited noise level of less than 90 dB (A).

The previous studies were focusing on hearing loss by measuring only aerial noise surveys which don’t show the specific exposure to specific worker. This study was intended to assess the prevalence of temporary hearing loss among workers with the measurement of aerial and personal noise level to identify the exact noise exposure which reaches the ear of workers.

## 1.3. Rationale of the study

Information on occupational health and safety services is helpful in raising awareness at all levels and making the problem of noise more visible to policy makers and managers. However, in Ethiopia there is no systematized recording and reporting of noise induced health problems. Data on noise at national level is also inadequate and even if it is present also it is not available at time wanted. Due to this lack of full information on noise exposure level; workers are engaged in unsafe occupational setups and temporary hearing loss problems. Though, this study was designed to assess personal noise exposure and temporary hearing loss among workers of textile factory Q. And also, the study had conducted to assess the noise levels of different production sections/departments in the textile factory which can help for implementing and evaluating the standards related to noise exposure. So making this assessment can help to strengthen and improve the occupational health and safety programs and systems of the country.

## 1.4. Significance of the study

The textile workers affected by the problem are the first beneficiary when the problem gets its end solution by the responsible authorities. This study was also important to help the textile factory managers in improving Occupational Safety and Health (OSH) programs and by far increasing their productivity. The study could enable the standard agencies and regulating bodies to give more attention about noise pollution in textile factories and other similar settings.

Finally, the findings could help to have risk free workers and healthy societies and it can also serve as base line information to undertake scientific studies on similar settings.

# 2. LITERATURE REVIEW

## 2.1. Noise exposure levels and its standards

Workers in the textile industry are often most severely exposed and affected to noise pollution. Many occupational surveys conducted in India, Pakistan and Ethiopia found that high noise level was observed in the weaving and spinning sections (13, 16).

A cross-sectional study conducted in Ethiopia and Pakistan in the weaving work sections found that the noise levels were 99.5-102.8 dB (A) and 88.4-104 dB (A) respectively (13, 16).

Many literatures indicated that occupational noise exposure is a series problem in every corner of the world including the developed countries. Even though every country has national standards of noise levels for different industrial settings and other working areas; studies conducted in these countries found that the actual situations noise levels are higher than those standards.

According to different noise related articles, the following catagories are widely applied because they correspond to regulatory limits in developed countries usually 85 dBA and many developing countries which is 90 dBA for an 8 hour working day. Though, the developing nations appear to be in the process of adopting and revising noise standarads. These standards are tending toward conservation, in that they are moving toward a permissible exposure limit of 85 dBA for 8 hours exposure time (17).

Table 1: Recommended limits of noise elevels for the number of hours exposed, 2019.

| Number of hours exposed | Sound level in dBA |
|---|---|
| 8 | 85-90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1.5 | 102 |
| 1 | 105 |
| 0.5 | 110 |

## 2.2. Prevalence of temporary hearing loss and occupational noise exposure

Several studies conducted in the United States have also found that working in a high-pressure environment coupled with exposure to noise pollution causes significant stress. Productivity is greatly affected by noise pollution and the interference to sound of someone talking nearby at work place can diminish productivity by up to 66% (18).

The hazardous effects of high noise level can also be common in terms of work related activities. One important thing for industrial productivity is efficient task performances including proper operations of machines. However the effects of noise pollution on task performance have been well-studied. Noise pollution impairs task performance, increases errors, and decreases motivation (19). These effects especially increase of errors are always interconnected with occupational injuries and damages.

A Nigerian study conducted among steel rolling mill workers showed that, they were exposed to noise levels ranging from 49 to 93 dBA. In Ethiopia, study conducted in Dire Dawa textile industry indicates that preventive interventions were generally absent, with no employee reporting use of personal protective devices (13). A study conducted in China on healthy volunteers also documented that; at equivalent sound pressure level of 103.5-111.3 dBA which lasts for 51 minutes: thirty-two ears (61.5%) and twenty-three ears (44.2%) were found to present the threshold increase of 5 dBA and 10 dB respectively (20). A study conducted in Dental college of United Arab Emirates had also recorded that 54% individual's reported one of the hearing-related problems asked in the distributed questionaires (21). An American study was conducted to identify the cause of digital music exposure on temporary threshold shift of individuals and according to this study; no consistent deficits at any of the test frequencies were measured at the lowest listening level; however TTS (temporary threshold shift) was reliably observed after the listening level were increased (8). A study conducted in different industries (Cement, concrete transverse and textiles) in Sivas-Turkey has found that distribution of hearing problems in textile industries; in which 40% of workers complained one of the health problems asked during questionnaire survey (9).

Similarly, studies conducted in Thailand and Vietnam also documented high levels of noise in weaving sections than in offices and other sections. In these studies the noise levels in the weaving sections were 101.3-104 dB (A) and 90-99 dB (A) respectively.

Though, the noise levels were high, 38.6% weavers in Thailand's study and all of the workers in Vietnam's study never used hearing protective devices. There were some factors explained in these studies as a reason of not using HPDs during working times such as lack of safety information and attitudes towards these HPDs (22, 23).

### 2.3. Factors associated with temporary hearing loss

The psychological effects of noise are more common compared to the physiological ones and they can be seen in the forms of annoyance, stress, concentration disorders and difficulties in resting and perception (24). Hearing mechanism damage caused by noise is very much related to the amount of acoustical energy (sound) received by hearing mechanism. The duration of noise exposure level and the susceptibility of the ear are primary factors for noise related temporary hearing loss (25).

Some findings also indicate that the main cause of high noise level in the weaving and spinning sections are likely due to outdated old machinery, poor design and construction and crowding of the workplaces. Besides to this, hearing protective devices was not used by the selected individuals due to different reasons such as lack of hearing protective devices availability, lack of knowledge and belief on their effectiveness (13, 16).

A Chinese study tried to state the association between socio-economic factors and noise related health effects and HPDs use. Though, people with education of senior high school or above were better in using HPDs than those with junior high school, primary school and illiteracy. So that mainly educational status was the close factor that affects workers attitude and belief on the use of HPDs (26).

A survey study in Northern India conducted in two textile plants also documented the knowledge of workers on the health effect of noise pollution and speech interferences. Only 29% of workers in these textiles were aware about the effect of noise on health and majority, 70% workers reported that high noise level causes speech interferences during their task performances. In addition to this, 42% workers report the effect of noise to be annoying and only 28% of the selected individuals were using HPDs (1).

Indeed, annoyance is one of the numerous health effects related to noise exposure and affects a large share of the population worldwide.

Numerous studies found a positive exposure-response relationship for annoyance with increasing noise exposure. A study conducted in Switzerland has reported that the proportion of the study samples which were highly annoyed by road traffic noise reaches 36% at a noise level of 70 dB A (27). In addition to the above highlighted health effects of noise pollution, some studies also tried to document the association between headache and occupational noise exposure. A case-control study conducted in Korea indicates that 19% of study subjects were experienced occupational noise exposure related headache. Also, the effect of occupational noise exposure on headache was significantly associated among cases than controls (28). Also one American study was conducted to evidence the effects of road traffic noise on annoyance, sleep disturbances and its public implications. According to the study, 9.5% of the total daytime populations were at risk of to be highly annoyed and 2.3% of the total nighttime populations were at risk of having high level of sleep disturbance (29).

Generally, previous studies was focused on measuring aerial noise levels/surveys and relating this noise level with noise induced hearing loss and other noise related health problems. This study was intended to measure both personal noise exposure and aerial surveys to compare with the national and international noise standards. The reason to include the personal noise exposure measurments was to identify the specific noise exposure level which reaches the specific workers in the textile factory.

As exposure to high level of noise have many health effects which can be summarized as physiological and psychological; previous studies were focused more on the physiological health effects of noise exposure mainly the prevalence of NHIL and the workers level of awareness on the use of HPDs. In Ethiopia a study documented the prevalence of NIHL due to excessive noise exposure and the reflection of workers on the use of hearing protective devices. Though, this study was aimed to assess personal noise exposure and temporary hearing loss.

In general better understanding of the noise level that exists, prevalence of temporary hearing loss and factors associated to theis temporary hearing loss is essential in the designing of effective noise pollution prevention strategy. So that the overall occupational health and safety services especially the noise pollution prevention mechanisms can be improved and noise effect such as noise induced temporary hearing loss and other non-auditory effects could be ultimately minimized and promote production opportunity.

## Conceptual Framework of the study

By considering the above reviews, temporary hearing loss and noise exposure among textile factory workers are summarized below (Fig 1). The conceptual framework for this study was developed after reviewing different literatures about factors that has been contributing for the occurrence of temporary threshold shift among textile factory workers. It used as a roadmap for pursuing the investigation.

As shown below, temporary hearing loss can be directly associated with noise levels emitted from the machines and individual factors (head injury, ear drain etc.), socidemographic factors and indirectly related to organizational factors (working department, exposure duration, engineering controls, availability of hearing protective devices, e.t.c.). It also assoiated indirectly with behavioral factors such as use of hearing protective devices at work places.

# Conceptual Framework

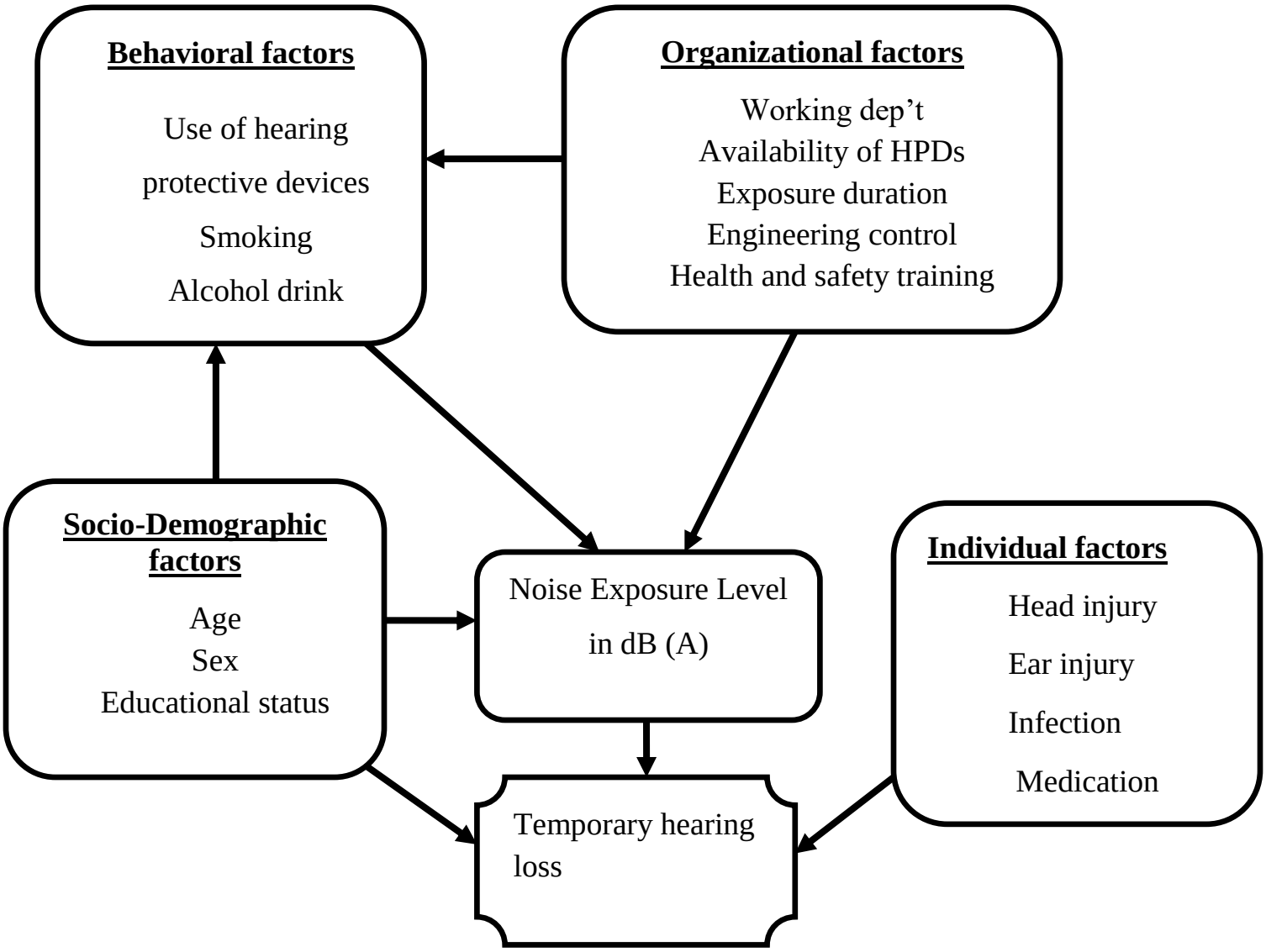


Figure 1: Conceptual framework of the study, 2019.

# 3. OBJECTIVES

## 3.1. General objective

- The main objective of this study was to assess temporary hearing loss, associated factors and measuring noise level among workers in a textile factory, Oromia Region.

## 3.2. Specific objectives

### *3.2.1. Primary specific objectives*

- To assess the prevalence of temporary hearing loss among workers of textile factory Q.
- To determine factors associated to temporary hearing loss among the workers in the textile factory.

### *3.2.2. Secondary specific objective*

- To measure aerial and personal noise exposure level of workers in textile factory.

