**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH**


# DETERMINANTS OF CHRONIC RESPIRATORY SYMPTOMS AMONG PHARMACEUTICAL FACTORY WORKERS IN ADDIS ABABA ETHIOPIA

**By**

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## Abstract

**Background**:-Chronic respiratory symptoms including chronic cough, chronic phlegm, wheezing, shortness of breath, and chest pain are manifestations of respiratory problems which are mainly evolved as the result of occupational exposures. Workers engaged in manufacturing, research and development of pharmaceuticals are potentially exposed to drug substances and also to chemical precursors that are potentially hazardous to health.

**Objective**:-To assess determinants of chronic respiratory symptoms among pharmaceutical factory workers.

**Methods: -**A case control study was done among 453 pharmaceutical factory workers with 151 cases and 302 controls. Cases were workers who had chronic respiratory symptom/s within one year period in the pharmaceutical factories from February 2016 to February 2017. Controls were workers who had no any chronic respiratory symptom/s within one year period in the pharmaceutical factories from February 2016 to February 2017. Prior to the actual data collection, a base line survey was conducted for one week to identify source of cases and the controls from each site. Study subjects were selected using simple random sampling technique. Data was collected using pretested and structured questionnaire by trained data collectors. Descriptive statistics, bivariate logistic and multivariate logistic regression analysis was done to see association between determinant factors and chronic respiratory symptoms.

**Result**: Workers' Previous history of chronic respiratory diseases (AOR 3.36, 95%CI (1.85 - 6.12)), family history of chronic respiratory diseases (AOR=2.55, 95% CI, (1.51 - 4.32)), previous dusty working environment (AOR=2.26, 95% CI, (1.07 - 4.78)), ever smoking (AOR 3.66, 95%CI (1.05 - 12.72)) and service year (AOR = 1.86, 95 % CI = (1.16 – 2.99)) showed statistically significant association with chronic respiratory symptoms among pharmaceutical factory workers.

**Conclusion and recommendation**: previous history of respiratory diseases, family history of chronic respiratory diseases, previous dusty working environment, ever cigarette smoking, and service year were determinants of chronic respiratory symptoms of the workers in pharmaceutical factory. Public health endeavors to prevent the burden of chronic respiratory symptoms in the pharmaceutical factories should target reduction of adverse workplace exposures and discouragement of ever smoking.

**Key word**: Chronic respiratory symptoms, socio demographic, behavioral, environmental and occupational factors and pharmaceutical factory worker.

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## Acronyms

**API:** Active pharmaceutical ingredients

**CI**: Confidence interval

**COPD**: chronic obstructive pulmonary disease

**COR**: Crude Odds Ratio

**CRDs**: Chronic respiratory diseases

**CRS**: Chronic respiratory symptoms

**EPI Info**: Epidemiological Information

**ILO** -International Labor Organization

**IRB**- Institutional review board

**OA**- Occupational asthma

**PI**: Principal Investigator

**PPE**: Personal Protective Equipment

**TVET**: Technical and vocational education training

**WHO:** World Health Organization

# 1. Introduction

## 1.1. Background

Chronic respiratory symptoms are defined as the development of one or more of the symptom/s of chronic cough, chronic phlegm, chronic wheezing, chronic shortness of breath and chronic chest tightness which last/s at least three months in one year(1). At least one of these symptoms can be the manifestation of chronic respiratory diseases. Chronic respiratory diseases are a group of chronic diseases affecting the airways and the other structures of the lungs. Some of the most common are chronic obstructive pulmonary disease (including, bronchitis and emphysema), asthma, pneumoconiosis and chronic rhinosinusitis(2).

Worldwide non-communicable diseases are the leading cause of mortality which accounts for 82% of deaths and among those non communicable diseases, chronic respiratory diseases such as, asthma and chronic obstructive pulmonary diseases accounted for 4million or 10.7% deaths according to World Health Organization (WHO) report of 2012(3).

In 2011, International labor organization (ILO) reported that occupational respiratory diseases accounted for up to 30% of all registered work related diseases and 10-20% of deaths were caused by respiratory problems. Workers in high risk sectors such as mining, construction, and dust generating works have 50% prevalence of occupational respiratory diseases(4). In Great Britain, there are about 12,000 deaths each year due to occupational respiratory diseases, about 2/3 of which were due to dust related diseases(5).

Undesired pharmacological or other adverse health effects can occur during the development and manufacture of drugs in the pharmaceutical industries if exposure in the workplace is not adequately controlled. There are rare reports regarding adverse health effects resulting from occupational exposure to chemical intermediates handled during the manufacture of the active pharmaceutical ingredient. Many later-stage intermediates have the potential to exhibit classic toxicological effects more typical of industrial chemicals(6).

Workers employed in the manufacture of drug substances can be exposed to active pharmaceutical ingredients designed with the express intention of an interaction with the human system and modification of its functioning. Whilst such modification is generally desirable in patients, any modification in function, whether positive or negative, is an unacceptable outcome in the pharmaceutical industry worker(7).

Little is known about the health risks of working in the pharmaceutical industry. The manufacturing of drugs may involve exposure to toxic industrial chemicals. While the finished products may be lifesaving medications for sick people, they can be dangerous to healthy workers who are inhaling or absorbing them during the production process(8).

## 1.2. Statement of the problem

Chronic respiratory diseases represent a public health problem in both developed and developing countries because of their health and economic impacts(9). Occupational and environmental exposures increase the risk of asthma, COPD, and other respiratory diseases. These respiratory diseases are predicted to become the third leading cause of death by 2020, according to the WHO. Epidemiological studies have identified high-risk occupations and harmful exposures, but there are still many unknown workplace exposures causing respiratory problems(10).

The prevalence of asthma and other respiratory illnesses and symptoms in populations vary widely according to environmental factors, with occupational exposures being among the most important(11). Airborne dusts are of particular concern because they are well known to be associated with classical widespread occupational lung diseases such as the pneumoconiosis, chronic obstructive pulmonary disease, occupational asthma, etc. Occupational exposure to dust particles occurs everywhere but is especially prevalent in low- and middle-income countries(12).

Workers employed in manufacturing, research and development of pharmaceuticals are potentially exposed to drug substances in the workplace that are designed to modify physiology and also to chemical precursors that are potentially hazardous to health(6). General epidemiological studies of pharmaceutical industry workers have been done in Europe and the United States. The results include a higher prevalence of hypertension and chronic bronchitis among long-term Serbian plant employees, and fewer capable of working(13).

Allergies are relatively common in drug production, research and development jobs in relation to exposure to several compounds. Numerous cases of allergic rhinitis, asthma and anaphylaxis have been reported after inhaling seed powder of *Povata* seed, particularly from powdered laxatives(14). Penicillin and cephalosporin antibiotics and enzymes (serratial peptidase and lysozyme Chloride) have been particularly implicated to cause respiratory sensitization. Therapeutic chemical agents such as cimetidine, salbutamol, lisinopril, α-methyldopa, and opiates also cause respiratory sensitization(7).

Active pharmaceutical ingredients (APIs) could be risk factors for workers exposed in pharmaceutical industries. Indeed, APIs are compounds specifically designed to interact with human organism and to modify its functioning, and some of them could act as carcinogens or sensitizers, for whom a safe threshold cannot be easily determined. Inhalation is the most important route of exposure. Occupational exposure limits are needed to protect workers' health, both concerning APIs and pharmaceutical intermediates. Now a day, several approaches have been suggested to set acceptable daily exposure limits in pharmaceutical industries, and they are a key point especially for carcinogens, sensitizers or endocrine disruptors. Despite literature evidence is sparse, occupational risks in pharmaceutical industries cannot be disregarded; several adverse health effects have been observed. In recent years, the quality of

air in pharmaceutical industries has improved, even though a special attention has to be paid to exposures to carcinogens and sensitizers(15).

In Ethiopia, there is no systematic recording of occupational chronic respiratory disorders among workers in pharmaceutical factory. Respiratory disorders in these workers were high due to a number of different factors and great emphasis was not given before to control and prevent the problems due to lack of scientific information. Therefore, the goal of this study was to assess the determinants of chronic respiratory symptoms among pharmaceutical factory workers in Addis Ababa.

### 1.3. Rational of the study

In most developing countries like Ethiopia, occupational morbidity and mortality are becoming a serious public health problem. Workers of the pharmaceutical industry face a broad spectrum of workplace hazards including chemical, physical, ergonomic, biological, work-related stressors and safety and mechanical hazards. Even though evidence based occupational health and safety services are extremely important, studies showing factors of occupational respiratory symptoms and diseases in pharmaceutical industry are scarce. The finding of this study will help to contribute in filling information gaps on the existing occupational health and safety service practice that applies for the development of effective preventive strategies so that morbidity, disability and death among pharmaceutical factory workers are minimized and this in turn, improved the production capacity of the Company. It will also use as baseline information for policy makers and other researchers.

# 2. Literature review

## 2.1. Epidemiology of chronic respiratory symptoms and diseases

### 2.1.1 Magnitude of chronic respiratory symptoms and diseases

Globally, hundreds of millions of people are burdened with chronic respiratory conditions; four million people die prematurely from chronic respiratory diseases each year(16). In general, the prevalence of CRD is increasing everywhere and in particular amongst children and the elderly(17). The burden of CRD has major adverse effects on the quality of life and disability of affected individuals. It has been predicted that the global burden of CRD will increase considerably in the future, even though many preventable and treatable CRDs including chronic obstructive pulmonary disease (COPD), asthma, and respiratory allergies can be controlled with adequate management in both developed and developing countries(18).

Research has found that occupational asthma (OA) is one of the leading causes of occupational lung diseases(19). Several case reports and a few surveys demonstrate that OA may occur among production workers especially in the manufacture of antibiotics and enzymes. Thirteen case reports document inhalation of dust from antibiotics and the occurrence of OA in a total of 53 workers (20-23). Most exposed workers developed symptoms within one year of exposure in seven of the 11 reports with data on latency. A systematic review of 23 case reports showed that the 21 of 37 (58.3%) cases developed symptoms within one year of exposure(20). Four types of enzymes (papain, bromelain, pepsin, and lactase) were found to be associated with 37 cases of OA documented in five investigations: The majority of these OA cases occurred within 1½ years of exposure(20, 24).

In a survey of 64 workers exposed to psyllium (isphagula), which is a bulk laxatives, 27 (42.2%) reported OA symptoms that occurred after an exposure that lasted a few hours to six months; however, these workers developed symptoms within two months of exposure. Another survey of 130 workers at a pharmaceutical plant that manufactured psyllium, 39 workers reported symptoms that were suggestive of occupational asthma. Marks et al. examined 125 psyllium-exposed workers and compared their respiratory symptoms and sensitization to psyllium to a

reference population of 738 randomly selected adults from the local community. Exposed workers had a higher prevalence of respiratory and skin symptoms than the reference population (52.0% vs. 43.3%). Workers who were sensitized to psyllium were more likely to develop symptoms if they were current smokers(20, 25).

A survey was done on workers handling powdered drugs in a pharmaceutical factory. Among 24 workers, 9 handled powdered drugs (A group), 5 handled the same in the past and had already been transferred to other sections for their symptoms (B group), 3 engaged in the process of capsule-filling (C group) and 7 handled several times occasionally during one year (D group). Their average months spent in handling powdered drugs were, in the case of anti-inflammatory enzyme, A group 53.2, B group 66.2, and in the case of antibiotics, 5workers in A group 24.0, 2 workers in B group 7.0, 3 workers in C group 25.7. Twenty workers complained of symptoms which were mainly irritation of mucosa including the respiratory system and itching of the skin while they were working, and accelerated nasal discharge, urticaria and asthma after working. Group A and group B were higher than group D in the rate of respiratory complaints (p less than 0.001). Fourteen workers pointed out anti- inflammatory enzyme as a cause of main symptoms, 7 workers flufenamic acid, 3 workers flopropion, 4 workers antibiotics(26)

### 2.1.2 Risk factors for chronic respiratory symptoms and diseases

In developing countries, where effective air pollution abatement techniques are lacking, people are continually exposed to substances that can have negative health effects in both the short and long term. Various risk factors have been associated with chronic respiratory diseases, including gender, socio-economic status, tobacco smoking habits, occupational environment and polluting fuel used for residential cooking/heating(27).