# 4. METHODS AND MATERIALS

## 4.1. Study area

The State of Oromia sprawls over the largest part of the country and at present consists of 12 administrative zones and 180 woredas. There are more than 761 investment projects in the region. One of these investment projects is Ayka Addis textile factory (textile factory Q), the Ethiopian subsidiary of the Turkish textile which was inaugurated in 2010 its factory at a cost of US$140 million at Sebeta (Alemgena). Ayka Addis has the capacity to export textile products worth US$100 million a year per annum. The factory includes 4729 administrative and production section workers and majority of the workers were females. Within the Textile factory there were five production departments/sections such as spinning I and II, knitting, dyeing and garment.

## 4.2. Study design abnd period

An Institution based cross-sectional study design was employed from January 15 to April 30, 2019.

## 4.3. Source/Study population

All employees working and involved in different production activities at textile factory Q was the source populations.

## 4.4. Study Subjects

The 406 workers who were working in textile factory Q; those satisfied the inclusion criteria, and included in the sample according to the proposed sampling strategy.

## 4.5. Eligibility criteria's

***Inclusion criteria:-***Workers at least one year service in different production sections of the textile factory were included irrespective of sex and age.

***Exclusion criteria:-***Workers who had any type of permanent hearing loss and seriously ill were excluded from this study.

## 4.6. Sample size determination

### *4.6.1. For Objective 1 (The level of temporary hearing loss)*

To determine the sample sizes for this study, textile factory Q was selected based on ***purposive sampling*** method and with in the factory there were 4157 production section workers. To formulate the sample size of the study subjects it is possible to apply single population proportion formula by taking prevalence of hearing heaing loss in textile industries of Sivas-Turkey which was 40%(9): so that P=0.4 and q=1-0.4=0.6.

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

$$n=\frac{(1.96)^{2*}0.4\,(0.6)}{(0.05)^2}$$

$$n=\frac{3.84*0.4(0.6)}{0.0025}$$

**n=369**

Where;

n: Sample size,

α: the level of significance, 5%

P: Prevalence of hearing problems (40% or 0.4)

*d*: Maximium acceptable difference (Margin of error = 5%)

$Z_{\alpha/2}$ = The value under standard normal table for the given value of confidence level

Then, by considering the non-response rate of 10% (37), the final sample size was 369+37= **406**

### *4.6.2. For objective 2 (Associated facors to temporary hearing loss)*

Study conducted in United States among volunteer individuals showed that the prevalence of temporary hearing loss among exposed was 0.44 and among non-exposed was 0.29 (30). Based on the study findings, sample size calculated using the following double population proportion formula:-

$$n= \frac{(Z_{\alpha/2}+Z_{\beta})^2*(P_1(1-P_1)+P_2(1-P_2)}{(P_1-P_2)^2}$$

Where: n is sample size to be determined

$P_1$ =0.44 (Prpoportion of temporary hearing loss among exposed)

$P_2$=15.3% (Proportion of temporary hearing loss among non-exposed)

$Z_{\alpha/2=}$level of statistical significance 1.96 at confidence level of 95%

$Z_{\beta}$ =Desired power for 85% power and

$P_1$-$P_2$= Difference between proportions

$$\text{Then } n= \frac{(1.96+1.04)^2 * (0.44(1-0.44)+0.29(1-0.29)}{(0.44-0.29)^2}$$

$$n=\frac{9*(0.2464+0.2059)}{(0.15)^2}$$

$$n=\frac{2.2176+0.2059}{0.0225}$$

$$n= \frac{2.4235}{0.0225}$$

**n=108**

Adding 10% of non-response rate, the sample size for objective 2 was **119**.

Since **406** was the maximum number of study subjects and it was better to use this large sample size for the sake of representativeness.

### *4.6.3. For objective 3 (Personal exposure level measurements)*

To select sample workers for personal noise exposure measurements; we can apply the principle of Homogeneous Exposure Group (HEG) in which workers with similar activities can be grouped at one. In many workshops, it is possible to split the population into Homogeneous Exposure Groups (HEG); i.e. groups of workers exposed to noise in conditions or activities that can be considered similar. Since the day-to-day activities were similar, one shift was considered who works in the daytime from 7:00 AM to 3:00 PM. Based on this homogenous exposure group and working shift the sample size was summarized in the following table.

Table 2: Sampling of workers for personal noise level measurements based on homogenous exposure group method, 2019

| **S. No** | **Production Departments** | **Sample individuals** | **Measurement type** |
|---|---|---|---|
| 1 | Spinning I | 9 | Personal |
| 2 | Spinning II | 9 | Personal |
| 3 | Knitting | 9 | Personal |
| 4 | Dyeing | - | Aerial |
| 5 | Garment | - | Aerial |
| 6 | Total | 27 | |

And a total of **5** Aerial noise surveys and **27** personal dosimeter measurements were recorded to compare the noise level of different production sections in the textile factory.

## 4.7. Sampling procedures

### *4.7.1. Self-administered questionnaire*

There were five production section departments in the textile factory: spinning I and II with 916 workers; knitting with 330 workers; dyeing with 497 workers and garment with 2414 workers. The total sample size calculated which was 406 were distributed based on ***probability proportion to size*** method. First a code number was given to all workers in each section separately. Then, simple random sampling was applied to select the individuals using using workers` attendance registrations as sampling frame for each production sections of the factory. In the textile factory there was a computerized and finger-print attendance method in which every worker's name and their working department was listed in the computer and this was used to give random numbers to each worker. This helps to apply random sampling technique using computerized (Epi-tools) simple random sampling was employed in order to select individuals and distribute the prepared self-adminstred questionnaires

### *4.7.2. Aerial and personal noise level measurements*

To select the subjects or workers for personal noise exposure (dosimeter) measurements; Homogeneous Exposure Group (HEG) principle was applied. In many workshops, it is possible to split groups of workers exposed to noise in conditions or activities that can be considered similar (31). As explained in sample size determination, in the textile factory there were five big departments and based on the activities they perform in each department , the workers was grouped in to similar noise exposure groups and selected using lottery method for personal noise level measurements. According to this sampling method, in Spinning I and II, nine-nine workers were selected from blowing, carding, preparation and ring operation sub-departments. And similarly; from knitting nine workers from weaving, qualiy check-up and packing sub-departments was selected. Then, the Bruel & Kjaer 4448 dsimeter was mounted on the shoulders of the individuals for 5 hours before launch and 2:15 hours after launch to record personal noise exposure level of the selected workers. For the aerial preliminary survey, every 2 meter square there was recording of noise level for 1 minute and the equipment was held 1.5 m above the floor in every five production sections of the textile factory.

## Sampling Procedure Chart

Using the ***probability proportional to size*** sampling method, the total sample size **(406)** was distributed to the four production sections of the textile factory as follows.

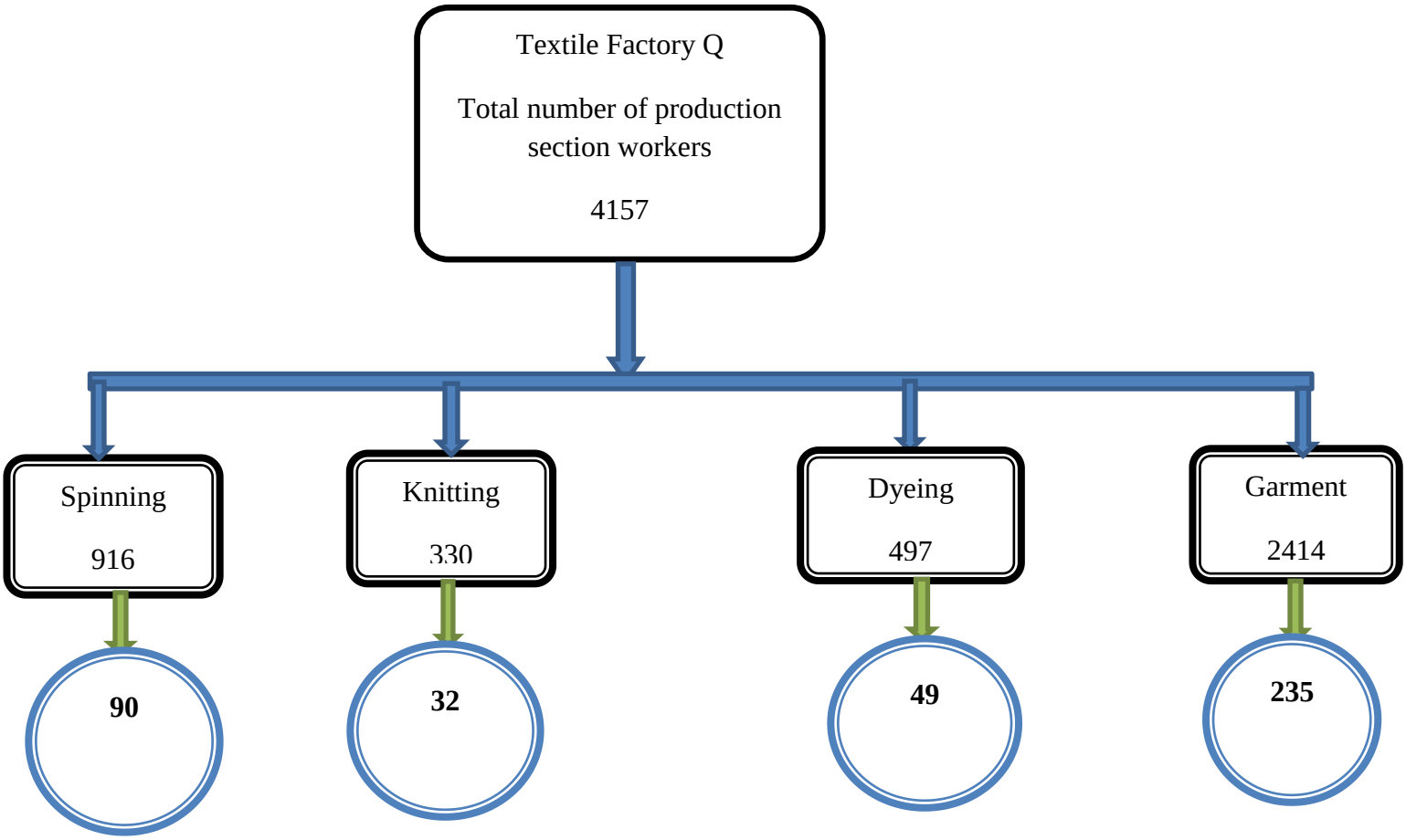


Figure 2: Chart for the sampling techniques of different work sections in the textile factory, 2019.

## 4.8. Study variables

### *4.8.1. Dependent variable*

- ❖ Temporary hearing loss

### *4.8.2. Explanatory Variables*

- ❖ **Noise level in dB (A)**
- ❖ **Individual Factors**
  - o Head injury
  - o Ear injury/drain
  - o Infection
  - o Medication
- ❖ **Socio-demographic factors**
  - Age
  - Sex
  - Educational status
- ❖ **Organizational factors**
  - ➢ Working department
  - ➢ Health and safety training
  - ➢ Availability of HPDs
  - ➢ Engineering control
  - ➢ Exposure time
- ❖ **Behavioral factors**
  - Use of hearing protective devices
  - Smoking
  - Alcohol drink

## 4.9. Data collection procedures

### *4.9.1. Self-administered questionnaire*

A standard questionnaire was prepared from literatures of similar study to assess personal noise exposure and temporary hearing loss in the textile factory. Since educational level (grade 8-10) is a criterion for hiring workers in the textile factory, self-administered questionnaire was used to workers reflection on temporary hearing loss. With close monitoring, the questionnaire was distributed to the selected workers with in 2 minutes after the end of the exposure to identify the real temporary hearing loss that can be caused by noise exposure in the textile factory.

### *4.9.2. Aerial and personal noise level measurements*

First, preliminary noise measurement survey was done for all departments of the selected textile factory to identify the most risky areas in terms of noise levels. Then personal dosimeter measurement was performed at these identified risky areas to measure the specific level of noise which reaches to the ear of the workers. Standard noise dosimeter equipment (Bruel and Kjaer, Type 4448, Denmark) was used to measure the personal noise levels of workers in the different working sections of the factory. A dosimeter is a special purpose sound level meter that is small enough that a worker can wear the whole shift. Dosimeter can measure the noise level exposure wherever the worker goes and does throughout the workday. Usually, dosimeters along with the microphone come with a small pin or clip so that we can mount to workers' shirt. The standard practice is that the dosimeter should be mounted to the worker, whose noise exposure needs to be measured, during the start of the shift and removed after the work shift. The output of dosimeter shows the time-weighted noise exposure for 8 hours. Data from the dosimeter was then downloaded in to a personal computer with the help of the software and details about the noise exposure throughout the day were determined.

### *4.9.3. Observational checklist*

Observational checklist was used to assess the institutions setup regarding noise control measures such as engineering control and the availability of hearing protective devices. The training status of workers and the practices occupational health and safety regarding noise hazards was also assessed using the prepared checklist.

### 4.10. Data Management

The English version questionnaire was translated to Amharic and Affan Oromo (local language) version and back to English to keep its consistency. Every day the completed questionnaire was given to the principal investigator and checked for consistence and completeness before data entry. Collected data was organized and entered in Epi-data version 4.2 and cleaning was done to avoid missing values, outliers and other inconsistencies. For data cleaning, frequency, sort and list were used. Cleaned data exported to SPSS version 21 for analysis. In addition to this, the personal noise level measuring equipment (Bruel and Kjaer, Type 4448) was checked whether it was functional or not.

### 4.11. Data Analysis procedures

Descriptive stastistics used to summarize data. Chi-square was used to see the difference between different production workers in the textile factory. Crude odds ratio with 95% Confidence Interval computed to see the association between exposure variable and temporary hearing loss symptoms. Binary logistic regression was used to compare the level of temporary hearing loss among workers of different production sections in the textile factory.

A Bivariate analysis used to identify whether exposure variables were significantly associated with the outcome variable or not. Those, variables $P \leq 0.2$ were included in multivariable analysis. The multivariable analysis used to identify variables associated with both exposure and outcome variables and to identify the confounding variables.

### 4.12. Data quality assurance

About 21 questinnaires was pre-tested in Jay-Jay garment and data collectors and respondent's gap identified and filled accordingly. Environmental health professionals and production section heads were engaged for self-administered questionnaires and observational checklist assessments. And they distribute the questionnaires to the selected workers with close monitoring by the principal investigator. Aerial noise survey and personal noise level measurements were performed by the principal investigator/researcher using personal dosimeters (Bruel and Kjaer, Type 4448) and then carefully transferred to personal comuter for analysis using software called Protector Type 7825.

### 4.13. Operational definitions

- **Exposure duration/time**: - Is the length of hours that a worker exposed to any noise level during work time(6).
- **Eight-hour per day exposure limit:** - The total amount of noise that a worker may be exposed to over an eight-hour per day(6).
- **Noise: -** is excessive or unwanted sound which potentially results in annoyance and/or hearing loss(11).
- **Permanent threshold shift: -** Noise-induced threshold shift that persists after a period of recovery subsequent to the exposure; at least 3 weeks recovery time(32).
- **Sound: -** A pressure variation (wave) that travels through air and is detected by the human ear(11).
- **Temporary threshold shift: -** It is a change in hearing threshold that recovers to pre-exposure levels or baseline overtime; the amount of time to recover to baseline may be relatively fast (minutes to hours) or slow (day to weeks)(32).

### 4.14. Ethical consideration

An Ethical clearance was obtained from Addis Ababa University Ethics Review Committee (ERC). Before starting the data collection, permission from the textile factory managers and written and verbal consent from the workers was gained after briefing about the purpose of the study. Great emphasis was given in explaining the fact that no individual was obliged to participate in this study and also no invasive procedures was involved. So that, each participant has the right to decide whether to participate or not after full understanding of the purpose of the study; even the right to refuse to participate at any point of the study time. And the one thing all participants to become sure was that the responses given in the questionnaire would be confidential to anyone else.

Finally, findings from the noise exposure measurements were given to factory managers on due request of them.

### 4.15. Dissemination plan

The result of this study was disseminated to textile factory Q managers and Ministry of Labor and Social Affairs (MoLSA). The paper has also be submitted to Addis Ababa university school of public health both with soft and hard copy with the plan of presenting findings at appropriate seminars, workshops and conferences. Besides, publication of the study findings on the local /international journal was considered.

# 5. RESULTS

## 5.1. Socio-demographic characterstics of the respondants

The questionnaire was completed by 388 (95.6% response rate) production section workers, of which 254 (65.5%) were females and 134 (34.5%) were males. Respondants age ranged from 18 to 49 years, with Mean (± SD) 25.5 (± 4.95) years. There was no significant difference in the distribution by age and sex for workers in the five sections of the textile factory. All respondants has attained education from primary to higher education levels, in which 176 (45.4%) were grade 9-12 and 158 (40.7%) were at diploma level. The mean monthly income for the study participants was 2420 Ethiopian Birr (1USD=29.23 ETB) and the income status of workers ranges from 900 to 12000 ETB.

Table 3: Socio-demographic characterstics of workers in textile factory Q, Oromia region, 2019

| Variables (n=406) | Textile factory workers n (%) | P-value |
|---|---|---|
| **Sex** | | |
| Male | 134 (34.5) | 0.13[a] |
| Female | 254 (65.5) | |
| **Age (In years)** | | |
| ≤ 30 | 336 (86.6) | 0.12[a] |
| >30 | 52 (13.4) | |
| Mean±SD | 25.5±4.9 | 0.26[b] |
| **Marital status** | | |
| Single | 244 (62.9) | |
| Married | 122 (31.4) | 0.23[a] |
| Divorced | 5 (1.3) | |
| Widowed | 17 (4.4) | |
| **Educational status** | | |
| 1-8 | 10 (2.6) | |
| 9-12 | 176 (45.4) | 0.15[a] |
| Diploma | 158 (40.7) | |
| Degree | 44 (11.3) | |
| **Monthly income** | | |
| ≤2500 | 283 (73) | 0.5[a] |
| >2500 | 105 (27) | |

Note: [a] *$\chi^2$test* [b] *independent sample t-test, P-value≤0.05.*

## 5.2. Work relatd factors among textile factory Q workers

Out of 388 participants, 14 (3.6%) employees in the textile factory were working in other noisy jobs (Flour mills, Garages and cement factory) before they were started job at this factory. Smoking was not common in the textile factory, in which only 2 (0.5%) individuals were smokers among the respondants.

Similarly, there were only 32 (8.2%) individuals who had the habit of alcohol drink in the textile factory. Regards to work experience, 317 (81.7%) individuals had a work experience of 1-5 years and 71 (18.3%) workers had service years of greater than 5 years. All workers had working time of 8 hours per day in which there was no overtime work system, but 170 (43.8%) employees from departments of spinning I and II, knitting and dyeing had working time of greater than 40 hours per week because they have only one day rest time per week. In addition to this, 122 (31.4%) workers were engaged in relatively high noise level departments such as spinning I and II and knitting. The work shift schedule in the textile factory was every week/weekly in all production sections. But, workers in the garment department have five working days per week and also no shift schedule among the workers (office hour workers).

Minority of the textile factory workers, 20 (5.2%) and 5 (1.3%) individuals respectivelly had severe head injury and ear drain problems before they were started job at the factory. Though, 40 (10.3%) workers reported that there were disturbing noise around their resident from road traffic, mills and religious institutions. Besides, 24 (6.2%) workers have complained of or the presence of severe headache confirmed by a Physicians before they have started job at this textile factory. There was a significant difference among workers in terms of working departments (Spinning I & II, Knitting and Dyeing), length of working days/working hours per week and history of head injury, $P \leq 0.05$.

No significant difference was found between those departments in terms of reported disturbing noise around their resident, past working history in noisy jobs and work experience, $P > 0.05$.

Table 4: Work related factors among textile factory Q workers, 2019.

| Variables (n=406) | Textile factory workers n (%) | P-value |
|---|---|---|
| **Working departments** | | |
| Spinning | 90 (23.2) | |
| Knitting | 32 (8.2) | 0.04[a] |
| Dyeing | 48 (12.4) | |
| Garment | 218 (56.2) | |
| **Work experience** | | |
| 1-5 | 317 (81.7) | 0.15[a] |
| >5 | 71 (18.3) | |
| **Working hours per week** | | |
| ≤40hrs. | 218 (56.2) | 0.02[a] |
| >40 hrs | 170 (43.8) | |
| **Head injury** | | |
| Yes | 20 (5.2) | 0.03[a] |
| No | 368 (94.8) | |
| **Ear drain** | | |
| Yes | 5 (1.3) | 0.26[a] |
| No | 383 (98.7) | |
| **Worked at noiy jobs** | | |
| Yes | 14 (3.6) | 0.22[a] |
| No | 374 (96.4) | |
| **Ear infection** | | |
| Yes | 34 (8.8) | 0.20 |
| No | 354 (91.2) | |
| **Medication** | | |
| Yes | 23 (5.9) | 0.21 |
| No | 365 (94.1) | |

Note: [a] $\chi 2$ test, P≤0.05

### 5.3. Prevalence of temporary hearing loss among workers

As shown in Table 4, the difference in prevalence of temporary hearing loss between spinning and dyeing; spinning and garment department workers were statistically significant for hearing problem after exit from work place (13.7%; OR=2.38, 95% CI=1.16-4.90) and (13.7%; OR=1.8, 95% CI=1.09-2.94) respectively. And also the difference in prevalence of temporary hearing loss between spinning and garment production section workers were statistically significant for communication with their friends after exit from workplace (13.92%; OR=2.26, 95% CI=1.37-3.73). In addition to the above associations, the difference in level of temporary hearing loss between spinning and garment section workers were statistically significant for trouble noise around their ears/head (15.46%. OR=3.6, 95% CI=2.14-6.03).

The likelihood of spinning department worker developing at least one temporary hearing loss problems or symptoms was 1.53 times higher than that of garment section worker.

Table 5: Prevalence of temporary hearing loss in textile factory Q workers, 2019

| **Variables** | **Departments** | | **Prevalence OR[a] (95% CI)[b]** |
|---|---|---|---|
| Hearing problem now/exactly after exit from work | Spinning n (%) | Dyeing n (%) | |
| | 53(13.7) | 18 (4.64) | 2.38 (1.16-4.90)* |
| | Spinning n (%) | Garment n (%) | |
| | 53(13.7) | 97 (25) | 1.79 (1.09-2.94)* |
| | Knitting n (%) | Dyeing n (%) | |
| | 22(5.67) | 18 (4.64) | 3.67 (1.42-9.47)* |
| | Knitting n (%) | Garment n (%) | |
| | 22 (5.67) | 97 (25) | 2.74 (1.24-6.07)* |
| Trouble noise around ear | Spinning n (%) | Dyeing n (%) | |
| | 60 (15.46) | 23 (5.93) | 2.17 (1.06-4.44)* |
| | Spinning n (%) | Garment n (%) | |
| | 60(15.46) | 78 (20.1) | 3.59 (2.14-6.03)* |
| | Knitting n (%) | Dyeing n (%) | |
| | 15 (3.86) | 23(5.93) | 0.96 (0.39-2.35) |
| | Knitting n (%) | Garment n (%) | |
| | 15(3.86) | 78 (20.1) | 1.58(0.75-3.34) |

| | | | |
|---|---|---|---|
| Difficulty in communication with friends after exit from work | Spinning n (%) 54 (13.92) | Dyeing n (%) 22(5.67) | 1.77 (0.87-3.59) |
| | Spinning n (%) 54(13.92) | Garment n (%) 87(22.4) | 2.26 (1.37-3.73)* |
| | Knitting n (%) 19 (4.90) | Dyeing n (%) 22 (5.67) | 1.72 (0.70-4.27) |
| | Knitting n (%) 19 (4.90) | Garment n (%) 87 (22.4) | 2.20 (1.03-4.68)* |
| Difficulty during phone call conversation | Spinning n (%) 49(12.63) | Dyeing n (%) 20(5.20) | 1.67 (0.82-3.39) |
| | Spinning n (%) 49(12.63) | Garment n (%) 88 (22.68) | 1.76 (1.07-2.89)* |
| | Knitting n (%) 17 (4.38) | Dyeing n (%) 20 (5.20) | 1.58 (0.64-3.90) |
| | Knitting n (%) 17(4.38) | Garment n (%) 88 (22.68) | 1.67 (0.79-3.53) |
| Noise prevents normal conversation during worktime | Spinning n (%) 75 (19.33) | Dyeing n (%) 37(9.54) | 1.48 (0.62-3.55) |
| | Spinning n (%) 75 (19.33) | Garment n (%) 152(39.20) | 2.17 (1.16-4.05)* |
| | Knitting n (%) 22 (5.67) | Dyeing n (%) 37 (9.54) | 0.65 (0.24-1.78) |
| | Knitting n (%) 22(5.67) | Garment n (%) 152 (39.20) | 0.95 (0.42-2.13) |
| At least one temporary hearing capacity loss problems | 190 (49.0%) | | 1.53 (1.15-2.03)* |

Note: [a] Prevalence odd ratio, [b] 95 % confidence interval and* $p \leq 0.05$.

### 5.4. Associated factors and temporary hearing loss

The bivariate and multivariable analysis summerized in table 5 showed that working department, length of working hours per week and history of head injury of the participants were significantly associated with temporary hearing loss ($P \leq 0.05$). However, sex, age, income status, educational level and history of working at noisy jobs before they start work at the textile factory was not significantly associated with temporary hearing loss ($P > 0.05$).

Working department and length of working hours per weeek were signficant in Bivariate analysis ($P \leq 0.05$) analysis. However, history of ear drain and past exposure to noise before started job at the textile factory was not significant in Bivariate analysis ($P > 0.05$).

Working departments were significantly associated with temporary hearing loss among the textile factory workers. Workers who were engaged in in spinning department (AOR=3.55, 95% CI=1.72-7.32) were more likely to develop temporary hearing loss than workers engaged in garment section. And also, workers who were working in the knitting section (AOR=2.48, 95% CI=1.46-4.21) were more likely to develop temporary hearing loss than workers engaged in garment department.

Length or working hours per week was also significantly associated with tamporary hearing loss among the textile factory workers. Workers who works greater than 40 hours per week in the factory (AOR=2.1, 95% CI=1.18-3.70) were more likely to develop temporary hearing loss than workers who had 40 hours or less per week (Table 5).