A study done in Croatia in pharmaceutical company indicated that pharmaceutical workers might be at risk for the development of respiratory problems as a result of their work environment. A significantly higher prevalence of chronic respiratory symptoms was recorded among workers (compared to controls), the highest being for sinusitis, nasal catarrh, and dyspnea. There was also a high prevalence of acute symptoms recorded during the work shift. Odds ratio showed

that the most significant risk factors for these respiratory findings were smoking and length of time worked in the pharmaceutical industry, particularly in men(28).

Research finding showed that there was higher prevalence for all chronic respiratory symptoms in exposed than in unexposed workers particularly among women, a majority of which were nonsmokers. Logistic regression analysis indicated that the presence of chronic respiratory symptoms among exposed workers was primarily associated with the amount of smoking. Additionally, there was high prevalence of acute symptoms during the work shift. Among the chemical workers these were greatest for eye irritation (male: 43.9%; female: 51.9%), dryness of the throat (male: 43.4%; female: 57.0%) and irritation of the throat (male: 37.4%; female: 56.6%). In particular nonsmoking women exhibited abnormal lung function. The effect of smoking among exposed workers was demonstrated on all ventilatory capacity tests by regression analysis for all measured respiratory parameters. Both length of exposure and age were correlated with lung function loss for forced vital capacity(29).

A study was performed in 17 female workers employed in a latex glove manufacturing plant. The prevalence of chronic respiratory symptoms was greater among latex workers than among control confectionery packer workers, varying from 5.9% (vs. 0% in controls) for occupational asthma to 58.8% (vs. 0% in controls) for dyspnea grades 3 or 4. There was also a high prevalence of acute work-related symptoms in this industry, in particular, eye irritation (76.5%), dryness of the nose (70.6%), throat burning (70.6%), dryness of the throat (64.7%), and cough (58.8%). The data suggest that in addition to occupational asthma, the manufacture of latex gloves is associated with frequent, nonspecific respiratory findings(30).

A random sample of 8,515 white adults residing in 6 cities in the eastern and mid-western United States were used to examine the relationships between occupational exposures to dust or to gases and fumes and chronic respiratory symptoms; 31% of the population had a history of occupational dust exposure and 30% reported exposure to gas or fumes. After adjusting for smoking habits, age, gender, and city of residence, subjects with either occupational exposure had significantly elevated prevalence of chronic cough, chronic phlegm, persistent wheeze, and breathlessness. The adjusted relative odds of chronic respiratory symptoms for subjects

exposed to dust ranged from 1.32 to 1.60. Subjects with gas or fume exposure had relative odds of symptoms between 1.27 and 1.43 when compared with unexposed subjects. Occupational dust exposure was associated with a higher prevalence of chronic obstructive pulmonary disease as defined by an FEV 1/FVC ratio of less than 0.6, when comparing exposed and unexposed participants (OR = 1.53, 95% CI = 1.17 − 2.06). Gas or fume exposure was associated with a small, but not significant, increase in COPD prevalence. Significant trends were noted for wheeze and phlegm with increasing duration of dust exposure. Although 36% of exposed subjects reported exposure to both dust and fumes, there was no evidence of a multiplicative interaction between the effects of the individual exposures. Smoking was a significant independent predictor of symptoms, but did not appear to modify the effect of dust or fumes on symptom reporting(31).

Data from a random sample of 3,606 adults 40 to 69 years of age residing in Beijing, China, were analyzed to investigate the association of reported occupational exposures to dusts and gases/fumes with the prevalence of chronic respiratory symptoms and level of pulmonary function. The prevalence of occupational dust exposure was 32%, and gas or fume exposure, 19%. After adjusted for age, sex, area of residence, smoking status, coal stove heating, and education, an increased prevalence of chronic phlegm and breathlessness was significantly related to both types of exposures. Chronic cough was significantly related only to dust exposure, and persistent wheeze only to fume exposure. The global estimates of the relative odds of the two symptoms were 1.30 (95% CI (1.09 to 1.48)) and 1.27 (95% CI 1.09 to 1.48), respectively, for dusts and for gases/fumes. These two occupational exposures are associated with chronic respiratory symptoms independent of smoking, gender, and each other. There was an increasing prevalence of each symptom with increasing dust and fume exposure, represented by the index of cumulative exposure duration and exposure intensity. Linear trends for increased prevalence of chronic bronchitis and breathlessness were significant both current and former smokers appeared to be more susceptible to the effect of dusts than the never smokers(32).

## 2.2. Safety precautions and Regulations

The precautionary principle is a more appropriate public health approach to assessing hazards and making decisions about preventive action. Occupational exposure limits (OELs) are a key component of the quantitative risk assessment/cost-benefit approach to occupational health. Official and unofficial standards for airborne chemicals, they usually are set by governments (sometimes after advice from a multi-stakeholder committee), industry associations, and/or an employer. OHS specialists and enforcement officials use them to judge acceptable levels of airborne chemicals and some other hazards(33).

Worker health and safety risks during pharmaceutical manufacturing are created by exposures to airborne dusts and may occur during dispensing, drying, milling and blending operations. Exposure to pharmaceutical products is a particular concern when mixtures containing high proportions of active drug substances are handled or processed. Wet granulation, compounding and coating operations may create high worker exposures to solvent vapour(34).

As dusts are a major hazard in many pharmaceutical production processes, to complement control banding, some U.S. researchers are developing methods to evaluate how dusty pharmaceutical powders are, given the small amounts of an API available in research and development and early production phases (35). National Institute for Occupational Safety and Health (NIOSH) is starting to consider control banding as a basis for their recommendations(36).

Workplace control measures such as use of respirators (e.g., dust and organic vapour masks and, in some cases, powered air-purifying respirators or air-supplied masks and suits) and personal protective equipment (PPE); and worker training on workplace hazards and safe work practices should be applicable during the various pharmaceutical manufacturing operations. Specific issues involve substituting less hazardous materials whenever possible during drug development and manufacturing. Also, minimizing material transfers, unsealed or open processing and sampling activities decrease the potential for worker exposures(34).

A study done in Ethiopia showed that PPE use was not statistically significant in relation to the occurrence of chronic respiratory symptoms(1). A study done in Nigeria showed that no

significant difference was detected for the prevalence of other respiratory symptoms between the users and nonusers of facemasks (37).

## 2.3. Conceptual framework

To identify the factors associated with chronic respiratory symptoms in the study setting, it is necessary to use conceptual framework. The complex hierarchical interrelationship between determinant factors for the outcome variable is best managed through the use of conceptual framework(38). Conceptual framework provides guidance for the use of multivariate techniques and aids the interpretation of their results in light of social and biological knowledge.

Chronic respiratory symptoms are determined by a number of factors. The factors associated with chronic respiratory symptoms can be socio-demographic factors (like age, sex, religion, marital status, education status, employment condition, income), behavioral factors (such as smoking, alcohol drinking, khat chewing, use of PPE) and working environment and occupational factors (like working department, training, working hours per week, and service year in the department).

These factors directly or indirectly influence the development of chronic respiratory symptoms. Working environment and occupational factors are hypothesized as immediate determinant that directly influence the development of chronic respiratory symptoms while past occupational and disease history and behavioral factors are intermediate determinant that directly and indirectly affect respiratory health. Socio-economic and demographic factors are distal determinant which directly and indirectly influence the development of respiratory symptoms as shown in figure 1 below.

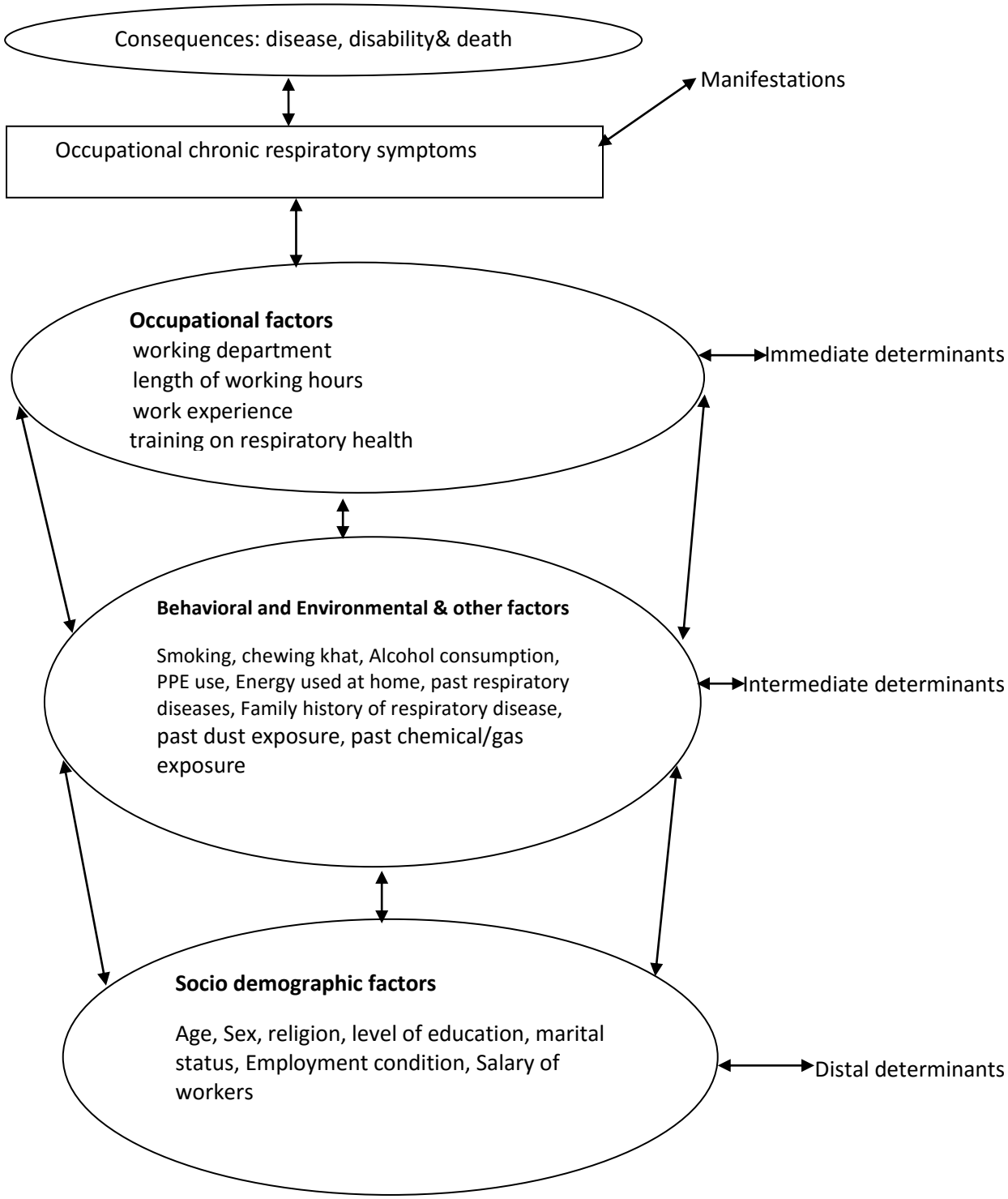


Figure 1 Conceptual Framework for determinants of CRS in pharmaceutical factories adapted from the literatures review.

## Research question

Does occupational exposure for greater than five years in pharmaceutical factory cause chronic respiratory symptoms?

## Hypothesis

HA: There is association between occupational exposure for greater than five years in pharmaceutical factory and chronic respiratory symptoms

## 3. Objective

**General objective**: -

To assess determinants of chronic respiratory symptoms among pharmaceutical factory workers

**Specific objectives**

- ✓ To determine the association between socio-demographic factors of pharmaceutical factory workers and chronic respiratory symptoms
- ✓ To determine the association between behavioral factors of pharmaceutical factory workers and chronic respiratory symptoms
- ✓ To determine the association between environmental and occupational factors of pharmaceutical factory workers and chronic respiratory symptoms

# 4. Methods

## 4.1. Study area and Period

The study was conducted in four pharmaceutical factories in Addis Ababa Ethiopia from February - April, 2017. The factories manufacture a number of products of different therapeutic categories including antibiotics, gastrointestinal drugs, cardiovascular drugs, central nervous drugs, anti-diabetic agents, analgesics, antihistamines, antehelmitics, antiprotozoals, dermatological preparations, minerals and vitamins.

Factory A has a total of 435 employees from which 330 of them work in research and development, production and quality control departments.

Factory B has a total of 195 employees from which 155 of them work in research and development, production and quality control departments.

Factory C has a total of 154 employees from which 120 of them work in research and development, production and quality control departments.

Factory D has a total of 179 employees from which 125 of them work in research and development, production and quality control departments.

## 4.2. Study design

Institution based unmatched case control study design was conducted to assess determinants of chronic respiratory symptoms among pharmaceutical factory workers.

## 4.3. Source population

All workers of Pharmaceutical factories in Addis Ababa were the source population.

## 4.4. Study population

The study population were all employees of the selected pharmaceutical factories working in the production, quality control, research and development departments with the following cases and controls definitions. Cases were workers who had chronic respiratory symptom/s within one year period in the pharmaceutical factory from February 2016 to February, 2017. Controls were workers who had not any chronic respiratory symptom/s within one year period in the factory from February 2016 to February, 2017. A structured respiratory symptom questionnaire was used to identify cases and controls (39, 40).

Workers working in marketing department and other managerial working area were excluded from the study assuming that they were less exposed for occupational chronic respiratory disease. Employees who were absent from work for more than 3 times of visit at the time of data collection were not included. Workers having work experience of below one year were excluded from the study.

### 4.5. Sample size determination

Sample size was calculated by using EPI-INFO version 7 statistical software's statCalc program for unmatched case control study design by considering 20% exposed for greater than 5 years work experience among the control group from the previous study(1). With an assumption of one-to-two case-to-controls ratio; a minimum detectable odds ratio of 2 at 95% confidence interval, and 80% power of the study. Sample size determination for proportion in two populations was used.

$$n = \left(\frac{r + 1}{r}\right) \frac{(\bar{p})(1 - \bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

n= sample size in the case group

r=ratio of controls to cases

$P_1$= Percent of cases exposed

$P_2$= Percent of control exposed for greater than 5 years work experience = 20%

$\bar{P} = (P_1 + rP_2)/1+r$

$Z\alpha_{/2}$ = 95% degree of confidence interval; $\alpha = 0.05$; $Z\alpha_{/2} = 1.96$

$Z_{\beta}$ = 80% power of the study; $(1-\beta) = 0.84$

Case: control ratio = 1: 2

Therefore by considering the above assumption, the sample size was determined. 137 cases and 274 controls was calculated and 10% none response rate was added both for cases and controls; finally a total of 453 study participants (151 cases and 302 controls) were included in the study.

## 4.6. Sampling Procedure

There are nine pharmaceutical manufacturing factories in Addis Ababa. From these, four factories were purposively selected because they had greater number of staff and have been producing relatively huge quantities of pharmaceuticals. Working departments which were included in the study were research and development, production and quality control department. Eligible study participants were identified by using workers' data obtained from human resource managers in each factory. The study samples that have been determined in the sample size determination were distributed in the four factories according to proportion number of workers (fig 2). Prior to the actual data collection, a baseline survey (which used structured respiratory symptom questionnaire) was conducted for one week to identify source of cases and the control groups from each factory. Then a sampling frame was prepared for both cases and the control group for each factory based on survey data. The study subjects were selected by using simple random sampling technique (lottery method) from the sampling frame and by deriving an assumption that determinant factors of chronic respiratory symptoms were homogeneous in the factories.

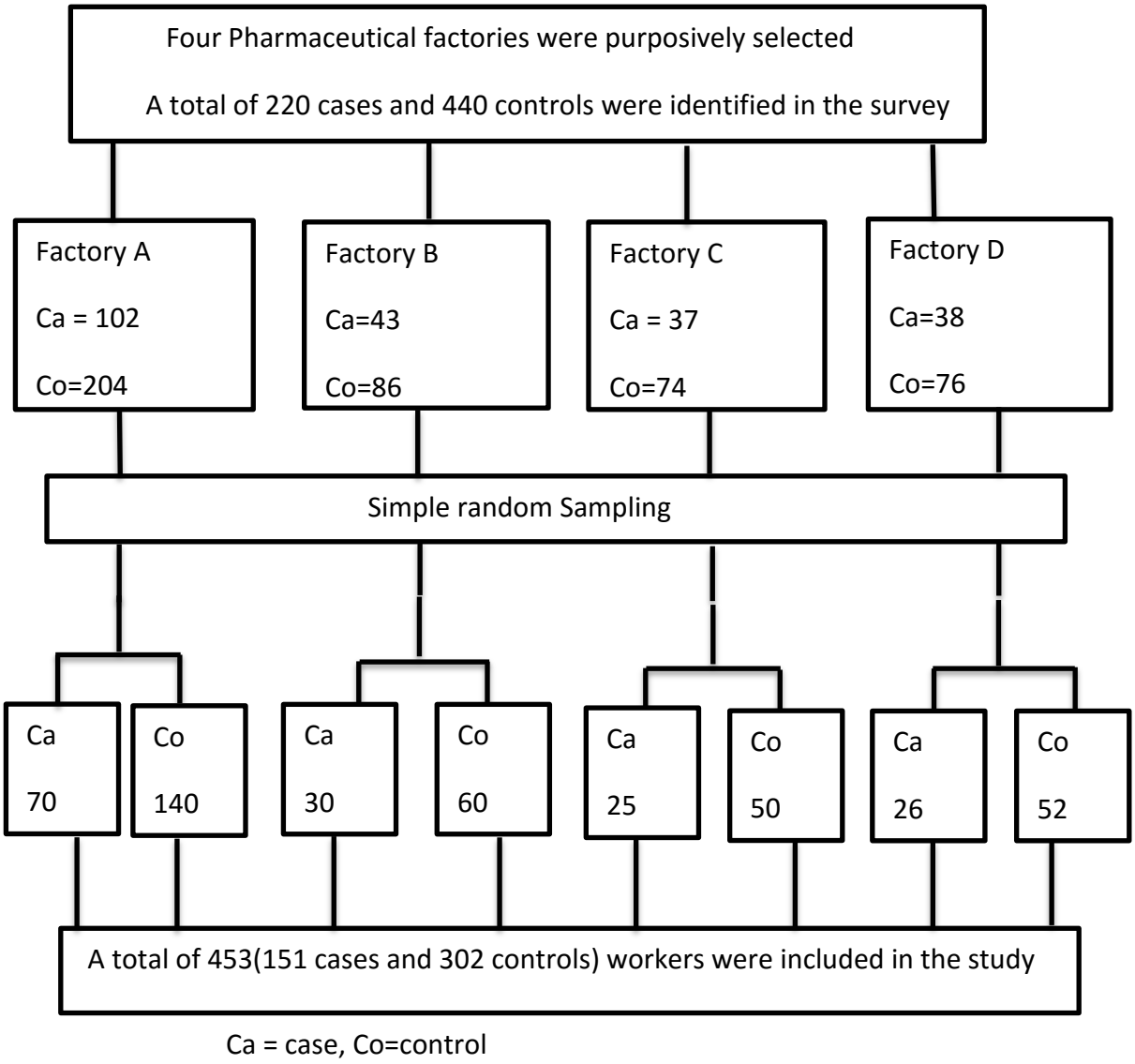


**Figure 2 Schematic presentation of sampling techniques**

## 4.7. Data collection method

### 4.7.1. Study Variables

**Dependent variable**: chronic respiratory symptoms

**Independent variables**:

**Socio-demographic factors**: sex, age, religion, level of education, marital status, salary of workers and employment condition.

**Behavioral factors**: smoking, drinking alcohol, khat chewing, Use of personal protective equipment

**Occupational and Environmental factors**: working department, length of working hours, work experience, training on respiratory health, and energy used at home.

**Occupational history**: past dust exposure, past chemical/gas exposure.

**Family history of chronic respiratory diseases**: chronic bronchitis, emphysema, chronic sinus, tuberculosis (TB), heart disease, asthma and lung cancer

**Past chronic respiratory diseases:** chronic bronchitis, emphysema, chronic sinus, tuberculosis (TB), heart disease, asthma and lung cancer.

### 4.7.2. Operational definitions

- Chronic respiratory symptoms: The development of one or more of the symptom/s of chronic cough, chronic phlegm, chronic wheezing, chronic shortness of breath and chronic chest tightness which last/s at least three months in one year.
- Chronic Cough: Experience of cough as much as 4–6 times per day occurring for most days of the week (≥four days) for at least three months in one year.
- Chronic Phlegm: It is sputum expectoration as much as twice a day for most days of the week (≥4 days) for at least three months in one year.
- Chronic Wheezing: A condition of causing a wheezy or whistling sound during inspiration/expiration at least three months in a year occasionally apart from that caused by a cold or acute upper respiratory infection.
- Chronic Chest tightness: In the past one year, chest pain that kept off work with phlegm.
- Chronic Shortness of breath: It is divided into 5 grades with the following definitions:

- Grade 0: No breathlessness except with strenuous exercise;
- Grade 1: Breathlessness when hurrying on the level ground or walking up a slight hill at least three months in a year.
- Grade 2: Walking slower than people of the same age on the level because of breathlessness or need to stop for breath when walking at own pace or level at least three months in a year.
- Grade 3: Stopping for breath after walking about a certain distance or a few minutes on the level ground at least three months in a year.
- Grade 4: Too breathless to leave the house or breathless when dressing or undressing at least three months in a year.

- Past dust exposure: any work experience on dusty environment before the current working position.
- Past chemical/gas exposure: any work experience on chemical/gaseous environment before the current working position.
- Family history of chronic respiratory diseases: the presence of one or more of the chronic disease/s of chronic bronchitis, tuberculosis (TB), heart disease, chronic sinus, asthma and lung cancer in either of natural parents(Mother or Father) and identified by physicians.
- Past chronic respiratory diseases: one or more of respiratory disease/s like chronic bronchitis, tuberculosis (TB), heart disease, chronic sinus, asthma and lung cancer that could be developed before the current working position and identified by physicians.
- Smoking behavior :

  Never smokers: workers who used no cigarette.

  Current smokers: workers who smoked at the time of the study or had stopped smoking less than one year before.

  Ex-smokers: workers who had quit at least 1 year before the study.

  Ever smoker: worker who has smoked at least one hundred cigarettes during the course of his/her life. It includes current smokers and ex-smokers.

Personal Protective Equipment (PPE): Utilization of the worker-specialized clothing or equipment worn by employees for protection against health and safety hazards.

### 4.7.3. Measurement tool

Pretested and structured questionnaire was used. The questionnaire used was a modified version of the British Medical Research Council respiratory questionnaire and American Thoracic Society and National Heart & Lung Institute - Division of Lung Disease Respiratory questionnaire (41, 42). It contains questions on socio-demographics, respiratory symptoms, behavioral, occupational and environmental variables. The questionnaire was translated from English to Amharic and back to English.

The questions on demographic characteristics include sex, age, educational level, religion, marital status, employment condition and salary of workers. The study participants were asked about respiratory symptoms mainly cough, phlegm, shortness of breath, wheezing, and duration of respiratory symptoms. For the respiratory symptoms within the last one year, the study subjects were classified as having chronic cough if they answered yes to all of the following five questions: Have you had cough on most time in the last 12 months?, Have you had cough on most time as much as 4 to 6 times a day, 4 or more days out of the week in the last 12 months?, Have you had cough at all on most time on getting up, or first thing in the morning in the last 12 months?, Have you had cough at all on most time during the rest of the day or at night in the last 12 months?, Have you had cough on most time like this on most days for 3 consecutive months or more during the year?. The study participants were classified as having dyspnea within the last one year if they answered “yes” to “Have you troubled by shortness of breath when you were walking at your own pace on level ground?” (37). They were classified as having a wheeze within the last one year if they had ever experienced a whistling sound from the chest.