Table 6: Temporary hearing loss and associated factors among textile factory Q workers, 2019

| Variables | Hearing problem after exit from workplace | | COR (95% CI) | AOR (95% CI) |
|---|---|---|---|---|
| | Yes | No | | |
| **Sex** | | | | |
| Male | 57 | 77 | 0.90 (0.60-1.39) | 0.69(0.30-1.57) |
| Female | 114 | 140 | 1.00 | 1.00 |
| **Age** | | | | |
| 18-28 | 138 | 175 | 1.00 | 1.00 |
| 29-39 | 39 | 37 | 0.97 (0.57-1.65) | 0.99 (0.48-2.00) |
| 40-50 | 3 | 5 | 1.31 (0.31-5.60) | 1.17 (0.70-1.90) |
| **Educational status** | | | | |
| Primary Education | 4 | 6 | 0.88 (0.22-3.55) | 0.9 (0.40-2.00) |
| High school & prep | 78 | 98 | 1.05 (0.54-2.04) | 1.02 (0.43-2.45) |
| Diploma | 70 | 88 | 1.05 (0.54-2.05) | 1.08 (0.50-2.20) |
| Degree | 19 | 25 | 1.00 | 1.00 |
| **Working departments** | | | | |
| Spinning | 53 | 37 | 1.79 (1.09-2.94)* | **3.55 (1.72-7.32**)** |
| Knitting | 22 | 10 | 2.74 (1.24-6.07)* | **2.48 (1.46-4.21)**** |
| Dyeing | 18 | 30 | 0.75 (0.39-1.42) | 1.10 (0.50-2.40) |
| Garment | 97 | 121 | 1.00 | 1.00 |
| **Work experience** | | | | |
| 1-5 years | 146 | 171 | 1.00 | 1.00 |
| >5 years | 25 | 46 | 0.64 (0.37-1.09) | 0.93 (0.46-1.90) |
| **Working hrs./week** | | | | |
| ≤40 hours | 97 | 121 | 1.00 | 1.00 |
| >40 hours | 93 | 77 | 1.5 (1.01-2.25)* | **2.1 (1.18-3.70)**** |
| **Head injury** | | | | |
| Yes | 13 | 7 | 2.47 (1.00-6.33) | 1.09 (0.58-2.03) |
| No | 158 | 210 | 1.00 | 1.00 |

Note: 1.00=reference value, $R^2$=0.823, *P≤0.2 for COR and **P≤0.05 for AOR.

### 5.5. Hearing protective devices

Based on responses from the administered questionnaires and walk through observations, none of the textile factory workers were used hearing protective devices. The main reasons mentioned by the participants for none use of hearing protective devices were; not provided by the factory/lack of availability 342 (88.2%) and feel uncomfortable 21 (5.4%).

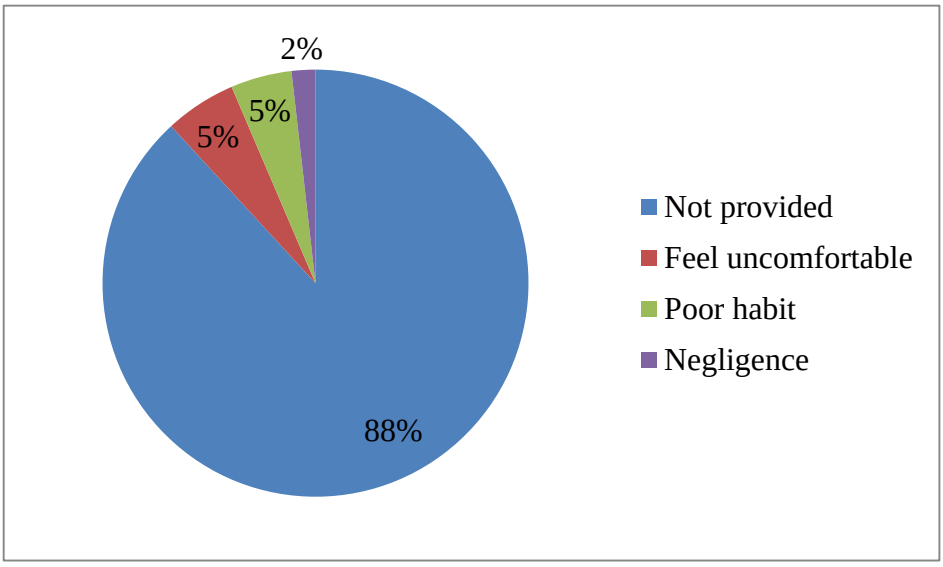


Figure 3: Reasons for not use of hearing protective devices among textile factory Q workers, 2019 (n=388).

### 5.6. Work place observation

Work place observation of the study showed that no engineering control was applied to reduce the noise level released from the machines. Regarding personal protective equipments, no individual was using hearing protective device during work time due to lack of availability of the equipments in the textile factory. The other observation regarding the noise level was indicated that noise levels in the two spinnings and knitting were very disturbing and high than that of dyeing and garment departments. Finally, areas with high noise level in the textile factory were not labeled to keep workers safe from exposing themselves to impulsive noise levels from different machines.

## 5.7. Noise survey and personal dosimeter measurements

According to Ethiopian directives agency, there are action limit and exposure limit value for workers. For the lower action limit (80 dBA) there should be information and training to workers and for the upper action limit (85 dBA) hearing protective devices required in the work setting. Besides, for exposure limit value of 87 dBA there should be hearing protective devices and must not be exceeded to this limit. Workers were exposed continuously to noise exposure levels for an entire eight-hour shift except during a single fourty-five minutes meal break. The factory is in use for 24 hours, six days per week. The noise level (minimum and maximum) in the five working departments were presented in the following table:

Table 7: Aerial and personal noise exposure level of different production departments in textile factory Q, 2019.

| **S. No** | **Production dep'ts** | **Aerial Measurements (in dBA)** | | | **Personal in dBA (LAeq)** |
|---|---|---|---|---|---|
| | | **Minimum** | **Maximum** | **LAeq, 8** | |
| 1 | Spinning I | 58 | 115 | 88.2 | 85.9 |
| 2 | Spinning II | 60 | 121 | 89.1 | 86.9 |
| 3 | Knitting | 58 | 113 | 89 | 87.4 |
| 4 | Dyeing | 51 | 79 | 76.9 | - |
| 5 | Garment | 48 | 78 | 74.4 | - |

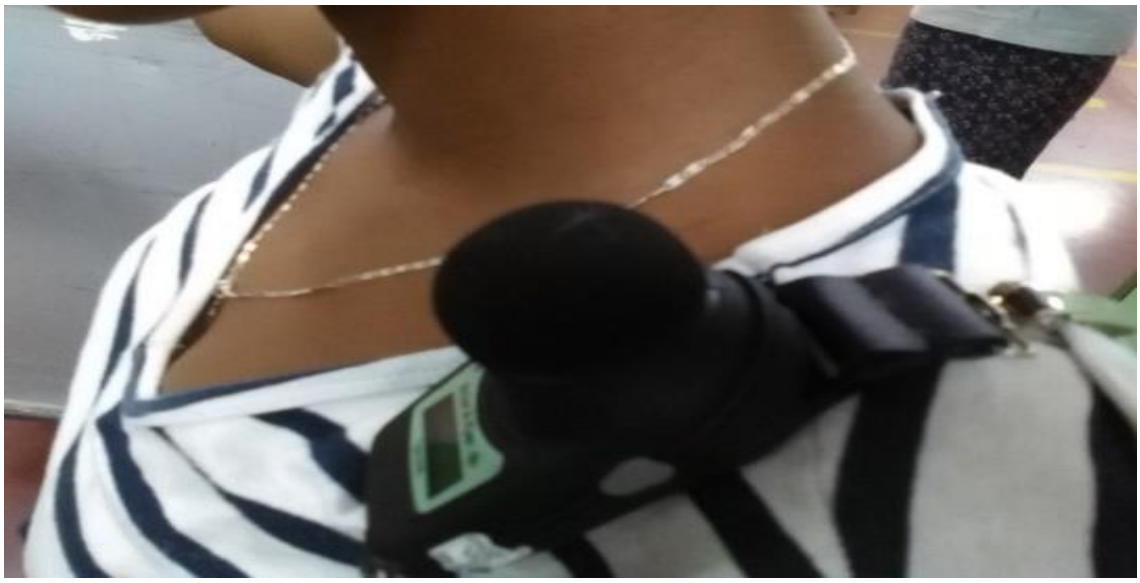

Figure 4: Spinning I department worker, ring operators (A picture by Yonas A.).

Figure 5: Spinning II department worker, ring operators (A picture by Yonas A.).

# 6. DISCUSSION

This study demonstrated that noise was a serious occupational health hazard in the textile factory. The level of temporary hearing loss among the textile workers, 49% were higher when compared to a study conducted in Sivas-Turkey among textile factory workers; which was 40% (9). This may be due to textile factory setup, sample size difference and control measure taken on noise exposure of workers.

The higher level of temporary hearing loss in spinning department workers was due to relatively high noise level than dyeing and garment departments. This might be due to exposure to eight-hour time for relatively high noise level leads workers to have trouble noise around their ear/head for long time after exit from workplace.

Besides, 44.85% workers had difficulties in telephone conversations which was higher when compared to a study conducted among individuals in United Arab Emirates (UAE) in which 14% students had difficulty in hearing telephone conversations (21). This higher percentage may be due to unavailability of hearing protective devices, approach of data collection and institutional setup.

Majority, about 73.7% of workers had complained the interference of noise level in their day-to-day normal conversations with co-workers. This problem was similar to a study conducted in two textile plants of Northren India in which 70% of workers reported noise as the major factor causing speech interference (1).

The major risk factors for temporary hearing loss were the duration of exposure and the noise level. This relationship was similar to previous studies in India and Republic of Korea (1, 28). In these studies at areas of high noise level the temporary hearing loss was high and workers who had exposed for long working time were suffering this occupational problem than workers with less exposure time.

Personal protective equipments utilization behavior of the textile factory workers was low. However, majority of the workers agreed on the importance of hearing protective devices for preventing themselves from high noise levels emitted from the machines, but the textile factory don’t supply HPDs for workers which was in line with the result of a study conducted in Ethiopia among Dire-Dawa textile factory workers (13).

In addition to the above associated factors, the awareness among the workers regarding the effects of exposure to high noise was maximal, as 92.5% of workers report to be aware of these effects. And this percentage was very high while compared to 29% of Indian workers who had reported they were aware of the health effects of exposure to high noise level in the textile factories (1). However, this high percentage on awareness of noise related health problems was due to the self-reported questionnaire used to sort out the awareness level of the workers.

Workers in the two spinnings and knitting deprtments were exposed to average levels of noise above 85dB (A), the threshold limit value set by many industrial countries in Eourope and United States (13). However, employes in the dyeing and garment production sections were less exposed in relative to those of individuls working in the two spinnings and knitting departments in which the noise levels in these sections (garment and dyeing) were 74.4 dBA and 76.9 dBA respectively.

This study can be used as a reference point for policy makers and standard agencies to formulate clear threshold limit values of noise exposure for workers in different industrial settings of Eathiopia. Since, it is important to prevent workers from leaving their work place due to different noise exposure related health problems; our countries regulatory bodies has the opportunity to use this study as a starting point to assess what is happening in the textile factories of the country regarding workers health in general and specifically to noise related health problems among the workers.

# 7. Strengths and limitations of the study

## Strengths of the study

There are some strengths about the conducted reaserch such as both aerial and personal noise level measurements was recorded to identify the highly risk areas in different production sections or departemnts of the textile factory.

## Limitations of the study

One of the limitations of the study was use of self-administered quetionnaires to identify the magnitude of temporary hearing loss symptoms of workers in which it can lead to overestimation of the problem.

# 8. CONCLUSION

Based on the finding of this study, it can be concluded that the temporary hearing loss were higher among spinning workers than dyeing and garment workers. Working department and length of working hours are the determinant factors for the occurrence of temporary hearing loss symptoms. None of employes in the textile factory were provided hearing protective devices which is the last option for controlling and preventing noise exposures.

Even though the noise level was lower than the national standard which is <90 dBA for 8-hours and higher than the international occupational exposure limit (85 dBA); workers in the two spinnings and knitting departments were relatively more exposed than the other departments.

In general, the results of this study concluded that working in the spinning and knitting production departments without using hearing protective devices has an adverse effects on the hearing condition of the textile workers.

# 9. RECOMMENDATIONS

Based on the study findings, the following important measures were recommended to protect and improve the health of workers in the textile factory.

**For factory managers/owners:-**

- ❖ They should implement control measures to reduce the noise levels:-
- ➢ ***Engineering controls***-Enveloping/protecting textile machines
- ➢ ***Adminstritavie controls***:-Rotation of workers from high noise level departments to low level departments
- ➢ ***Hearing Protective Devices (HPDs)***:-Workers should also be provided hearing protective devices during working time.

**For factory workers:-**

- ▪ Workers should ask the managers to get personal protective devices and
- ▪ Use other traditional noise conservation materials to protect themselves

Finally, further studies should be conducted for future by using audiometric measurements of textile workers.

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# 11. ANNEXES

## ANNEX I: ADVANTAGES AND DISADVANTAGES OF SOUND LEVEL METER AND PERSONAL DOSIMETER

### A. Advantages of Personal Dosimeter

- ✓ Provides noise level measurement specific to specific worker
- ✓ Help the business in managing OHS claims regarding noise
- ✓ Results from the dosimeter can be reported as compliance with state OHS regulations
- ✓ Easy to use and does not require a noise assessor to be present through the day
- ✓ Since modern dosimeter are light and small, it can be clipped to the worker easily and will have minimal disruption during work
- ✓ Used in restriction or controlled environment where noise assessor cannot use sound level meter
- ✓ Can measure and provide results both LAeq & LCpeak

### B. Disadvantages of Personal Dosimeter

- Easy to overestimate the noise level if the microphone of the dosimeter is inappropriately placed in a position that has the risk of other noise due to reflection, surface friction or impact.
- Difficult to identify the accurate source of noise as the employee may work in any area throughout the day.
- Influence or other sounds nearby such as forklift rumbling, public announcement system, working operator, conversation with others can affect the results
- Sound exposure during break times will also be calculated
- In some cases, workers can tamper the dosimeter, and the whole noise assessment is not controlled or monitored
- Require specialist skills to set the dosimeter, download the information using specific software and prepare the report.
- Sometimes purchasing or hiring a dosimeter can be expensive than a sound level meter.
- Does not provide information or opportunities to identify how to reduce noise level as we cannot identify the primary source of noise form.

## C. Advantages of Sound Level Meter

- Provides detail information about the source of noise
- Help the business in managing OHS claims regarding noise
- Results from the dosimeter can be reported as compliance with state OHS regulations
- Easy to use and does not disturb the worker
- Recommended practice by the Victorian code of practice
- Information collected using sound level meter can be used to draw a noise map of the site and also finds opportunities to reduce the noise level.
- Can measure and provide results both LAeq & LCpeak
- In most cases, it is cheaper to purchase or hire a sound level meter
- Sound level meter can be used to measure a specific situation or activity or machine operation
- If needed, noise level and immediately re-measured with ease.

## D. Disadvantages of Sound Level Meter

- Need a skilled resource to conduct a noise assessment using sound level meter
- Sound level meter is difficult to use in controlled environments such as working at heights and confined space
- The assessor needs to convert the data to 8 hours' average.
- There will be a minimum disruption to operational activity when sound level meters are used
- Influence or other sounds nearby such as forklift rumbling, public announcement system, working operator, conversation with others can affect the results.

## ANNEX II: PARTICIPANT INFORMATION SHEET

### 1. PARTICIPANT INFORMATION SHEET FOR SELF-ADMINISTERED QUESTIONNAIRE

**Greetings:**

How are you? I am Yonas Angaw. I came from Addis Ababa University, College of Health Science, and School of Public Health to conduct research. The aim of the study is to assess the effect of noise exposure on temporary threshold shift among workers of Ayka Addis Textile factory in Oromia region, Ethiopia. Therefore, this study will have a great role in the control and prevention of noise induced health effects among Textile factory workers. Further, I believe that this study will help governmental institutions and stakeholders to focus in this area to solve the problems faced among these workers. During the study period standard questionnaire and observational checklist will be used. The study has ethical approval from School of Public Health. You will be requested for the willingness after I provide you the required information about the study. This self-administered questionnaire will take about 15 minutes.

This study will not provide any direct benefit to the study participants. However, the information obtained from this study will help to generate data in order to design appropriate intervention methods. This study will not have any harm to the study participants except spending time to fill the prepared questionnaire. Your participation is voluntary and you have the right to be involved or not after being fully informed. Nothing will happen if you say “No”. If you feel discomfort with the questions in the questionnaire, please be free to withdraw or discontinue at any time you want. Any personal information given by you will be kept anonymously.

Whom to contact: If you have any question about the research you may contact Yonas Angaw (PI) Addis Ababa University, College of Health Sciences, School of Public Health (Tel +251-9-43-70-84-07) or Dr. Teferi Abegaz (Tel +251-9-11-36-16-07) or Mrs. Ansha Nega (Tel +251-9-18-15-10-73) (supervisors) Addis Ababa University, College of Health Sciences, School of Public Health or School of Public Health ethical review committee (Tel +251-115157701).

At this time, do you want to ask me anything about the purpose or content of this Self-administered questionnaire? Are you willing to participate in the study?

## 2. PARTICIPANT INFORMATION SHEET FOR THE NOISE EXPOSURE MONITORING

**Greetings:**

How are you? I am Yonas Angaw. I came from Addis Ababa University, College of Health Science, and Scholl of Public Health to conduct research. The aim of the study is to assess the effect of personal noise exposure on temporary hearing loss among workers of Ayka Addis textile factory, Oromia region, Ethiopia. Therefore, this study will have a great role in the control and prevention of noise related health effects among Textile factory workers. Further, I believe that this study will help governmental institutions and stakeholders to focus in this area to solve the problems faced among these workers. During the study period standard dosimeter (noise level) measurement will be conducted. The study has ethical approval from School of Public Health. You will be requested for the willingness after I provide you the required information about the study.

The procedure how to perform: you will be requested to fix the tools of noise level measurements on your body for quantifying the personal noise level exposure which is probably to be dumped to your ear from the machines. Small size noise level measuring equipment will be putted on your shoulder. The tool has no interference with your health as well as your work. The sampling duration is to cover the whole working hours. The principal investigator will help you in fixing the tool, start and stop the Dosimeter equipment.

This study will not provide any direct benefit to the study participants. However, the information obtained from this study will help to generate data in order to design appropriate intervention methods. In addition to that, we will inform you exposure level you will have during the exposure assessment. This study will not have any harm to the study participants except spending time for the exposure measurement over the whole working hours. Your participation is voluntary and you have the right to be involved or not after being fully informed. Nothing will happen if you say “No”. If you feel discomfort with the measurement, please be free to withdraw or discontinue at any time you want. The exposure data will not be accessible to anybody other than the study members. Any personal information given by you will be kept confidential.

Whom to contact: If you have any question about the research you may contact Yonas Angaw (PI) Addis Ababa University, College of Health Sciences, School of Public Health (Tel +251-9-43-70-84-07) or Dr. Teferi Abegaz (Tel +251-9-11-36-16-07) or Mrs. Ansha Nega (Tel +251-9-

18-15-10-73) (supervisors) Addis Ababa University, College of Health Sciences, School of Public Health or School of Public Health ethical review committee (Tel +251-115157701).

At this time, do you want to ask me anything about the purpose or content of this noise level measuring equipment? Are you willing to participate in the study?

## ANNEX III: INFORMED CONSENT FORM

Having the above information, I kindly ask you to take part in the study.

I the undersigned will like to approve that, as I give my consent to participate in this study after detailed objective of the study have been explained to me in the language I understand. I have also understood that I can withdraw my consent any time without loss of any personal benefits.

1. If yes, continue to the following questions
2. If no, provide compliment, and skip to the next participant

Participant signature: _____ Date: _____

Name of data collector: _____ Signature: _____ Date: _____

**IDENTIFICATION**

Name of principal investigator: Yonas Angaw, Phone number: +251-9-43-70-84-07

Questionnaire code: _____ Work site: _____

Please encircle the correct answer and write a correct number in the space provided, example age in years using pen (Blue).

**ANNEX IV: ENGLISH VERSION QUESTIONNAIRE**

**PART I: SOCIO-DEMOGRAPHIC CHARACTERISTICS**

| S. No | Question | Response | Skip |
|---|---|---|---|
| 101 | Sex | 1. Male<br>2. Female | |
| 102 | Religion | 1. Orthodox<br>2. Muslim<br>3. Catholic<br>4. Protestant<br>5. Other;_____ | |
| 103 | Age | _____years | |
| 104 | Marital status | 1. Single<br>2. Married<br>3. Divorced<br>4. Widowed | |
| 105 | Educational level | 1. 1-8<br>2. 9-12<br>3. Diploma<br>4. Degree | |
| 106 | What is your income per month? | _____ETB | |
| 107 | When do you start this job? | _____E.C (year) | |
| 108 | What is the name of your working department/section? | 1. Spinning<br>2. Knitting<br>3. Dyeing<br>4. Garment | |
| 109 | What is your working time? | ____to___ hours. | |
| 110 | How many working hours per day? | _____hrs. | |

| | | | |
|---|---|---|---|
| 111 | How many working days per a week? | _____days | |
| 112 | How much overtime per week you have? | 1. 5-10 hrs.<br>2. 11-15 hrs.<br>3. 16-20 hrs.<br>4. 21-25<br>5. Other:_____ | |
| 113 | Is there shift in your working schedule? | 1. Yes<br>2. No | Q No 115 |
| 114 | If "Yes" for Q number 113, how is the schedule of the shift? | 1. Weekly<br>2. Monthly<br>3. Every 3 month<br>4. Other:_____ | |
| **PART II. PAST MEDICAL AND OCCUPATIONAL HISTORY** | | | |
| 115 | Have you ever work for other noisy job? | 1. Yes<br>2. No | Q No 117 |
| 116 | If "Yes" for Q number 115,<br>For how long did you work in the areas listed below (Years) (more than one answer is possible) | 1. Flour Mill:____<br>2. Garages:_____<br>3. Cement factory:____<br>4. Textile factory:_____<br>5. Other(specify):_____ | |
| 117 | Have you ever faced head injury in your life time? | 1.Yes<br>2. No | |
| 118 | Have you ear drain problem before you join this company? | 1. Yes<br>2. No | |
| 119 | Was either of your past life ever told by a doctor that you | 1. Yes<br>2. No | |

| | | | |
|---|---|---|---|
| | had a severe headache/migraine? | | |
| 120 | Do you have problem of sleeping at night before you hired at this factory? | 1. Yes<br>2. No | |
| **PART III: NOISE EXPOSURE AND TEMPORARY THRESHOLD SHIFT QUESTIONS** | | | |
| 121 | How concerned are you that noise from this textile factory might affect your hearing ability? | 1. Extremely<br>2. Very<br>3. Moderately<br>4. Slightly<br>5. Not at all | |
| 122 | Are you aware of hazardous effects of noise? | 1. Yes<br>2. No | |
| 123 | Had you ever examined your ear at any health institution? | 1. Yes<br>2. No | |
| 124 | Have you ever had ear discharge or trauma or infection after you are hired at this factory? | 1. Yes<br>2. No | |
| 125 | Have you ever had a broken ear drum? | 1. Yes<br>2. No | |
| 126 | Do you have ear problem now? | 1. Yes<br>2. No | |

| | | | |
|---|---|---|---|
| 127 | Do you feel you have hearing problem? | 1. Yes<br>2. No | |
| 128 | Do you feel that there is difference between two ears? | 1. Yes<br>2. No | |
| 129 | Do you have any ringing/ trouble noise in your ear or head? | 1. Yes<br>2. No | |
| 130 | If "Yes", for how long period of time? | | |
| 131 | Do you use hearing protective devices during work time? | 1. Yes<br>2. No | Q No 133 |
| 132 | If "NO" for Q number 131, what is the reason for not using hearing protective gears? | 1. Feel uncomfortable<br>2. Don't have habit<br>3. Due to negligence<br>4. Not provided by the company | |
| 133 | Have you had any occupational safety training / education? | 1. Yes<br>2. No | |
| 134 | How long since your last training/education? | _____days/months/years | |
| 135 | Do noise levels prevent conversation with co-workers in a normal voice level when at work? | 1. Yes<br>2. No | Q No 138 |
| 136 | If "YES" for Q number 135, | 1. Always | |

| | | | |
|---|---|---|---|
| | How frequent is it? | 2. Often<br>3. Sometimes<br>4. Seldom | |
| 137 | If "YES" for Q number 135, how you communicate with your workers in your department? | 1. Using body gestures<br>2. By approaching to each other<br>3. By increasing my tone<br>4. Other (Specify):____ | |
| 138 | Have you noticed a change in your hearing/your ability to understand words in every day speech? | 1. Yes<br>2. No | |
| 139 | Have you noticed ringing/temporary reduction in hearing after you arrive at home? | 1. Yes<br>2. No | Q No 141 |
| 140 | Your hearing potential during communication with your friends exactly after exit from work? | 1. Without difficulty<br>2. Do miss some conversation<br>3. Do miss a lot<br>4. Difficult conversation | |
| 141 | Hearing condition of phone call exactly after exit from work? | 1. Without difficulty<br>2. Do miss some conversation<br>3. Do miss a lot<br>4. Difficult conversation | |
| 142 | Have you visited a doctor/clinic about your ears? | 1. Yes<br>2. No | Q No 144 |
| 143 | If "YES" for Q number 142, why? | 1. Explain:_____ | |
| 144 | Do you have problem of | 1. Yes | Q |

| | | | |
|---|---|---|---|
| | headache due to noise at work place? | 2. No | No 148 |
| 145 | If "YES" for Q number 144, How frequent it is? | 1. Always<br>2. Often<br>3. Sometimes<br>4. Seldom | |
| 146 | At what time is this headache problem starts? | 1. Beginning of work<br>2. Middle of work time<br>3. End of working time<br>4. After arriving at home | |
| 147 | What kind of remedy you took for this headache problem? | 1. Taking drugs<br>2. Taking coffee/tea<br>3. Nothing<br>4. Other (specify):____ | |
| 148 | Is there disturbing noise around your resident? | 1. Yes<br>2. No | Q No 152 |
| 149 | If "YES" for Q number 148, what is the source of that noise? | 1. Mill<br>2. Traffic road noise<br>3. Religious noises<br>4. Other (specify):___ | |
| 150 | At what time is this noise present? | 1. The whole day<br>2. The whole night<br>3. 24 hours<br>4. Other (specify):___ | |
| 151 | How do you rate this noise level? | 1. Very high<br>2. High<br>3. Moderate<br>4. Low | |

| | | | |
|---|---|---|---|
| 152 | How much time you sleep after exit from work place? | _____hours | |
| 153 | Do you feel sleep at work place? | 1. Yes<br>2. No | Q No 156 |
| 154 | If "YES" for Q number 153, what do you think the reason? | 1. Fatigue<br>2. Noise disturbance<br>3. Short sleep time at home<br>4. I don't know | |
| 155 | What kind of solution you took, if sleeping at work place is your problem? | 1. Explain:_____ | |
| 156 | Do you feel annoyed with high level of noise at work place? | 1. Yes<br>2. No | Q No 159 |
| 157 | If "YES" for Q number 156, How frequent is it? | 1. Always<br>2. Often<br>3. Sometime<br>4. Seldom | |
| 158 | Rate the annoyance due to this noise exposure? | 1. Very annoying<br>2. Annoying<br>3. Moderate<br>4. Very less | |
| 159 | Do you currently use tobacco products? | 1. Yes<br>2. No | Q No 161 |
| 160 | If "YES" for Q number 159, what kind and amount? | 1. Kind:_____<br>2. Amount:_____ | |
| 161 | Do you have any habit of alcohol drink? | 1. Yes<br>2. No | Q No |

| | | | |
|---|---|---|---|
| | | | 163 |
| 162 | If “YES” for Q number 161, amount per day? | 1. Amount:_____ | |
| 163 | Rate the overall satisfaction with working environment? | 1. Very satisfied<br>2. Highly satisfied<br>3. Moderately<br>4. Low | |