The participants were also asked about their previous history of respiratory diseases, family history of chronic respiratory diseases and about their past dust, chemical/gaseous working environment. The workers were interviewed about their personal behavioral regarding use of respiratory protective devices, khat chewing, smoking and alcohol consumption. The study participants were also asked about their occupational and environmental variable questions

including their working department, length of working hours, work experience, training on respiratory health, and energy used at home.

### 4.7.4. Data Collection procedure

Data was collected using pretested and structured Amharic version questionnaire via face to face interview of the study participants after getting ethical clearance from responsible bodies and informed verbal consent from study subjects. Based on the pretest, necessary modification was done on the questions and participants who involved in the pretest were excluded in the actual data analysis. The questionnaire focused on socio-demographic, behavioral, and environmental variables. Data collection was administered by trained data collectors after two-days training.

### 4.7.5. Data Management and Quality Control

The questionnaire was prepared originally in English and translated to Amharic and back to English to keep the consistency of the questionnaires. Training of the data collection team (data collectors and supervisor) on all aspect of data collection tools, questioning techniques, ethical issues, role played on how to fill the questionnaire with pretesting in 5% of the sample size before the actual study were made for two days to ensure the possible quality of the data. Based on the pretest results, the questionnaire was additionally adjusted quantitatively, contextually and terminologically, and administered on the study population. On each day of data collection, the completed questionnaires were handled by the supervisor. The data collected at the factory were checked daily for completeness, clarity and logical consistency by the investigator and supervisors. Incorrectly filled or missed ones were sent back to data collectors for correction. Anything, which was unclear and ambiguous, was corrected on the next day. Five percent of the samples were rechecked by the supervisor whether the interviewers have done their job correctly or not. Before the actual data processing, 5% of the collected data was entered to EPI INFO 7 software package twice by the principal investigator to verify proper entry and to maintain the quality of data.

### 4.8. Data processing and analysis

After the completion of data collection, the raw data was entered in to a computer using EPI INFO 7 version computer software package for editing, cleaning, coding, and check completeness and consistency. Finally, the data was exported to Stata version 14 for data management and analysis. Descriptive statistics, bivariate logistic and multivariate logistic regression analysis were done to see association between determinant factors and chronic respiratory symptoms. Crude odds ratio with 95% confidence intervals and significance level at P< 0.05 was used to see the association between determinant factors and chronic respiratory symptoms. Variables with 95% confidence interval and P value at <0.05 during the bivariate analysis were included in the multivariate logistic regression analysis to see the relative effect of confounding and interaction of variables. Adjusted odd ratios with 95% confidence interval were calculated. The data was presented by tables and statements.

### 4.9. Ethical consideration

The study was approved by Addis Ababa University, school of Public Health ethical clearance committee. Before data collection, a formal letter from Addis Ababa University, School of Public Health ethical clearance committee was submitted to the relevant and concerned bodies to the pharmaceutical factories. Verbal consent from each study subjects was obtained after clear explanation on the purpose of the study. To this end, the right of each respondent to refuse, answer for few or all questions were respected. Confidentiality was maintained by omitting their names and personal identification, never be used in connection with any information and it would not be revealed to anyone except the principal investigator and assistants and was kept and locked with key in the entire study period. Privacy was maintained by arranging quite place for interviewer and study participant to protect them exposing other parties according to the choice of the respondent ensuring visual and auditory privacy throughout the data collection time.

### 4.10. Dissemination of findings

The finding of the study was disseminated to Addis Ababa University School of Public Health, Pharmaceutical factories, Ministry of industry and Ministry of Labor and Social affairs. Effort will be exerted to publish the study findings on local/ international journal.

# 5. Result

## 5.1. Socio demographic characteristics

A total of 453 participants with 151 cases and 302 controls were interviewed. From these, 83(55.0%) of cases and 157(52.0%) of controls were female workers; 102(67.5%) of cases and 228(75.5%) controls were below the age of 30 years. The religion frequency distribution showed that 109(72.2%) of cases and 228(75.5%) of controls were Orthodox. Relatively large number of participants in both cases 94(62.0%) and controls 211(69.9%) were single. 63(41.7%) of cases and 114(37.7%) of controls had educational status of TVET and Diploma. Concerning employment condition, 121(80.1%) of cases and 216(71.5%) of controls were permanent employee. One hundred one (66.9%) cases and two hundred four (67.5%) controls earned below the mean monthly salary of the workers (2625 ($\pm$1980.75) Ethiopian birr). (Table1)

Table 1 Distribution of Socio-Demographic characteristics of participants in Pharmaceutical factories in Addis Ababa, Ethiopia, May, 2017

| Socio demographic variables | Case (n=151) (%) | Control (n=302) (%) | Total (%) | P-value |
|---|---|---|---|---|
| Sex | | | | |
| Female | 83(55.0) | 157(52.0) | 240(53) | 0.549 |
| Male | 68(45.0) | 145(48.0) | 213(47) | |
| Age group | | | | |
| <30 years | 102(67.5) | 228(75.5) | 330(72.8) | |
| ≥30 years | 49(32.5) | 74(24.5) | 123(27.2) | 0.074 |
| Religion | | | | |
| Orthodox | 109(72.2) | 228(75.5) | 337(74.4) | 0.114 |
| Catholic | 3(2.0) | 1(0.3) | 4(0.9) | |
| Muslim | 15(9.9) | 28(9.3) | 43(9.5) | 0.150 |
| Protestant | 24(15.9) | 45(14.9) | 69(15.2) | 0.144 |
| Marital status | | | | |
| Married | 55(36.0) | 86(28.5) | 141(31.1) | 0.842 |
| Single | 94(62.0) | 211(69.9) | 305(67.3) | 0.925 |
| Widowed | 1(1.0) | 2(1.0) | 3(0.7) | |
| Divorced | 1(1.0) | 3(10.0) | 4(0.9) | 0.810 |
| Educational level | | | | |
| ≤ Grade 8 | 2(1.3) | 6(2.0) | 8(1.8) | |
| Grade 9-12 | 59(39.1) | 109(36.1) | 168(37.1) | 0.560 |
| TVET & Diploma | 63(41.7) | 114(37.7) | 177(39.1) | 0.543 |
| First degree & above | 27(17.9) | 73(24.2) | 100(22.1) | 0.902 |

| | | | | |
|---|---|---|---|---|
| Employment condition | | | | |
| Temporary | 30(19.9) | 86(28.5) | 116(25.6) | |
| Permanent | 121(80.1) | 216(71.5) | 337(74.4) | 0.049 |
| Monthly Salary in ETB | | | | |
| ≤2625 | 101( 66.9) | 204(67.5) | 305(67.3) | |
| >2625 | 50(33.1) | 98(32.5) | 148(32.7) | 0.887 |

## 5.2. Previous and Family history of CRDs, past dust and chemicals/gas working environment

From the study participants, 40(26.5%) of cases and 25(8.3%) of controls had reported the presence of chronic respiratory diseases identified by physicians before they started working in their current pharmaceutical factory job. Family history of chronic respiratory disease was reported by 45(29.8%) cases and 37(12.3) controls.

The study revealed that, 60(39.7%) of cases and 65(21.5%) of controls had worked in dusty working environment before they started working their current job; 48(31.8%) cases and 52(17.2%) controls had exposed to chemicals/gas working environment before they employed in the pharmaceutical factory (Table 2).

Table 2 Distribution of previous and family history of CRDs, past dust and chemicals/gas working environment of participants in Pharmaceutical factories in Addis Ababa, Ethiopia, May, 2017

| Variables | Case (n=151) (%) | Control (n=302) (%) | Total (%) | P-value |
|---|---|---|---|---|
| Previous history of chronic respiratory diseases | | | | |
| Yes | 40(26.5) | 25(8.3) | 65(14.3) | <0.0001 |
| No | 111(73.5) | 277(91.7) | 388(85.7) | |
| Family history of chronic respiratory disease | | | | |
| Yes | 45(29.8) | 37(12.3) | 82 (18.1) | <0.0001 |
| No | 106(70.2) | 265(87.7) | 371 (81.9) | |
| Previous dusty working environment | | | | |
| Yes | 60(39.7) | 65(21.5) | 125(27.6) | <0.0001 |
| No | 91(60.3) | 237(78.5) | 328(72.4) | |
| Previous Chemicals/gas working environment | | | | |
| Yes | 48(31.8) | 52(17.2) | 100(22.1) | 0.001 |
| No | 103(68.2) | 250(82.8) | 353(77.9) | |

### 5.3. Behavioral characteristics

In this study, 11(7.3%) of cases and 4(1.3%) of controls were ever smokers (current and ex-smokers). From the total ever smokers, 2(18.2%) cases and 2(50.0%) controls were current smokers. Eighty five (56.3%) cases and 159(52.6%) controls reported that they drank alcohol. From alcohol drinker, 60(70.6%) cases and 116(73.0%) controls drank occasionally. One hundred twenty nine (85.4%) of cases and 263(87.1%) of controls used personal respiratory protective material (Table 3).

Table 3 Distribution of behavioral factors of participants in Pharmaceutical factories in Addis Ababa, Ethiopia, May, 2017

| Behavioral factors | Case (n=151) (%) | Control (n=302) (%) | Total (%) | P-value |
|---|---|---|---|---|
| Ever smokers(current and ex-smokers) | | | | |
| Yes | 11(7.3) | 4(1.3) | 15(3.3) | 0.003 |
| No | 140(92.7) | 298(98.7) | 438(96.7) | |
| Current Smokers | | | | |
| Yes | 2(18.2) | 2(50) | 4(26.7) | 0.236 |
| No | 9(81.8) | 2(50) | 11(73.3) | |
| Alcohol drinking | | | | |
| Yes | 85(56.3) | 159(52.6) | 244(53.9) | 0.73 |
| No | 66(43.7) | 143(47.4) | 209(46.1) | |
| How often? | | | | |
| Everyday | 1(1.2) | 2(1.2) | 3(1.2) | |
| One-three days/week | 24(28.2) | 41(25.8) | 65(26.7) | 0.900 |
| Occasionally | 60(70.6) | 116(73.0) | 176(72.1) | 0.978 |
| Khat chewing | | | | |
| Yes | 19(12.6) | 25(8.3) | 44(9.7) | 0.147 |
| No | 132(87.4) | 277(91.7) | 409(90.3) | |
| How often? | | | | |
| Everyday | 1(5.3) | 1(4.0) | 2(4.5) | |
| One-three days/week | 6(31.6) | 6(24.0) | 12(27.3) | 1.000 |
| Occasionally | 12(63.1) | 18(72.0) | 30(68.2) | 0.782 |
| Use of Personal respiratory protective material | | | | |
| Yes | 129(85.4) | 263(87.1) | 392(86.5) | |
| No | 22(14.6) | 39 (12.9) | 61(13.5) | 0.627 |

### 5.4. Occupational and Environmental factors

From the respondents, 121 (80.1%) of cases and 214 (70.8%) of controls were working in the production department of the Pharmaceutical factories. Eighty (53.0%) cases and 171(56.6%) controls worked for more than 48 hours per week. Eighty five (56.3%) of cases and 77(25.5%) controls had work experience of greater than five years. One hundred eight (71.5%) cases and 204 (67.5%) controls used electricity as a source of energy in their home.

Table 4 Distribution of Occupational and Environmental factors of participants in Pharmaceutical factories in Addis Ababa, Ethiopia, May, 2017

| Occupational and Environmental factors | Case (n=151) (%) | Control (n=302) (%) | Total (%) | P-value |
|---|---|---|---|---|
| Working department | | | | |
| Research and development | 16(10.6) | 44 (14.6) | 60(13.2) | 0.753 |
| Production | 121 (80.1) | 214 (70.8) | 335(74.0) | 0.079 |
| Quality control | 14(9.3) | 44(14.6) | 58(12.8) | |
| Working hours per week | | | | |
| ≤ 48 hrs | 71(47.0) | 131(43.4) | 202(44.6) | |
| >48 hrs | 80(53.0) | 171(56.6) | 251(55.4) | 0.462 |
| Length of time worked | | | | |
| 1-5 years | 66(43.7) | 225(74.5) | 310(68.4) | |
| >5 years | 85(56.3) | 77(25.5) | 143(31.6) | <0.0001 |
| Training on respiratory health | | | | |
| Yes | 52(34.4) | 100(33.1) | 152(33.6) | 0.778 |
| No | 99(65.6) | 202(66.9) | 301(66.4) | |
| Energy used at home | | | | |
| Electricity | 108(71.5) | 204(67.5) | 312(68.9) | 0.377 |
| kerosene | 16(10.6) | 28(9.3) | 44(9.7) | 0.357 |
| Wood | 1(0.7) | 5(1.7) | 6(1.3) | |
| Charcoal | 26(17.2) | 65(21.5) | 91(20.1) | 0.536 |

### 5.5. Factors associated with chronic respiratory symptoms: Bivariate Analysis

#### 5.5.1. Association between socio-demographic factors and chronic respiratory symptoms

Sex, age group, religion, marital status, educational level and monthly salary of the workers did not show significant association with chronic respiratory symptoms in the bivariate analysis

(Table 5). Only employment condition of the workers had significant with association chronic respiratory symptoms. Permanently employed workers (COR: 1.61 95% CI: [1.01 - 2.57) were more likely to have chronic respiratory symptoms than temporary workers.

Table 5 Association between socio-demographic factors of pharmaceutical factory workers and CRS in Addis Ababa, Ethiopia, May, 2017

| Socio demographic variables | Case (n=151) (%) | Control (n=302) (%) | COR (95%CI) | P-value |
|---|---|---|---|---|
| Sex | | | | |
| Female | 83(55.0) | 157(52.0) | 1.13(0.76 -1.67) | 0.549 |
| Male | 68(45.0) | 145(48.0) | 1 | |
| Age group | | | | |
| <30 years | 102(67.5) | 228(75.5) | 1 | |
| ≥30 years | 49(32.5) | 74(24.5) | 1.48(0.96 - 2.28) | 0.074 |
| Religion | | | | |
| Orthodox | 109(72.2) | 228(75.5) | 0.16(0.02 - 1.55) | 0.114 |
| Catholic | 3(2.0) | 1(0.3) | 1 | |
| Muslim | 15(9.9) | 28(9.3) | 0.18(0.02 - 1.87) | 0.150 |
| Protestant | 24(15.9) | 45(14.9) | 0.18(.02 - 1.80) | 0.144 |
| Marital status | | | | |
| Married | 55(36.0) | 86(28.5) | 1.28(0.11 - 14.44) | 0.842 |
| Single | 94(62.0) | 211(69.9) | 0.89(0.08 - 9.95) | 0.925 |
| Widowed | 1(1.0) | 2(1.0) | 1 | |
| Divorced | 1(1.0) | 3(10.0) | 0.67(0.03 - 18.06) | 0.810 |
| Educational level | | | | |
| ≤ Grade 8 | 2(1.3) | 6(2.0) | 1 | |
| Grade 9-12 | 59(39.1) | 109(36.1) | 1.62(0.32 - 8.30) | 0.560 |
| TVET & Diploma | 63(41.7) | 114(37.7) | 1.66(0.33 - 8.46) | 0.543 |
| First degree & above | 27(17.9) | 73(24.2) | 1.11(0.21 - 5.84) | 0.902 |
| Employment condition | | | | |
| Temporary | 30(19.9) | 86(28.5) | 1 | |
| Permanent | 121(80.1) | 216(71.5) | 1.61(1.01 - 2.57) | 0.049 |
| Monthly Salary in ETB | | | | |
| ≤2625 | 101( 66.9) | 204(67.5) | 1 | |
| >2625 | 50(33.1) | 98(32.5) | 1.03(0.68 - 1.56) | 0.887 |

### 5.5.2. Association of Previous and Family history of CRD, past dust and chemicals/gas working environment with CRS

Workers who had previous history of chronic respiratory diseases (COR=3.99, 95%Cl = (2.31 - 6.89)) were more likely to have chronic respiratory symptom/s than those who had no the history. The odds of developing chronic respiratory symptom/s were significantly higher for those workers who had family history of chronic respiratory diseases (COR=3.04, 95%Cl = (1.86 - 4.96)) than those who had not.

Workers of the pharmaceutical factory who had previous dust exposure (COR=2.40, 95%Cl = (1.57 - 3.68)) were more likely to have chronic respiratory symptom/s than those workers who did not work in dusty environment. Past chemicals/gaseous exposure were also significantly associated with chronic respiratory symptoms. Workers who had worked in previous chemicals/gaseous working environment had the odds of developing chronic respiratory symptoms about 2 times more likely (COR = 2.24, 95 % CI, (1.42 - 3.53) than those who did not work.

Table 6 Bivariate analysis of factors and CRS among pharmaceutical factory workers in Addis Ababa city, Ethiopia, 2017

| Variables | Case (n=151) (%) | Control (n=302) (%) | COR (95%CI) | P-value |
|---|---|---|---|---|
| Previous history of respiratory diseases | | | | |
| Yes | 40(26.5) | 25(8.3) | 3.99(2.31 - 6.89) | <0.0001 |
| No | 111(73.5) | 277(91.7) | 1 | |
| Family history of chronic respiratory disease | | | | |
| Yes | 45(29.8) | 37(12.3) | 3.04(1.86 - 4.96) | <0.0001 |
| No | 106(70.2) | 265(87.7) | 1 | |
| Previous dusty working environment | | | | |
| Yes | 60(39.7) | 65(21.5) | 2.40(1.57 - 3.68) | <0.0001 |
| No | 91(60.3) | 237(78.5) | 1 | |
| Previous Chemicals/gas working environment | | | | |
| Yes | 48(31.8) | 52(17.2) | 2.24(1.42 - 3.53) | 0.001 |
| No | 103(68.2) | 250(82.8) | 1 | |

### 5.5.3. Association of behavioral factors with chronic respiratory symptoms

From behavioral determinant variables, ever cigarette smokers showed statistically significant association with chronic respiratory symptoms in the crude analysis. The odds of developing chronic respiratory symptom/s were significantly higher for those workers who smoke cigarette at any time in their life (COR=5.85, 95%Cl = (1.83-18.70)) than non-smokers. However, current smoking, alcohol drinking, khat chewing and use of personal respiratory protective material did not show significant association with chronic respiratory symptoms among pharmaceutical factory workers in Addis Ababa.

**Table 7 Bivariate analysis of behavioral factors and CRS among pharmaceutical factory workers in Addis Ababa city, Ethiopia, May 2017**

| Behavioral factors | Case (n=151) (%) | Control (n=302) (%) | COR (95%CI) | P-value |
|---|---|---|---|---|
| Ever smokers (current and ex-smokers) | | | | |
| Yes | 11(7.3) | 4(1.3) | 5.85(1.83-18.70) | 0.003 |
| No | 140(92.7) | 298(98.7) | 1 | |
| Current Smokers | | | | |
| Yes | 2(18.2) | 2(50) | 0.22(0.02 - 2.67) | 0.236 |
| No | 9(81.8) | 2(50) | 1 | |
| Alcohol drinking | | | | |
| Yes | 85(56.3) | 159(52.6) | 1.16(0.78 - 1.72) | 0.73 |
| No | 66(43.7) | 143(47.4) | 1 | |
| How often? | | | | |
| Everyday | 1(1.2) | 2(1.2) | 1 | |
| One-three days/week | 24(28.2) | 41(25.8) | 1.17(0.10 - 13.60) | 0.900 |
| Occasionally | 60(70.6) | 116(73.0) | 1.03(0.09 - 11.64) | 0.978 |
| Khat chewing | | | | |
| Yes | 19(12.6) | 25(8.3) | 1.60(0.85 - 3.00) | 0.147 |
| No | 132(87.4) | 277(91.7) | 1 | |
| How often? | | | | |
| Everyday | 1(5.3) | 1(4.0) | 1 | |
| One-three days/week | 6(31.6) | 6(24.0) | 1(0.05 - 19.96) | 1.000 |
| Occasionally | 12(63.1) | 18(72.0) | 0.67(0.04 - 11.72) | 0.782 |
| Use of Personal respiratory protective material | | | | |
| Yes | 129(85.4) | 263(87.1) | 1 | |
| No | 22(14.6) | 39 (12.9) | 1.15(0.66 - 2.02) | 0.627 |

### 5.5.4. Association of Environmental and occupational factors with chronic respiratory symptoms

Among environmental and occupational factors; working department, total working hours per week, training on respiratory health and energy used at home did not show significant association with chronic respiratory symptoms. However, work experience (service year) showed association with development of chronic respiratory symptoms. Workers of the pharmaceutical factory who had service year greater than five years had the odds of developing chronic respiratory symptoms about 2 times more likely (COR = 2.27, 95 % CI = (1.50- 3.43)) than those workers with work experience of one to five years (Table 8).

Table 8 Bivariate analysis of environmental and occupational factors and CRS among pharmaceutical factory workers in Addis Ababa city, Ethiopia, May 2017

| Occupational and Environmental factors | Case (n=151) (%) | Control (n=302) (%) | COR (95%CI) | P-value |
|---|---|---|---|---|
| Working department | | | | |
| Research and development | 16(10.6) | 44 (14.6) | 1.14(0.50 - 2.62) | 0.753 |
| Production | 121 (80.1) | 214 (70.8) | 1.78(0.94 - 3.38) | 0.079 |
| Quality control | 14(9.3) | 44(14.6) | 1 | |
| Working hours per week | | | | |
| ≤ 48 hrs | 71(47.0) | 131(43.4) | 1 | |
| >48 hrs | 80(53.0) | 171(56.6) | 0.86(0.58 - 1.28) | 0.462 |
| Length of time worked | | | | |
| 1-5 years | 66(43.7) | 225(74.5) | 1 | |
| >5 years | 85(56.3) | 77(25.5) | 2.27(1.50- 3.43) | <0.0001 |
| Training on respiratory health | | | | |
| Yes | 52(34.4) | 100(33.1) | 1.06(0.7 - 1.6) | 0.778 |
| No | 99(65.6) | 202(66.9) | 1 | |
| Energy used at home | | | | |
| Electricity | 108(71.5) | 204(67.5) | 2.65(0.31- 22.95) | 0.377 |
| kerosene | 16(10.6) | 28(9.3) | 2.86(0.31 - 26.66) | 0.357 |
| Wood | 1(0.7) | 5(1.7) | 1 | |
| Charcoal | 26(17.2) | 65(21.5) | 1.99(0.22 - 17.95) | 0.536 |

## 5.6. Multivariate Analysis

Variables with P <0.05 during the bivariate analysis were included in the multivariate logistic regression analysis to see the effect of confounding variables.

The multivariate analysis indicated that previous history of chronic respiratory diseases, family history of chronic respiratory diseases, previous dusty working environment, ever cigarette smoking, and service year showed statistically significant association with chronic respiratory symptoms among pharmaceutical factory workers. But, employment condition, and past chemical/gas working environment did not show significant association with chronic respiratory symptoms.

The odds of having chronic respiratory symptoms in workers who had previous history of respiratory diseases were about 3 times higher than those who had no the previous history of respiratory diseases (AOR 3.36, 95%CI (1.85 - 6.12)). Family history of chronic respiratory diseases was significantly associated with chronic respiratory symptoms among pharmaceutical factory workers. Workers who had family history of chronic respiratory diseases were more likely to develop chronic respiratory symptoms (AOR=2.55, 95% CI, (1.51 - 4.33)) than those who had not the disease.