**ANNEX V: INFORMATION SHEET (AMHARIC VERSION)**

**የስምምነት ማሳወቂያ ቅጽ**

ስሜ..... ይባላል፡፡ እዚህ የተገኘሁት የአዲስ አበባዩኒቨርስቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ሳይንስ ትምህርት ቤት የድህረ-ምረቃ ተማሪ የሆኑት ዮናስ አንጋዉ ወክየ ነው። እሳቸውም ጨርቃ-ጨርቅ ፋብሪካ ውስጥ በሚሰሩ ሰራተኞች የድምፅ ብክለት እና ተያያዥ የጤና ችግሮች ዙርያ ላይ ጥናት በመስራት ላይ ይገኛሉ። ይህንን ጥናት ለማካሄድ ተሳታፊ የሚሆኑትን በሎቶሪ የናሙና አወጣጥ ምልመላ ሲካሄድ እርሶ በዚህ ጥናት እንዲሳተፉ የተመረጡ ሲሆን ጥናቱ በሚካሄድበት ወቅት የድምፅ ብክለት እና ተያያዥ የጠና ችግሮች ዳሰሳ ለማድረግ

1. እርስዎ አንብበው የሚሞሉት ለጥናቱ የተዘጋጀ መጠይቅ እጠቀማለው

2. ቀላል ዘዴ በመጠቀም የድምፅ ብክለት እንለካለን ይህም የእርሶን ሙሉ ትብብር የሚጠይቅ ይሆናል፡፡ ስለሂደቱም አጭር ገለጻ ይደረጋል፡፡ ልኬቱ የሚካሄደው ሥራ ቦታ ሲሆን የሚወስደው 8፡00 ሠዓት ጊዜ ነው፡፡

የምትሰጡን መረጃ ሁሉም ምስጢራውነቱ የተጠበቀና ቅፅ ላይ ስም አይሰፍርም፡፡ ከጥናቱ በቀጥታ የሚያገኙት ጥቅም የለም፡፡ ነገር ግን በተዘዋዋሪም ጥናቱ ጨርቃ-ጨርቅ ፋብሪካ በሚሰሩ ሰራተኞች ላይ የሚታዩ የድምፅ ብክለት እና ተያያዥ የጤና ችግሮች ለመከላከልና ለመቆጣጠር ትልቅ አስተዋፅኦ ይኖረዋል፡፡ በተጨማሪም ለቀጣይ የምርምር ስራዎች መሰረት በመሆን ያገለግላል፡፡

እንዲሁም ይህንን ጥናት መሰረት በማድረግ መንግስትና የተለያዩ ባለድርሻ አካላት ትኩረት በመስጠት ችግሩ ላይ የራሳቸው አስተዋፆ እንዲያደርጉ ይረዳል ብዬ አስባለሁ፡፡ ስለዚህ የእርሶ ተሳትፎ ለዚህ ምርምር ጠቃሚ ነው፡፡ በዚህ ምርምር መሳተፍ ምንም አይነት የጎንዮሽ ጉዳት አይኖረውም፡፡ ስለዚህ በጥናቱ መሳተፍም ሆነ አለመሳተፍ የእርሶ መብት ነው፡፡ ከጥናት ጋር ተያያዥ ጥያቄ ካለዎት ወይም ተጨማሪ መረጃ ከፈለጉ ከአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ሳይንስ ትምህርት ክፍልን ወይም ጥናት አድራጊውን በሚከተለው አድራሻ ማግኘት ይችላሉ፡፡

**ጥናት አድራጊ፡-** ዮናስ አንጋዉ

ስልክ፡-+251-943708407

**ኢ-ሜል፡**-yonasangaw27@gmail.com

**ANNEX VI: INFORMED CONSENT (AMHARIC VERSION)**

**የስምምነት መዋዋያ ቅጽ**

**ጥናቱን በሚካሄደው አካል ስለጥናት በቂ መረጃ ተሰጥቶኛል፡፡ የዚህ ጥናት ዓላማም ጨርቃ-ጨርቅ ፋብሪካ ያለዉን የድምፅ ብክለት እና የሚያመጣዉን ተያያዥ የጤና ችግሮች መለካትና ማጥናት መሆኑን ተረድቻለሁ፡፡ ከኔ የሚወሰደው መረጃ በእኔ ላይ ምንም ዓይነት ጉዳት የማያስከትልና መረጃውን ለጥናት ዓላማ ብቻ እንደሚውል ተረድቻለሁ፡፡**

**ማንኛውም እኔን የተመለከተ መረጃ ሚስጥራዊነቱ የተጠበቀ ነው፡፡ እንደዚሁም በጥናቱ ለመሳተፍ ፍቃደኛ ካልሆንኩ በጥናቱም ለመሳተፍ እንደማልገደድ ነገር ግን በዚህ ጥናት መሳተፌ ለሳይንሳዊ ዕውቀት ጠቃሚ መረጃ የማበርከትና ወደፊት በዚህ ዙሪያ ለሚሰሩ ስራዎች መሰረት የሚሆኑ ግብዓት መስጠት እንደምችል ተረድቻለሁ፡፡ በመሆኑም በዚህ ጥናት ላይ ለመሳተፍ የተስማማሁ መሆኔን በፊርማዬ አረጋግጣለሁ፡፡**

**የተሳታፊው ፊርማ…… ቀን……**

**መረጃ ሰብሳቢ ስምና ፊርማ…… ቀን……..**

**ANNEX VII: AMHARIC VERSION QUESTIONNAIRE**

**አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የሕብረተሰብ ጤና ሳይንስ ትምህርት ቤት**

**መጠይቅ የተሞላበት ቀን_____**

**የፋብሪካዉ ሙሉ ሥም_____**

| **ክፍልአንድ፡- ማህበራዊ ሁኔታ መስፈርት** | | | |
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| **ተ.ቁ** | **ጥያቄ** | **ምላሽ** | **ይለፉ** |
| 101 | **ፆታ** | 1. **ወንድ**<br>2. **ሴት** | |
| 102 | **ዕድሜ** | _____**ዓመት** | |
| 103 | **ሀይማኖት** | 1. **ኦርቶዶክስ**<br>2. **ሙስልም**<br>3. **ካቶሊክ**<br>4. **ፕሮተስታንት**<br>5. **ሌላ፡**_____ | |
| 104 | **የትዳር ሁኔታ** | 1. **ያላገባ**<br>2. **ያገባ**<br>3. **የፈታ**<br>4. **አግብቶ የሞተበት/የሞተባት** | |
| 105 | **የትምህርት ደረጃ** | 1. 1-8<br>2. 9-12<br>3. **ዲፕሎማ**<br>4. **ዲግሪ** | |
| 106 | **አጣቃላይ የወር ገቢ** | _____**ብር** | |
| 107 | **እዚህ ፋብሪካ ስራ መቸ ጀመሩ?** | _____**ዓ.ም** | |
| 108 | **እየሰሩበት ያለው ዲፓርትመንት ምን ይባላል?** | 1. **ስፒንግ**<br>2. **ኒቲግ**<br>3. **ዳይንግ** | |

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| | | 4. ጋርመንት | |
| 109 | የሥራ ሰዓትዎ | _____እስከ_____ | |
| 110 | በቀን ለስንት ሰዓት ይሰራሉ? | ለ_____ሰዓት | |
| 111 | በሳምንት ለስንት ቀናት ይሰራሉ? | ለ_____ቀናት | |
| 112 | በዚህ ፋብሪካ ዉስጥ በሳምንት ስንት የትርፍ ሰዓት ሥራ ወይም ፐርዲያም አለዎት? | 1. 5-10<br>2. 11-15<br>3. 16-20<br>4. 21-25<br>5. ሌላ_____ | |
| 113 | በዚህ ፋብሪካ ሲሰሩ የስራ መቀያየር ፕሮግራም ወይም ሽፍት አለ እንዴ? | 1. አዎ<br>2. የለም | ወደ 115 |
| 114 | ለ ቁጥር 113 መልስዎ አዎ ከሆነ፣ሽፍቱ በየስንት ቀን ነው? | 1. በየሳምንቱ<br>2. በየወሩ<br>3. በየ 3 ወሩ<br>4. ሌላ_____ | |
| **ክፍል ሁለት፡ ያለፈው የጤናና የስራ ታሪክ ወይም ሁኔታ** | | | |
| 115 | ከዚህ በፊት ድምፅ በበዛበት ድርጅት ሰርተው ያውቃሉ? | 1. አዎ<br>2. የለም | ወደ 117 |
| 116 | ለ ቁጥር 115 መልስዎ አዎ ከሆነ ምን አይነት ድርጅት እና ለስንት ግዜ/አመት? | 1. ወፍጮ ቤት_____<br>2. ጋራጅ_____<br>3. ሰመንት ፋብሪካ_____<br>4. ጨርቃ-ጨርቅ_____<br>5. ሌላ፡_____ | |
| 117 | በህይወት ዘመንዎ የደረሰብዎት የጭንቅላት አደጋ | 1. አዎ<br>2. የለም | |

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| | ነበር? | | |
| 118 | እዚህ ድርጅት ከመግባትዎ በፊት ጆሮዎ ፈሳሽ የማውጣት ችግር አለው ተብለው ያውቃሉ? | 1. አዎ<br>2. የለም | |
| 119 | ከዚህ በፊት ሀኪም ቤት ሂደው ሀይለኛ የራስ ምታት አለበዎት ተብለው ያውቃሉ? | 1. አዎ<br>2. የለም | |
| 120 | እዚህ ፋብሪካ ከመቀጠርዎ በፊት ለሊት የእንቅልፍ እጦት ችግር ነበረብዎት? | 1. አዎ<br>2. የለም | |
| **ክፍል ሦስት፡ የድምፅ ብክለትና ተያያዥ የጤና ችግሮች የተመለከቱ ጥያቄዎች** | | | |
| 121 | ከዚህ ፋብሪካ የሚወጣ ድምፅ የጆሮየን የመስማት ችሎታ ይጎዳብኛል ብለው ምን ያክል ያሳስብዎታል? | 1. በከፍተኛ ደረጃ<br>2. በጣም<br>3. መካከለኛ<br>4. በትንሹ<br>5. ምንም አያሳስበኝም | |
| 122 | የድምፅ ብክለት የጤና ችግር እንደምያመጣ ያውቃሉ? | 1. አዎ<br>2. የለም | |
| 123 | በየትኛውም የጤና ተቋም የጆሮ የጤና ምርመራ አድርገው ያውቃሉ? | 1. አዎ<br>2. የለም | |
| 124 | እዚህ ፋብሪካ ከገቡ በኃላ የጆሮ እንፈክሽን | 1. አዎ<br>2. የለም | |

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| | ወይም መግል ወይም አደጋ አጋጥሞት ያዉቃል? | | |
| 125 | ከዝህ በፊት የጆሮዎ ታመቡር ተበጥሶ ያዉቃል? | 1. አዎ<br>2. የለም | |
| 126 | አሁን የጆሮ ህመም ችግር አለብዎት? | 1. አዎ<br>2. የለም | |
| 127 | አሁን የመስማት ችግር አለብዎት? | 1. አዎ<br>2. የለም | |
| 128 | በሁለቱ ጆሮዎት መሀከል የመስማት ልዩነት አለ ብለዉ ያስባሉ? | 1. አዎ<br>2. የለም | |
| 129 | በጆሮዎ ወይም በጭንቅላትዎ የሚንቀጠቀጥ ወይም የሚረብሽ ድምፅ ይሰማዎታል እንዴ? | 1. አዎ<br>2. የለም | |
| 130 | አዎ ከሆነ ለስንት ግዜ ይቆያል? | _____ | |
| 131 | በስራ ቦታ ድምፅ መከላከያ መሳርያ ጆሮዎት ላይ ያደርጋሉ? | 1. አዎ<br>2. የለም | ወደ 133 |
| 132 | መልስዎ አላደርግም ከሆነ፡ምክንያቱ ምንድነው? | 1. ምቾት አይሰጠኝም<br>2. ልምዱ የለኝም<br>3. ችለልተኝነት<br>4. ድርጅቱ አይሰጠኝም | |