Ever smoker workers were more likely (AOR 3.66, 95%CI (1.05 - 12.71)) to develop chronic respiratory symptoms compared with non-smokers. Workers of the pharmaceutical factory who had service greater than five years had the odds of developing chronic respiratory symptoms about 2 times more likely (AOR = 1.86, 95 % CI = (1.1 - 2.99)) than those workers with work experience of one to five years (Table 9)

**Table 9 Multivariate analysis of factors and CRS among pharmaceutical factory workers in Addis Ababa city, Ethiopia, May 2017**

| Variables | Case (n=151) (%) | Control (n=302) (%) | COR (95%CI) | AOR (95%CI) |
|---|---|---|---|---|
| Employment condition | | | | |
| Temporary | 30(19.9) | 86(28.5) | 1 | 1 |
| Permanent | 121(80.1) | 216(71.5) | 1.61(1.01- 2.57) | .98(0.57 - 1.66) |
| Previous history of respiratory diseases | | | | |
| Yes | 40(26.5) | 25(8.3) | 3.99(2.31 - 6.89) | 3.36(1.85 - 6.12) ** |
| No | 111(73.5) | 277(91.7) | 1 | 1 |
| Family history of chronic respiratory disease | | | | |
| Yes | 45(29.8) | 37(12.3) | 3.04(1.86 - 4.96) | 2.55(1.51 - 4.32) ** |
| No | 106(70.2) | 265(87.7) | 1 | 1 |
| Previous dusty working environment | | | | |
| Yes | 60(39.7) | 65(21.5) | 2.40(1.57 - 3.68) | 2.26(1.07 - 4.78) * |
| No | 91(60.3) | 237(78.5) | 1 | 1 |
| Previous Chemicals/gas working environment | | | | |
| Yes | 48(31.8) | 52(17.2) | 2.24(1.42 - 3.53) | 1.10(0.49 - 2.48) |
| No | 103(68.2) | 250(82.8) | 1 | 1 |
| Ever smokers (current and ex-smokers) | | | | |
| Yes | 11(7.3) | 4(1.3) | 5.85(1.83-18.70) | 3.66(1.05- 12.72) * |
| No | 140(92.7) | 298(98.7) | 1 | 1 |
| Length of time worked | | | | |
| 1-5 years | 66(43.7) | 225(74.5) | 1 | 1 |
| >5 years | 85(56.3) | 77(25.5) | 2.27(1.50- 3.43) | 1.86(1.16 - 2.99) * |

* Significant at p<0.05 ** Significant at p<0.001

## 6. Discussion

This study identified determinants of chronic respiratory symptoms among pharmaceutical factory workers in Addis Ababa. Previous history of chronic respiratory diseases, family history of chronic respiratory diseases, previous dusty working environment, ever smoking, and service year were the independent determinants of chronic respiratory symptoms of the workers. But, it found that any of the socio demographic characteristics were not statistically significant with the development of chronic respiratory symptoms.

The study revealed that workers who had previous history of respiratory diseases were about 3 times more likely (AOR 3.36, 95%CI (1.85 - 6.12)) to develop chronic respiratory symptoms than those who had not the history of the disease. This finding was consistent with study done in Ethiopia(1). This can be explained by the fact that the previous respiratory disease might affect the normal function of the respiratory system by causing airway obstruction and respiratory sensitization. This alteration may lead to the development of chronic respiratory symptoms. Pre-existing respiratory diseases may impair respiratory tract defense mechanism causing the increased susceptibility to the occurrence the symptoms. Asthmatics harbor a special type of inflammation in the airways that makes them more responsive than non-asthmatics to a wide range of triggers, leading to excessive narrowing with consequent reduced airflow and symptomatic wheezing and dyspnea.

This study indicated that employees of the factory in which either of their natural family had history of chronic respiratory diseases was associated with chronic respiratory symptoms. Workers who had family history of chronic respiratory diseases were about 3 times more likely to develop chronic respiratory symptoms than those who had no the disease. This finding was in line with study done in Thailand(39). This may be due the fact that genetics has its own contribution for the development of chronic respiratory conditions.

Employers of the pharmaceutical factory, who had worked in any dusty working environment before their current job, were about 2 times more likely (AOR = 2.26, 95 % CI = ((1.07 - 4.78)) to develop chronic respiratory symptoms than workers that were not engaged in previous dusty work environment. This result is in line with the study done in United States and China (31),

(32). This statistical significance could be due to the workers might previously work in dusty jobs identified to cause respiratory problems including organic dust (43), cement dust exposure (44), aerosol and sisal fiber dust (45). Exposures to inorganic and organic dusts can cause interstitial lung disease that presents with a restrictive pattern and a decreased diffusing capacity. Similarly, exposures to a number of organic dusts or chemical agents may result in occupational asthma or COPD that is characterized by airway obstruction. The past exposure to dusts might also lead to the aforementioned respiratory tissue physiologic change in a later life and exacerbate the occurrence of respiratory symptoms.

Ever smoker workers (Ex and current smokers) were about 4 times more likely to have chronic respiratory symptoms than non-smokers. This finding was consistent with the studies done in South Africa, Croatia and India (27-29, 32, 42); however, it was inconsistent with a study done in Iran, which reported no difference in respiratory symptoms between ever smokers and non-smokers (46). This disparity in result might be due to the difference in the frequency and duration of smoking, strength, quality and number of cigarettes smoked.

Workers who had service greater than five years had the odds of developing chronic respiratory symptoms about two times more likely than those workers with work experience of one to five years. The result was in line with study done by many researchers (13), (28), (32), (47)and(48) . This might be due to increased dust accumulation in the lung with long term exposure leading to air way limitations. The finding indicated that long duration of exposures to the manufacturing of pharmaceuticals may lead to the development of chronic respiratory symptoms. Many authors reported that rhinitis, occupational asthma and symptoms in pharmaceutical workers may be due to exposures to groups of antibiotics such as penicillin, cephalosporin, tetracycline, azythromycin, spiramycin, and other therapeutic agents including salbutamol, cimetidine, hydroxychloroquine, lisinopril, α-methyldopa, hydralazine and opiates (7), (14), (28), (49). In the study settings, at least one the aforementioned medicines are manufactured in each factory which may contribute to the development of long lasting respiratory symptoms and diseases.

The study revealed that socio demographic characteristics such as sex, age, religion, marital status, educational status, employment condition and monthly income of workers were not significantly associated with the development of chronic respiratory symptoms. Previous study has reported that sex and socio-economic status had significant association with chronic respiratory diseases (27), (28)). This difference may account for existence of variation among countries culture, belief, living and earning conditions.

The finding of the study indicated that there was no difference in the development of chronic respiratory symptoms between those workers who used personal respiratory protective equipment and those that did not use in pharmaceutical factory. This finding was in line with the study done in Ethiopia and Tanzania(1, 37). This might be due to the users could not use appropriate PPE in terms of quality (piece of cloth instead of the nose/mouth mask or respirator), protection capacity and comfort.

# 7. Strength and Limitations of the study

**Strengths of the study**

- This case control study design easily identifies multiple exposures for chronic respiratory symptoms by comparing the exposures among workers who experienced chronic respiratory symptoms and who did not.
- Use of face to face interview during data collection reduced non response rate, permitted clarification of questionnaires and addressed all participants who differ in socio demographic status.

**Limitations of the study**

- A one year case control study design could lead to recall bias (under or over report of some determinant factors of chronic respiratory symptoms.
- Relatively high number of workers' turnover may leads to decrease in association of determinant of chronic respiratory symptoms.
- Lack of similar studies particularly in Ethiopia made difficult in comparing results.

## 8. Conclusion

The study showed that occupational exposure time (service year of workers) in pharmaceutical factory was determinant of chronic respiratory symptoms of the workers. Besides to occupational exposure time, factors such as previous history of chronic respiratory diseases, family history of chronic respiratory diseases, previous dusty working environment and ever smoking were determinants of chronic respiratory symptoms among pharmaceutical factory workers in Addis Ababa.

## 9. Recommendation

Comprehensive occupational safety practice on occupational chronic respiratory disorders should be done by considering the determinant factors in the factories.

Workers of the pharmaceutical factories with previous history of chronic respiratory diseases, family history of chronic respiratory diseases and previous dusty working environment should recognize stimulating agents and take action accordingly. Smoking discouragement should also be promoted.

Long serving workers with complicated chronic respiratory symptoms should get treatment.

Further prospective study should be done to identify causes of chronic respiratory symptoms in the pharmaceutical factories.

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## Annex 1: English version questionnaire

### 1. Participant's Information Sheet

Questionnaire ID: _____

How are you? I am _____ from Addis Ababa University research team. I would like to ask few questions about determinants of chronic respiratory symptoms among pharmaceutical factory workers. Your genuine information that you are going to provide will help policy makers to design strategy/give priority for prevention and control of occupational respiratory diseases to have healthy workforce. Participant of this study will give me consent after you have understood the following information sheet:

**Title of the project:** Determinants of Chronic Respiratory Symptoms among Pharmaceutical Factory Workers in Addis Ababa, Ethiopia.

**Objective of the study**: To assess determinants of chronic respiratory symptoms among pharmaceutical factory workers. This research undertaking is a postgraduate Master of Public Health partial fulfillment research thesis.

**Rights of the participant**: participating and not participating is the full right and participants can stop from participation in the study at any time. And also the participant can skip question which does not want to respond. Participants can ask any questions which is not clear for understanding.

**Confidentiality**: - Any information forwarded will be kept private and his/her name will not be specified.

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

**Risk**: The proposed research does not have any inhuman treatment of research participants. It does not cause any physical harm, social discrimination, psychological trauma and economic loss.

**Person to Contact:** The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa University College of Health Sciences institutional review board (IRB). The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm. If you want more information and check about this project you can contact the following people.

Principal Investigator: Sahle Asfaw: 0912770212 (Mobile)
Advisor: Professor Fikre Enquselasie, Yifokir Tefera and Muluken Gizaw
Addis Ababa University College of Health Sciences IRB Secretary Office Tel. 0115157701

## Annex 2: Informed consent form

Title of the project: Determinants of Chronic Respiratory Symptoms among Pharmaceutical Factory Workers in Addis Ababa, Ethiopia. I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate principal investigator is Sahle Asfaw. I will have been fully informed in the language I understand about the research project objective that is to assess determinants of chronic respiratory symptoms among pharmaceutical factory workers in Addis Ababa. I will have been informed that all the information I will provide to the interviewer will be kept confidential. I understand that the research has no any risk and compensation. I also know that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the pharmaceutical factory. I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact the principal investigator, advisor and the University IRB office.

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

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)
Signature _____ (if written consent)
Date of interview _____

Result of interview 1. Completed 2. Respondent not available 3. Refused 4. Partially completed. If the respondent is not voluntary, please skip to the next participant.

Please, put check (√) on the response part of the question and write a correct number example age put in years.

**Part I: Information on Respiratory symptoms within the last one year**

Q101 COUGH

| SN. | Questions | Code for Response | Response |
|---|---|---|---|
| Q 101A | Have you had cough on most time in the last 12 months?<br>If Q101A is no, skip to Q101C | 0= No | |
| | | 1= Yes | |
| Q 101B | Have you had cough on most time as much as 4 to 6 times a day, 4 or more days out of the week in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q 101C | Have you had cough at all on most time on getting up, or first thing in the morning in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q101D | Have you had cough at all on most time during the rest of the day or at night in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q101E | If Yes to Q101A or Q101B or Q 101C or Q101D,<br>Have you had cough on most time like this on most days for 3 consecutive months or more during the year? | 0=No | |
| | | 1=Yes | |

Q102 Phlegm **(**sputum production)

| SN. | Questions | Code for Response | Response |
|---|---|---|---|
| Q102A | Have you brought up phlegm from your chest on most time in the last 12 months?<br>If Q102A is no, skip to Q102C | 0=No | |
| | | 1=Yes | |
| Q102B | Have you brought up phlegm like this on most time as much as twice a day, 4 or more days out of the week in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q102C | Have you brought up phlegm at all on most time on getting up or first thing in the morning in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q102D | Have you brought up phlegm at all on most time during the rest of the day or at night in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q102E | If Yes to any of the above (Q102A, Q102B, Q102C,or 102D), | 0=No | |

| | | | |
|---|---|---|---|
| | Have you brought up phlegm like this on most days for 3 consecutive months or more during the year? | 1=Yes | |

**Q103 wheezing**

| SN | Questions | Code for Response | Response |
|---|---|---|---|
| Q103A | Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q103B | Have you ever had attacks of shortness of breath with wheezing? | 0=No | |
| | | 1=Yes | |

**Q104 Breathlessness**

| **SN.** | Questions | Code for Response | Response |
|---|---|---|---|
| Q104A | Have you troubled by shortness of breath when you were hurrying on the level or walking up a slight hill at any time in the last 12 months?<br>If yes, answer question Q104B,C,D and E | 0=No | |
| | | 1=Yes | |
| Q104B | Have you walked slower than people of your age on the level because of breathlessness at any time in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q104C | Have you ever had to stop for breath when you were walking at your own pace on the level in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q104D | Have you ever had to stop for breath after walking about a certain distance or a few minutes on the level ground in the last 12 months? | 0=No | |
| | | 1=Yes | |
| Q104E | Have you been too breathless to leave the house or breathless on dressing or undressing? | 0=No | |
| | | 1=Yes | |