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| 133 | ከዚህ በፊት ስለ ስራ ቦታ ደህንት ስልጠና ወስደዉ ያዉቃሉ? | 1. አዎ<br>2. የለም | |
| 134 | ስልጠናዉን ከወሰዱ ምን ያህል ጊዜ ሆኖታል ? | ---------- (ቀናት/ ወራት/ ዓመት) | |
| 135 | በተለመደ ድምፅዎት በስራ ዲፓርትመንት ከስራ ባልደረቦት ስያወሩ የማሽኖቹ ድምፅ እንዳትሰማሙ ይከለክላል እንዴ? | 1. አዎ<br>2. የለም | ወደ 138 |
| 136 | ለ ቁጠር 135 መልስዎ አዎ ከሆነ፡ የመከልከል ድግግሞሽ እንዴት ይገልፁታል? | 1. ሁል ግዜ<br>2. ብዙ ግዜ<br>3. አልፎ አልፎ<br>4. ሳት ብሎ | |
| 137 | ለ ቁጥር 135 መልስዎ አዎ ከሆነ ታድያ እንዴት ትግባባላችሁ? | 1. በምልክት<br>2. አንዳችን ወደ አንዳችን በመሄድ<br>3. ድምፃችን ከፍ በማድረግ<br>4. ሌላ_____ | |
| 138 | በቀን ተቀን ከሰዎች ጋር በሚያደርጉት ንግግር የመስማት ወይም ቃላቶች የመረዳት ችሎታዎ የሆነ ለውጥ አስተውለው ያውቃሉ? | 1. አዎ<br>2. የለም | |
| 139 | እቤት ከደረሱ በኃላ ጆሮዎ የመርበድበድ ወይም ግዚያዊ የመስማት ችሎታ | 1. አዎ<br>2. የለም | ወደ 141 |

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| | መቀነስ አለው ? | | |
| 140 | ልክ ከስራ እንደወጡ ከጓዶቾችዎ ስያወሩ የመስማት ችሎታዎ ምን ይመስላል? | 1. በቀላሉ እሰማለሁ<br>2. ትንሽ ትንሽ ያመልጠኛል<br>3. ብዙ ያመልጠኛል<br>4. አይሰማኝም | |
| 141 | ልክ ከስራ እንደወጡ በስልክ ስያወሩ የመስማት ችሎታዎ ምን ይመስላል? | 1. በቀላሉ እሰማለሁ<br>2. ትንሽ ትንሽ ያመልጠኛል<br>3. ብዙ ያመልጠኛል<br>4. አይሰማኝም | |
| 142 | ስለ ጆሮዎት የጤና ሁኔታ በዶክተር ታይተው ያውቃሉ? | 1. አዎ<br>2. የለም | ወደ 144 |
| 143 | ለ ቀጥር 142 መልስዎ አዎ ከሆነ ለምን? | ምክንያቱ ይፃፉ_____ | |
| 144 | ከማሽኖቹ በሚወጣ ድምፅ ምክንያት የራስ ምታት በሽታ አለብዎት እንዴ? | 1. አዎ<br>2. የለም | ወደ 148 |
| 145 | ለ ቁጥር 144 መልስዎ አዎ ከሆነ ድግግሞሹ እንዴት ይገልፁታል? | 1. ሁል ግዚ<br>2. ብዙ ግዚ<br>3. አልፎ-አልፎ<br>4. ሳት ብሎ | |
| 146 | ይህ የራስ ምታት በሽታ መች ነው የሚጀምረው? | 1. ስራ ስጀምር<br>2. በማህል<br>3. ስራ ከጨረስኩ በኃላ<br>4. እቤት ከገባሁ በኃላ | |
| 147 | ይህንን የራስ ምታት ለመቀነስ ምን አይነት | 1. መድሀኒት<br>2. ሻሂ ወይም ቡና | |

| | | | |
|---|---|---|---|
| | መፍትሄ ይወስዳሉ? | 3. ምንም 4. ሌላ፡_____ | |
| 148 | በሚኖርበት ቤት አካባቢ የሚረብሽ ድምፅ አለ እንዴ? | 1. አዎ<br>2. የለም | ወደ 152 |
| 149 | ለ ቀጥር 148 መልስዎ አዎ ከሆነ የድምፁ ምንጭ ምንድነው? | 1. ወፍጮ ቤት<br>2. የመኪኖች ድምፅ<br>3. የሀይማኖት ተቋማት ድምፅ<br>4. ሌላ_____ | |
| 150 | ይህ ድምፅ መች ነው የሚኖረው? | 1. ቀኑን ሙሉ<br>2. ለሊቱን ሙሉ<br>3. 24 ሰዓት<br>4. ሌላ_____ | |
| 151 | የዚህን ድምፅ መጠን እንዴት ይገልፁታል? | 1. 1. በጣም ከፍተኛ<br>2. 2. ከፍተኛ<br>3. 3. መካከለኛ<br>4. 4. ዝቅተኛ | |
| 152 | ከስራ ከወጡ በኃላ ለስንት ሰዓት ይተኛሉ? | _____ሰዓት | |
| 153 | ሰራ እየሰሩ እንቅልፍ እንቅልፍ የሚል ሰሜት ይሰምዎታል እንዴ? | 1. አዎ<br>2. የለም | ወደ 156 |
| 154 | ለቁጥር 153 አዎ ከሆነ መልስዎ፡ምክንያቱ ምንድነው ይላሉ? | 1. ድካም<br>2. የድምፁ ረብሻ<br>3. እቤት ብዙ አለመተኛት<br>4. አላውቀዉም | |
| 155 | ሰራ ቦታ የመተኛት ልምድ ካሎት ምን አይነት መፍትሄ ይወስዳሉ? | ይግፉ_____ | |
| 156 | ከማሽኖቹ የሚወጣ | 1. አዎ | ወደ |

| | | | |
|---|---|---|---|
| | ድምፅ ያበሳጭዎታል ? | 2. የለም | 159 |
| 157 | ለቁጥር 156 መልስዎ አዎ ከሆነ ድግግሞሹ እንዴት ይገልፁታል | 1. ሁል ግዜ<br>2. ብዙ ግዜ<br>3. አልፎ አልፎ<br>4. ሳት ብሎ | |
| 158 | ለዚህ ብስጭትዎ ደረጃ ይስጡት | 1. በጣም ያበሳጫኛል<br>2. ያበሳጫኛል<br>3. መካከለኛ<br>4. በትንሹ ያበሳጫኛል | |
| 159 | በአሁን ግዜ የተባኮ (እንደ ሲጋራ ያሉ) ውጤቶች የመጠቀም ባህርይ አልዎት? | 1. አዎ<br>2. የለም | ወደ 161 |
| 160 | ለቁጥር 159 መልስዎ አዎ ከሆነ | 1. አይነት_____<br>2. ብዛት_____ | |
| 161 | አልኮል የመጠጣት ልምድ አልዎት? | 1. አዎ<br>2. የለም | ወደ 163 |
| 162 | ለቁጥር 161 መልስዎ አዎ ከሆነ | 1. አይነት_____<br>2. ብዛት_____ | |
| 163 | አጠቃላይ በዚህ ድርጅት ሲሰሩ ያለዎት እርካታ ደረጃ ይስጡ | 1. በጣም ደስተኛ ነኝ<br>2. ደስተኛ ነኝ<br>3. መካከለኛ<br>4. በትንሹ | |

**Miiltoo VIII: Waraqaa Odeeffannoo (kutaa afaan Oromo)**

**Uunka Beeksisa Waliigaltee**

Maqaan koo ----------jedhama. Kanan asitti argameef Kolleejjii Saayinsii Fayyaa Uunivarsiitii Finfinneetti mana barnootaa saayinsii fayyaa hawwaasaa barataa eebbifamaa digirii lammaffaa kan ta'an Yoonaas Aangaawuun bakka bu'eeni dha. Isaanis hojjettoota waarshaa huccuu keessa hojjetaniin faalama sagalee fi rakkoo nageenyaa kana wajjin walqabatan irratti qo'annoo hojjechaa jiru. Qo'annoo kana gaggeessuuf hirmaattota kan ta'an sumudaa bahumsa lootariitiin calalliin erga godhameen booda isin qo'annoo kana irratti akka hirmaattan kan filatamtanii waan ta'eef yeroo qo'annichi gaggeeffamutti faalama sagalee fi rakkoo fayyaa kanaan walqabatan xiinxala gochuuf

1. Isin dubbistanii kan guuttan gaaffii qo'annichaaf qophaa'e nan fayyadama
2. Mala salphaa fayyadamuun faalama sagalee ni safarra kunis gargaarsa keessan guutuu kan gaafatu ni ta'a. waa'ee adeemsichaas ibsi gabaabaan ni godhama. Safartuun kan gaggeeffamu bakka hojiitti yommuu ta'u yeroon fudhatu sa'aa 8:00 dha.

Odeeffannoon nuuf kennitanis iciitiin isaa kan eegamee fi uunkaa irratti maqaan hin guutamu. Qo'annicha irraa faayidaan kallattiin argattan hin jiru. Haa ta'u malee al-kallattin hojjettoota warshaa huccuu keessa hojjetan irratti faalama sagalee mul'atanii fi rakkoo fayyaa kanaan walqabatan ittisuu fi to'achuuf bu'aa guddaa ni qabaata. Dabalataanis hojii qorannoo itti aanuufis bu'uura ta'ee ni fayyada.

Akkasumas qo'annoo kana bu'uura godhachuun mootummaanii fi qaamoleen qooda fudhattootaa adda addaa xiyyeeffannoo kennuun rakkoo kana irratti tumsa mataa isaanii akka godhan ni fayyada jedheen yaada. Kanaafuu hirmaannaan keessan qorannoo kanaaf barbaachisaa dha. Qorannoo kana irratti hirmaachuun miidhaa biraa tokko illee hin qabu. Kanaafuu qo'annoo kana irratti hirmaachuunis ta'e hirmaachuu dhiisuun mirga keessani dha. Qo'annoo waliin gaaffii walqabatu yoo qabattan yookiin odeeffannoo dabalataa yoo barbaaddan Kolleejjii Saayinsii Fayyaa Uunivarsiitii Finfinnee kutaa barnootaa saayinsii fayyaa hawwaasaa yookiin qo'annoo gaggeessaa teessoo armaan gadiin argachuu ni dandeessu.

Qo’annoo kan godhe :-  Yoonaas Aangaawu

Lakk. Bilbilaa:- +251-943708407

e.mail:- yonasangaw27@gmail.com

Miiltoo IX:  Waliigaltee Beeksifame (kutaa afaan Oromo)

**Uunka Waliigaltee Itti Taasifamu**

Qo’annicha qaama gaggeessuun odeeffannoon gahaan naaf kennameera. Kaayyoon qo’annoo kanaas faalama sagalee warshaa huccuu jiruu fi rakkoo fayyaa kanaan walqabatee dhufu safaruu fi qo’achuu ta’uu hubadheera. Odeeffannoon ana irraa fudhatamu miidhaa kamiyyuun kan na irratti hin qaqabsiisnee fi odeeffanichis kaayyoo qo’annoof qofa akka oolu hubadheera.

Odeeffannoon na ilaallatu kamiyyuu icciitummaan isaa eegamaa dha. Akkasumas qo’annicha irratti hirmaachuuf eeyyamamaa ta’uu yoon baadhe qo’annicha irratti hirmaachuuf akkan hin dirqisiifamne haa ta’u malee qo’annoo kana irratti hirmaachuun koo beekumsa saayinsiif odeeffannoo faayidaa qabeessa gumaachuu fi gara fuulduraatti hojiiwwan kana irratti hojjetamaniif galumsa bu’uura ta’u kennuu akkan danda’u hubadheera. Kan ta’uu isaatiif qo’annoo kana irratti hirmaachuuf kanan waliigale ta’uu mallattoo kootiin nan mirkaneessa.