**Part II- Socio demographic information**

| No | Questions | Code for Responses | response |
|---|---|---|---|
| Q201 | Sex (by observation) | 0=Female | |
| | | 1=Male | |
| Q202 | Age | ----------years | |
| Q203 | Religion | 0=Orthodox | |
| | | 1=Catholic | |
| | | 2= Muslim | |
| | | 3= Protestant | |
| | | 4=Other specify-------- | |
| Q204 | Marital status: | 0=Married | |
| | | 1=Single | |
| | | 2= Widowed | |
| | | 3= Divorced | |
| Q205 | Educational level | 0=Cannot read and write | |
| | | 1= Can read and write | |
| | | 2=Primary school (1-8) | |
| | | 3=Secondary school (9-12) | |
| | | 4= Graduated from TVET | |
| | | 5= Diploma | |
| | | 6= First degree | |
| | | 7=Second degree | |
| Q206 | Employment condition | 0=Temporary | |
| | | 1=Permanent | |
| Q207 | Monthly Salary in Birr | _____ | |

**Part III Information on history of chronic respiratory diseases before employment in the pharmaceutical factory**

| SN. | Questions | Code for Response | Response |
|---|---|---|---|
| Q 305A | Have you ever had attacks of Bronchitis? | 0=No | |
| | | 1=Yes | |
| Q 305B | If yes to 305A, was it confirmed by a doctor? | 0=No | |
| | | 1=Yes | |
| Q305C | Have you ever had attacks of emphysema? | 0=No | |
| | | 1=Yes | |
| Q305D | If yes to 305C, was it confirmed by a doctor? | 0=No | |
| | | 1=Yes | |
| Q305E | Have you ever had attacks of asthma? | 0=No | |
| | | 1=Yes | |
| Q305F | If yes to 305E, was it confirmed by a doctor? | 0=No | |
| | | 1=Yes | |
| Q305G | Have you ever had attacks of sinus trouble? | 0=No | |
| | | 1=Yes | |
| Q305H | If yes to 305G, was it confirmed by a doctor? | 0=No | |
| | | 1=Yes | |
| Q305I | Have you ever had attacks of Pulmonary Tuberculosis? | 0=No | |
| | | 1=Yes | |
| Q305J | If yes to 305I, was it confirmed by a doctor? | 0=No | |
| | | 1=Yes | |

**Part IV Family history of chronic respiratory disease**

| **SN.** | Questions | Code and Response | | |
|---|---|---|---|---|
| | Were either of your natural parents(Mother or Father) ever told by a doctor that they had a chronic lung condition as mentioned below: | 0=No | 1=Yes | 2=I don't know |
| Q401 | Chronic bronchitis? | | | |
| Q402 | Asthma? | | | |

| | | | | |
|---|---|---|---|---|
| Q403 | Lung cancer? | | | |
| Q404 | Chronic sinus? | | | |
| Q404 | Other chest conditions? | | | |

**Part V Information on Occupational history before employment in the pharmaceutical factory**

| **SN.** | Questions | Code for Response | Response |
|---|---|---|---|
| Q501 | Have you ever worked for any other dust?<br>If no, skip to Q505 | 0=No | |
| | | 1=Yes | |
| Q502 | Specify the job---------- | | |
| Q503 | Total years worked---------- | | |
| Q504 | What perceived level of dust has been exposed in that job? | 0= mild | |
| | | 1=moderate | |
| | | 2= sever | |
| Q505 | Have you ever been exposed to gas or chemical fumes in your work?<br>If no, skip to Q601 | 0=No | |
| | | 1=Yes | |
| Q506 | Specify the job---------- | | |
| Q507 | Total years worked---------- | | |
| Q508 | What perceived level of fume has been exposed in that job? | 0= mild | |
| | | 1=moderate | |
| | | 2= sever | |

**Part VI Behavioral factors**

| **SN.** | Questions | Code for Response | Response |
|---|---|---|---|
| **Q601** | Have you ever smoked cigarettes?<br>If No, skip to Q605 | 0=No | |
| | | 1=Yes | |
| **Q602** | If Q601is Yes, Do you now smoke cigarettes? | 0=No | |
| | | 1=Yes | |
| **Q603** | If Q602 is No, Have you stopped smoking? | 0=No | |

| | | | |
|---|---|---|---|
| | | 1=Yes | |
| **Q604** | If Q603 is Yes, How long ago did you stop? | ____ years ago | |
| **Q605** | Have you ever taken a drink that contains alcohol? If no, skip to Q607 | 0=No | |
| | | 1=Yes | |
| **Q606** | If Q605 is Yes, how often? | 0=Every day | |
| | | 1=one-three days/wk | |
| | | 2=Occasionally | |
| **Q607** | Have you ever chewed khat? If No, skip to Q609 | 0=No | |
| | | 1=Yes | |
| **Q608** | If Q607 is yes; how often? | 0=Every day | |
| | | 1=one-three days/wk | |
| | | 2=Occasionally | |
| **Q609** | Did you use Personal respiratory protective material? | 0= No | |
| | | 1=Yes | |

**Part VII Occupational and Environmental factors**

| No | Questions | Responses | Skip |
|---|---|---|---|
| **Q 701** | What is your working department? | 0=Research and development<br>1= Production<br>2= Quality control | |
| **Q702** | Working hours per week | 0= ≤48<br>1= >48 | |
| **Q703** | Length of time worked in the department | 0= 1-5 years<br>1= >5 years | |

| | | | |
|---|---|---|---|
| **Q704** | Do you have training on occupational safety and health about respiratory problems related to your work? | 0=No<br>1=Yes | |
| **Q705** | What kind of energy do you use most for cooking in your home? | 0=Electricity<br>1= kerosene<br>2=Wood<br>3=Charcoal<br>4=Biogas<br>5=No food cooked in home<br>6= Other specify---------- | |

This is the end of the questionnaire. Thank you very much for your cooperation!

## Annex 2: Amharic version Questionnaire

### የአማርኛ ትርጉም መጠይቅ

አዲስ አበባ ዩኒቨርሲቲ፣ጤና ሳይንስ ኮሌጅ ፣የሕብረተሰብ ጤና ትምህርት ክፍል

### ፣በጥናቱ ላይ ለሚሳተፉ የሚሰጥ መረጃ

የመጠይቁ መለያ ቁጥር _____

ጤና ይስጥልኝ፡ እኔ _____እባላለሁ። ከአዲስ አባባ ዩኒቨርስቲ ጤና ሳይንስ ኮሌጅ የህበረተሰብ ጤና ሳይንስ ትምህርት ቤት ጥናት ለማካሄድ ነው የመጣሁት። ለረጅም ጊዜ ከሚቆዩ የመተንፈሻ አካላት ህመም ምልክቶች ጋር የተያያዙ መንስኤ ሊሆኑ ስለሚችሉ ነገሮች ለአጭር ጊዜ የሚቆይ ጥያቄ ልጠይቅዎት እፈልጋለሁ። እርስዎ የሚሰጡን ትክክለኛ መልስ ለህግ አርቃቂዎች በቀላሉ ከሙያ ጋር በሚደርሱ የመተንፈሻ አካላት ህመምች በመከላከል እና በመቆጣጠር ጤናማ የሰራተኛ ሀይል እንዲፈጠር ይረዳል። ። በዚህ ጥናት ላይ የሚሳተፍ ማንኛዉም ሰዉ ከዚህ በታች ስለ ጥናቱ የተሰጠዉን መረጃ በትክክል ተረድቶ ፍቃደኝነቱን ሲያሳይ ብቻ ነዉ።

**የጥናቱ ርዕስ፡** በአዲስ አበባ በሚገኙ መድኀኒት ፋብሪካ ሰራተኞች ላይ ለረጅም ጊዜ ከሚቆዩ የመተንፈሻ አካላት ህመም ምልክቶች ጋር የተያያዙ መንስኤዎች።

**የጥናቱ ዋና አላማ፡** በአዲስ አበባ በሚገኙ መድኀኒት ፋብሪካ ሰራተኞች ላይ ለረጅም ጊዜ ከሚቆዩ የመተንፈሻ አካላት ህመም ምልክቶች ጋር የተያያዙ ዋና ዋና መንስኤዎቻቸዉን ለይቶ ማወቅ። ይህ ጥናት ለድህረ-ምረቃ ትምህርት ማሟያነት የሚካሄድ ነው።

**የተሳታፊዎች መብት፡** በጥናቱ ላይ መሳተፍ በፍላጎት ላይ የተመሰረተ ነዉ። ተሳታፊዎች ጥናቱን በፈለጉት ቦታ ማቋረጥ ይችላሉ፤መመለስ ያልፈለጉትንም ጥያቄ መዝለልም ይችላሉ፤ማንኛዉንም ያልገባቸዉን ጥያቄ መጠየቅ ይችላሉ።

**የጥናቱ ሚስጥራዊነት፡** ከእርስዎ የምናገኘው ማንኛውንም መልስ በሚስጥር እንጠብቃለን። ከዚህ ጥናት ጋር በተያያዘ በማንኛውም ቦታና ጊዜ ስምዎ እንዳይፃፍና እንደማይጠቀስ ልንገልጽልዎ እንወዳለን።

**ጥቅም፡** ይህ ጥናት የአጭር ጊዜ የገንዘብ፣ የጤና እንክብካቤ እና የአቅም ግንባታ ጥቅማ ጥቅሞች ለተሳታፊዎች የሉትም። ነገር ግን በሂደት የጥናቱ ውጤት ለሚመለከተው ኣካልና ፖሊሲ አውጪዎች ለፖሊሲ ግብአትነት፣ አቅጣጫ እና ስትራቴጂ ቀረፃ ይረዳል። በይበልጥ ጥናቱ በመስኩ እንደ መነሻ መረጃ ሆኖ ያገለግላል።

**ጉዳት፡** ሊካሄድ የታሰበው ጥናት በተሳታፊዎች ላይ ኢሰብአዊ የሆነ አቀራረብ አይኖረዉም። አካላዊ፣ ማህበራዊ ፣ ስነልቦናዊ እና ኢኮኖሚያዊ ጉዳት አያስከትልም።

**መገናኘት የሚችሉት ሰው አድራሻ፡** የጥናቱ ተሳታፊ ስለጥናቱ ሁኔታ እና ይዘት ግልጽ ካልሆነለት በማንኛውም ሰዓት መረጃ የመጠየቅ መብት አለው። ዋና አጥኚዉን እና አማካሪዎቹን ማግኘት ይችላሉ። ለበለጠ መረጃ እና ስለፕሮጀክቱ ማረጋገጥ የሚፈልጉት ነገር ካለ በሚከተለው አድራሻ መጠቀም ይችላሉ።

**ዋና አጥኚ፡** ሳህሌ አስፋዉ ስልክ፡ 0912770212

**አማካሪዎች፡** ፕሮፌሰር ፍቅሬ እንቁስላሴ፣ አቶ ይፎክር ተፈራ ፣አቶ ሙሉቀን ግዛዉ አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ት/ቤት ስልክ: 011-5157701

**II <u>የተሳታፊዎች የፈቃደኝነት መጠየቂያ ቅፅ</u>**

ይህ መጠይቅ በአዲስ አበባ በሚገኙ መድኀኒት ፋብሪካ ሰራተኞች ላይ ከቆዩ የመተንፈሻ አካላት ህመም ምልክቶች ጋር የተያያዙ መንስኤዎቻቸዉን ለማጥናት የተዘጋጀ ነዉ። ይህ በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ት/ቤት አስተባባሪነትና ድጋፍ ለተማሪ ሳህሌ አስፋዉ ለድህረ-ምረቃ ፕሮግራሙን ማሟያነት እንደሚካሄድ አውቃለሁ። በሚገባኝና በማውቀው ቋንቋ ስለፕሮጀክቱ ዓላማ በአግባቡ ተገልፆልኛል። እኔ ለጠያቂው የምሰጣቸው መረጃዎች ሚስጥራዊነት እንደሚጠበቅ፣ጥናቱም ምንም ዓይነት ጉዳት እንደማያስከትል፣ ጥቅማ ጥቅምም ሆነ ካሣ እንደሌለው ተረድቻለሁ። በተጨማሪም በማናቸውም ሰዓት በጥናቱ ዙሪያ ግልጽ ያልሆኑልኝ ነገሮችን የመጠየቅ ሙሉ መብቱ እንዳለኝ ተረጋግጦልኛል።

ይህ የፍቃደኝነት መጠየቂያ ቅጽ ከላይ በውስጡ ስለያዛቸው ጉዳዮች በማውቀው/በምረዳው ቋንቋ አንብቤ/ተነቦልኝ በጥናቱ ለመሳተፍ ፍቃደኝነቴን በቅጹ ላይ በመፈረም ተስማምቼያለሁ።

በጥናቱ ለመሳተፍ ተስማምቻለሁ፡ 1. አዎ 2. አይ (በቃል ለመስማማት በመረጡት ላይ ምልክት ያድርጉ)

ፊርማ .....( የጽሁፍ ፍቃደኝነት መግለጫ ከሆነ)

ቃለ ምልልሱ የተካሄደበት ቀን.....