Mallattoo hirmaataa----------Guyyaa----------

Maqaa fi mallattoo odeeffannoo funaanaa----------Guyyaa---------

**Miiltoo X: kutaa gaaffii afaan Oromo**

**Kolleejjii Saayinsii Fayyaa Uunivarsiitii Finfinnee mana barnootaa saayinsii fayyaa hawwaasaa**

Gaaffichi guyyaa itti guutame_____

Maqaa guutuu waarshichaa _____

Gabatee 8: kutaa gaaffii afaan Amaaraa

| **Kutaa Tokko:- Ulaagaa haala hawwaasummaa** | | | |
|---|---|---|---|
| **T.lakk.** | **Gaaffii** | **Deebii** | **Darbaa** |
| 101 | Saala | 1. Dhiira<br>2. Dhalaa | |
| 102 | Umrii | waggaa_____ | |
| 103 | Amantii | 1.Ortodooksii<br>2.Musiliima<br>3. Kaatoolikii<br>4.Pirootastaantii<br>5.Kanbiroo: _____ | |
| 104 | Haala gaa'ilaa | 1. Kanhinfuune/heerumne<br>2. Kan fuudhe/heerumte<br>3. Kan hiike/te<br>4. Fuudhee/heerumtee kan jalaa du'e | |
| 105 | Sadarkaa barnootaa | 1. 1-8<br>2. 9-12<br>3. Dippiloomaa<br>4. Digirii | |
| 106 | Galii ji'aa waliigala | Qarshii _____ | |
| 107 | Warshaa kanatti hojii yoom eegaltanii? | Bara _____ | |
| 108 | Dippaartimantiin ittiin hojjechaa jirtan | 1. Ispiingii<br>2. Niitiingii | |

| | | | |
|---|---|---|---|
| | maal jedhamaa? | 3. Daayiingii<br>4. Gaarmantiin | |
| 109 | Sa'aatii hojii keessanii | _____hanga _____ | |
| 110 | Guyyaatti sa'aatii meeqaaf hojjettuu ? | Sa'aatii_____f | |
| 111 | Torbanitti guyyoota meeqaaf hojjettuu? | Guyyoota_____f | |
| 112 | Warshaa kana keessatti turban keessatti hojiib yeroo boqonnaa yookiin paardiyaamii meeqa qabduu? | 1. 5-8<br>2. 11-15<br>3. 16-20<br>4. 21-25<br>5. Kan biro_____ | |
| 113 | Warshaa kanatti yommuu hojjettan sagantaan hojii jijjiirraa yookiin shiiftiin jiraa? | 1. Eeyyen<br>2. Hin jiru | Gara 115 |
| 114 | Lakkoofsa 113'f deebiin keessan eeyyee yoo ta'e, shiiftichi guyyaa meeqatti dha? | 1. Torban torbaniin<br>2. Ji'aan<br>3. Ji'a 3'n<br>4. Kan biro_____ | |
| **Kutaa Lama: Fayyummaa darbee fi seenaa yookiin haala hojii** | | | |
| 115 | Kanaan dura dhaabbata sagaleen itti baay'atu keessa hojjettanii beektuu? | 1. Eeyyee<br>2. Lakki | Gara 117 |
| 116 | Lakkoofsa 113'f deebiin keessan eeyyee yoo ta'e dhaabbata akkamii fi yeroo meeqaaf/waggaa? | 1. Mana baaburaa_____<br>2. Garaajii _____<br>3. Warshaa simiintoo_____<br>4. Warshaa huccuu_____<br>5. Kan biro_____ | |

| | | | |
|---|---|---|---|
| 117 | Bara jireenya keessaniitti balaan sammuu isin irra gaheeru turee? | 1. Eeyyee<br>2. lakki | |
| 118 | Dhaabbata kana galuu keessaniin dura gurri keessan rakkoo dhangal'aa baasuu qaba jedhamtanii beektuu? | 1. Eeyyee<br>2. lakki | |
| 119 | Kanaan dura mana yaalaa deemtanii dhukkuba mataa cimaa qabdu jedhamtanii beektu? | 1. Eeyyee<br>2. lakki | |
| 120 | Warshaa kanatti qacaramuu keessaniin dura halkan dhabiinsa hirribaa qabdu turtanii? | 1. Eeyyee<br>2. lakki | |
| **Kutaa sadii: Gaaffilee Faalama sagalee fi rakkoo fayyaa kanaan walqabatan ilaalan.** | | | |
| 121 | Sagaleen warshaa kana keessaa bahu dandeettii dhageettii gurrakoo na jalaa miidha jettanii hangam isin yaachisa? | 1. Sadarkaa olaanaa<br>2. Baay'ee<br>3. Gidduugaleessa<br>4. Xiqqoo<br>5. Homaa nah in yaaddessu | |
| 122 | Faalamni sagalee rakkoo fayyummaa akka fidu ni beektuu? | 1. Eeyyee<br>2. lakki | |
| 123 | Dhaabbata fayyaa kamitti qorannoo fayyaa gurraa gootanii beektuu? | 1. Eeyyee<br>2. lakki | |
| 124 | Warshaa kana erga galtaniin booda | 1. Eeyyee<br>2. lakki | |

| | | | |
|---|---|---|---|
| | infeekshiniin gurraa yookiin malaan yookiin balaan isin quunnamee beekaa? | | |
| 125 | Kanaan dura dibbeen gurra keessanii cite beekaa? | 1. Eeyyee<br>2. lakki | |
| 126 | Amma rakkoo dhukkuba gurraa qabduu? | 1. Eeyyee<br>2. lakki | |
| 127 | Amma rakkoo dhageettii qabdu? | 1. Eeyyee<br>2. lakki | |
| 128 | Gurra keessan lamaan gidduu adda addummaan dhageettii jira jettanii yaadduu? | 1. Eeyyee<br>2. lakki | |
| 129 | Gurra keessaniin yookaan sammuu keessaniin sagaleen hurgufamu yookiin jeequ isinitti dhagahamaa laataa? | 1. Eeyyee<br>2. lakki | |
| 130 | Eeyyee yoo ta'e yeroo hammamiif turaa? | _____ | |
| 131 | Bakka hojiitti meeshaa dhorkaa sagalee gurra keessanitti godhattuu? | 1. Eeyyee<br>2. lakki | Gara 133 |
| 132 | Deebiin keessan hin godhadhuu yoo ta'e sababiin isaa maalii? | 1. Hin mijatu<br>2. Muuxannoo hin qabu<br>3. Dhibaahummaan<br>4. Dhaabbatichi hin kennu | |
| 133 | Kanaan dura leenjii waa'ee nageenya iddoo hojii fudhattanii | 1. Eeyyee<br>2. lakki | |

| | | | |
|---|---|---|---|
| | beektuu? | | |
| 134 | Leenjii erga fudhattanii yeroo hammam ta'eera? | (guyyoota/ji'oota/waggoota)_____ | |
| 135 | Sagalee keessan barameen dippaartimantii hojiitti hojjettoota waliin yeroo odeessitan sagaleen maashinootaa akka walii hin galle isin dhorkaa? | 1. Eeyyee<br>2. lakki | Gara 138 |
| 136 | Lakkoofsa 135'f deebiin keessan eeyyee yoo ta'e, irra deddeebbii dhorkiinsaa akkamiin ibsituu? | 1. Yeroo mara<br>2. Yeroo baay'ee<br>3. Darbee darbee<br>4. dogoggoree | |
| 137 | Lakkoofsa 135'f deebiin keessan eeyyee yoo ta'e, kanaaf akkamiin waliigalturee? | 1. Mallattoon<br>2. Tokkoon keenya gara tokkoo keenyaatti deemuun<br>3. Sagalee keenya ol kaasuun<br>4. Kan biro_____ | |
| 138 | Guyyaa guyyaan haasaa nama wajjin gootan dhageessisuu yookaan dandeettiin jechoota hubachuu keessanii jijjiirama ta'e hubattanii beektuu? | 1. Eeyyee<br>2. lakki | |
| 139 | Erga mana geessaniin booda gurri keessan wacuu yookiin hir'isuu dandeettiin dhageettii yeroofii qabaa? | 1. Eeyyee<br>2. lakki | Gara 141 |
| 140 | Akkuma hojiitii | 1. Salphaatiin nan dhagaha | |

| | | | |
|---|---|---|---|
| | baataniin hiriyyoota keessan wajjin yeroo odeessitan dandeettin dhageettii keessanii maal fakkaataa? | 2. Xiqqoo xiqqoo na darba<br>3. Baay'ee na darba<br>4. Natti hin dhagahamu | |
| 141 | Akkuma hojiitii baataniin yeroo odeessitan dandeettin dhageettii keessanii maal fakkaataa? | 1. Salphaatiin nan dhagaha<br>2. Xiqqoo xiqqoo na darba<br>3. Baay'ee na darba<br>4. Natti hin dhagahamu | |
| 142 | Haala fayyummaa gurra keessanii Doktoraan ilaalamtanii beektuu? | 1. Eeyyee<br>2. lakki | Gara 144 |
| 143 | Lakkoofsa 142'f deebiin keessan eeyyee yoo ta'e maaliif? | Sababa isaa barreessaa_____ | |
| 144 | Sababa sagalee maashinoota keessaa bahuun dhibee dhukkuba mataa qabdumoo laata? | 1. Eeyyee<br>2. lakki | Gara 148 |
| 145 | Lakkoofsa 144'f deebiin keessan eeyyee yoo ta'e irra deddeebbii isaa akkamiin ibsituu? | 1. Yeroo mara<br>2. Yeroo baay'ee<br>3. Darbee darbee<br>4. dogoggoree | |
| 146 | Mataan dhukkubii kuni yoomi kan isin jalqabu? | 1. Hojii yeroon eegalu<br>2. Gidduutti<br>3. Ergan hojii xumureen booda<br>4. Ergan mana galee booda | |
| 147 | Dhukkubbii mataa kana hir'isuuf furmaata akkamii fudhattuu? | 1. Qoricha<br>2. Shayii yookiin buna<br>3. Homayyuu<br>4. Kan biro_____ | |
| 148 | Naannoo mana | 1. Eeyyee | Gara |

| | | | |
|---|---|---|---|
| | jiraattanii sagaleen jeequ jiraa? | 2. lakki | 152 |
| 149 | Lakkoofsa 148'f deebiin keessan eeyyee yoo ta'e maddi sagalichaa maalii? | 1. Mana baaburaa<br>2. Sagalee konkolaattotaa<br>3. Sagalee dhaabbata amantii<br>4. Kan biro_____ | |
| 150 | Sagaleen kun yoomi kan jiraatu? | 1. Guyyaasaa guutuu<br>2. Halkansaa guutuu<br>3. Sa'aatii 24<br>4. Kan biro_____ | |
| 151 | Hanga sagalee kanaa akkamiin ibsituu? | 1. Baay'ee ol'aanaa<br>2. Ol'aanaa<br>3. Gidduugaleessa<br>4. Gadi aanaa | |
| 152 | Erga hojiirraa baataniin booda sa'aatii meeqaaf raftuu? | Sa'aatii_____ | |
| 153 | Otoo hojii hojjettanii miirri hirriba hirriba jedhu isinitti dhagahamaa? | 1. Eeyyee<br>2. lakki | Gara 156 |
| 154 | Lakkoofsa 153'f deebiin keessan eeyyee yoo ta'e sababni isaa maalidha jedhuu? | 1. Dadhabbii<br>2. Jeequmsa sagalee<br>3. Mana baay'ee rafuu dhiisuu<br>4. Hin beeku | |
| 155 | Bakka hojiitti muuxannoo rafuu yoo qabattan furmaata akkamii fudhattuu? | Barreessaa_____ | |
| 156 | Sagaleen maashinoota keessaa bahu aarsaa? | 1. Eeyyee<br>2. lakki | Gara 159 |
| 157 | Lakkoofsa 156'f deebiin keessan eeyyee yoo ta'e irra deddeebbii | 1. Yeroo hundaa<br>2. Yeroo baay'ee<br>3. Darbee darbee | |

| | | | |
|---|---|---|---|
| | isaa akkamiin ibsituu? | 4. dogoggoraan | |
| 158 | Aarii kanaaf sadarkaa kennaa | 1. Baay'ee nama aarsa<br>2. Nama aarsa<br>3. Gidduugaleessa<br>4. Xiqquma nama aarsa | |
| 159 | Yeroo ammaa kanatti toobaakoo(kan akka sigaaraa) bu'aa isaanii amala fayyadamuu qabduu? | 1. Eeyyee<br>2. lakki | Gara 161 |
| 160 | Lakkoofsa 159'f deebiin keessan eeyyee yoo ta'e | 1. Gosa _____<br>2. Baay'ina_____ | |
| 161 | Muuxannoo alkoolii dhuguu ni qabdu? | 1. Eeyyee<br>2. Lakki | Gara 163 |
| 162 | Lakkoofsa 161'f deebiin keessan eeyyee yoo ta'e | 1. Gosa _____<br>2. Baay'ina_____ | |
| 163 | Walumaagalatti dhaabbata kana keessaa yommuu hojjettani fedha bahuu keessan sadarkaa itti kennaa | 1. Baay'ee gammadaa dha<br>2. Gammadaadha<br>3. Gidduugaleessa<br>4. Xiqqoo | |

## ANNEX XI: OBSERVATIONAL CHECKLIST

| S. No | Checklist Items | Response | | Indicators (Observation) |
|---|---|---|---|---|
| | | Yes | No | |
| 1 | Are the workers use hearing protective devices? | | | |
| 2 | Are the hearing protective devices used in the correct manner? | | | Well fitted in the ears (Right, Left) |
| 3 | Are the hearing protective devices recommended by professionals based on the noise level? | | | Based on Noise Reduction Rate |
| 4 | Are the machines encircled or protected? | | | |
| 6 | Is there any training given to workers to increase awareness on noise hazards? | | | About NIHL, stress |
| 7 | Is high-noise areas labeled with signs to identify the danger? | | | |
| 8 | Posted-signs and warning lights/alarms in high noise areas? | | | |
| 9 | Locate noise sources away from normal travel ways? | | | |
| 10 | Supervisory enforcement of noise reduction requirements and discipline for those who fail to comply? | | | |
| 11 | Switch/rotate workers from high-noise to low-noise exposure jobs/occupations? | | | |
| 12 | Properly maintain all equipment to help reduce excessive noise resulting from lack of oil or grease? | | | |

**ASSURANCE OF PRINCIPAL INVESTIGATOR**

The undersigned agreed to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Research Publications Office in effect at the time of grant is forwarded as the result of this application.

Name of the student: **Yonas Angaw**

Date: September, 2019 Signature: _____

Name of the primary advisor: **Dr. Abera Kumie**

Date: _____ Signature: _____