የቃለ ምልልሱ ዉጤት 1፡ የተጠናቀቀ 2፡ ተሳታፊዉ መልስ አልሰጠም

3፡ ለመሳተፍ ፍቃደኛ አይደለም 4፡ በግማሽ ተመልሷል

ማሳሰቢያ ፡ ተሳታፊዉ ፈቃደኛ ካልሆነ ወደሚቀጥለዉ ተሳታፊ ይታለፍ።

ለቃለ-መጠይቅ አድራጊው እባክዎ ከጥያቄዉ ትክክለኛ መልስ መስጫ ቦታ የራይት ምልክት(√) እና ትክክለኛ ቁጥር በሚያስፈልግ ቦታ ይፃፉ።

**ክፍል 1) ካለፈዉ አንድ አመት ዉስጥ የመተንፈሻ ህመም ምልክቶችን የተመለከቱ ጥያቄዎች**

**ጥ201 ሳል**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| ጥ101ሀ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ ሳል ያስልዎት ነበር?<br>የጥ101ሀ ምላሽ አያስለኝም ከሆነ ወደ ጥ101ሐ ይዝለሉ። | 0=አያስለኝም | |
| | | 1=አዎ | |
| ጥ101ለ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ በቀን ከ4-6 ጊዜ፣በሳምንት 4ጊዜ ወይም ከዛ በላይ ያስልዎት ነበር? | 0=አያስለኝም | |
| | | 1=አዎ | |
| ጥ101ሐ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ ጠዋት ወይም ከእንቅልፍዎ ሲነሱ ያስልዎት ነበር? | 0=አያስለኝም | |
| | | 1=አዎ | |
| ጥ101መ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ በተቀሩት የቀን ወይም የማታ ጊዜያት ያስልዎት ነበር? | 0=አያስለኝም | |
| | | 1=አዎ | |
| ጥ101ሠ | የጥያቄ 101ሀ፣ለ፣ሐ ወይም መ መልስ አዎ ከሆነ ካለፈው አመት ወዲህ ለሶስት ተከታታይ ወራት ወይም ከዚያ በላይ በአብዛኞቹ ቀናት እንደዚህ አይነት ያስልዎት ነበር? | 0=አያስለኝም | |
| | | 1=አዎ | |

**ጥ102 አክታ**

| | | | |
|---|---|---|---|
| ጥ102ሀ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ ከደረትዎ አክታ ይወጣ ነበር?<br>የጥ102ሀ ምላሽ አልነበረኝም ከሆነ ወደ ጥ102ሐ ይዝለሉ። | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ102ለ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ እንደዚህ አክታ በቀን 2 ጊዜ፣በሳምንት 4 ጊዜ ወይም ከዛ በላይ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ102ሐ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ ጠዋት ወይም ከእንቅልፍዎ ሲነሱ አክታ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ102መ | ባለፉት 12 ወራት ውስጥ አብዛኛዉን ጊዜ በቀን ወይም በማታ አክታ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ102ሠ | የጥያቄ 102ሀ፣ለ፣ሐ ወይም መ መልስ አዎ ከሆነ ካለፈው አመት ወዲህ ለሶስት ተከታታይ ወራት ወይም ከዚያ በላይ በአብዛኞቹ ቀናት እንደዚህ አይነት አክታ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |

**ጥ103 የማንኮራፋት ድምፅ**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| ጥ103ሀ | ባለፉት 12 ወራት ዉስጥ ደረትዎ ላይ የማንኮራፋት ወይም የፉጨት ድምፅ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ103ለ | ባለፉት 12 ወራት ዉስጥ የትንፋሽ ማጠር ከማንኮራፋት ድምፅ ጋር ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |

**ጥ104 የትንፋሽ ማጠር**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| ጥ104ሀ | ባለፉት 12 ወራት ውስጥ በማናቸዉም ጊዜያት በፍጥነት ስትራመዱ ወይም ዳገት ስትወጡ የትንፋሽ ማጠር ችግር ነበርዎት?<br>አዎ ከሆነ ጥ104ለ፣ሐ፣መ እና ሠ መልስ | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ104ለ | ባለፉት 12 ወራት ውስጥ በትንፋሽ ማጠር ምክንያት ከእኮዮችዎ ባነሰ ፍጥነት የመራመድ አጋጣሚ ነበርዎት? | 0=አልነበረኝም | |
| | | 1=አዎ | |
| ጥ104ሐ | ባለፉት 12 ወራት ውስጥ በራስዎ ፍጥነት ሜዳ ላይ ስትራመዱ የትንፋሽ መቋረጥ አጋጥሞት ያዉቃል? | 0=አልገጠመኝም | |
| | | 1=አዎ | |
| ጥ104መ | ባለፉት 12 ወራት ውስጥ በሜዳ ላይ ወደ 100 ያርድ(96 ሜ) ከተራመዱ በኋላ የትንፋሽ መቋረጥ አጋጥሞት ያዉቃል? | 0=አልገጠመኝም | |
| | | 1=አዎ | |
| ጥ104ሠ | ባለፉት 12 ወራት ውስጥ ከቤት ስትወጡ፤ ልብስ ስትለብሱ ወይም ስታወልቁ ከፍተኛ የትንፋሽ መቋረጥ አጋጥሞት ያዉቃል? | 0=አልገጠመኝም | |
| | | 1=አዎ | |

**ክፍል 2፡ ማህበራዊና ስነ-ህዝባዊ ገፅታዎችን የተመለከቱ ጥያቄዎች**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| 201 | ፆታ (በማየት) | 0=ሴት | |
| | | 1=ወንድ | |
| 202 | እድሜ | ---------- ዓመት | |
| 203 | ሀይማኖት | 0=ኦርቶዶክስ | |
| | | 1=ካቶሊክ | |
| | | 2=ሙስሊም | |
| | | 3=ፕሮቴስታንት | |
| | | 4= ሌላ ካሉ ይጠቀስ---------- | |
| 204 | የጋብቻ ሁኔታ | 0=ያገባ/ች | |
| | | 1=ያላገባ/ች | |
| | | 2=የሞተችበት/የሞተባት | |
| | | 3=የፈታ/የፈታች | |
| 205 | የትምህርት ደረጃ | 0= መፃፍና ማንበብ የማይችል/የማትችል | |
| | | 1 =መፃፍና ማንበብ የሚችል/የምትችል | |
| | | 2=የመጀመሪያ ደረጃ ት/ት (1-8) ያጠናቀቀ/ች | |
| | | 3=ሁለተኛ ደረጃ ት/ት (9-12) ያጠናቀቀ/ች | |
| | | 4 =ከቴክኒክና ሙያ ት/ቤት የተመረቀ/ች | |
| | | 5 =ዲፕሎማ | |
| | | 6 =የመጀመርያ ዲግሪ | |
| | | 7 =ሁለተኛ ዲግሪ | |
| 206 | የቅጥር ሁኔታ | 0=በግዚያዊነት | |
| | | 1=በቋሚነት | |
| 207 | ደመወዝ | _____ | |

**ክፍል 3) መድኀኒት ፋብሪካ ከመስራት በፊት የነበሩ የመተንፈሻ በሽታዎች መረጃ በተመለከተ**

| ተ.ቁ | ጥያቄ | የመልስ ኮድና መልስ | |
|---|---|---|---|
| | መድኀኒት ፋብሪካ ከመስራትዎ በፊት በሀኪም የተረጋገጡ ከዚህ በታች የተዘረዘሩት ለረጅም ጊዜ የሚቆዩ የመተንፈሻ አካላት ህመምች ነበርዎት? | 0=አልነበረኝም | 1=አዎ |
| 301ሀ | የመተንፈሻ ቧንቧ በሽታ (ብሮንካይቲስ) | | |
| 301ለ | ለመተንፈስ የሚያውክ የሳንባ በሽታ(ኢምፋይሴማ) | | |
| 301ሐ | አስም | | |
| 301መ | ሳይነስ | | |
| 301ሠ | የሳንባ ካንሰር | | |
| 301ረ | የልብ ድካም | | |
| 301ሰ | የሳንባ ነቀርሳ(ቲቢ) | | |

**ክፍል 4 የቤተሰብ ለረጅም ጊዜ የሚቆዩ የመተንፈሻ በሽታ ታሪክ**

| **SN.** | ጥያቄ | የመልስ ኮድና መልስ | | |
|---|---|---|---|---|
| | በወላጅ እናትዎ ወይም አባትዎ በሀኪም የተነገሩ ከዚህ በታች የተዘረዘሩት ለረጅም ጊዜ የሚቆዩ የመተንፈሻ ህመምች ነበረባቸዉ? | 0=አልነበረም | 1=አዎ | 2=አላስታዉስም |
| ጥ401 | የመተንፈሻ ቧንቧ በሽታ (ብሮንካይቲስ)? | | | |
| ጥ402 | ለመተንፈስ የሚያውክ የሳንባ በሽታ(ኢምፋይሴማ)? | | | |
| ጥ403 | አስም? | | | |
| ጥ404 | የሳንባ ካንሰር? | | | |
| ጥ405 | ሳይነስ | | | |
| ጥ406 | ሌላ የመተንፈሻ በሽታ?..... | | | |

**ክፍል 5 መድኀኒት ፋብሪካ ከመስራት በፊት የነበሩ የስራ መረጃዎች**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ | መልስ |
|---|---|---|---|
| ጥ501 | እዚህ ፋብሪካ ከመስራትዎ በፊት አዉራ ያለበት ስራ ላይ ሰርተዉ | 0=አልሰራሁም | |

| | | | |
|---|---|---|---|
| | ያዉቃሉ?<br>አልሰራሁም ካሉ ወደ ጥያቄ 505ይለፉ | 1=አዎ | |
| ጥ502 | ስራው ቢገለፅ_____ | | |
| ጥ503 | ጠቅላላ የሰሩበት አመት_____ | | |
| ጥ504 | ስትሰሩበት በነበረ ቦታ ምን ያክል አቧራ ይቦን ነበር? | 0=ቀላል | |
| | | 1=መካከለኛ | |
| | | 2=ከፍተኛ | |
| ጥ505 | እዚህ ፋብሪካ ከመስራትዎ በፊት የጋዝ ወይም የኬሚካል ጭስ በሚጨስበት ስራ ላይ ሰርተዉ ያዉቃሉ?<br>አልሰራሁም ካሉ ወደ ጥያቄ 601ይለፉ | 0=አልሰራሁም | |
| | | 1=አዎ | |
| ጥ506 | ስራው ቢገለፅ_____ | | |
| ጥ507 | ጠቅላላ የሰሩበት አመት_____ | | |
| ጥ508 | ስትሰሩበት በነበረ ቦታ ምን ያክል የጋዝ ወይም የኬሚካል ጭስ ይጨስ ነበር? | 0=ቀላል | |
| | | 1=መካከለኛ | |
| | | 2=ከፍተኛ | |

**ክፍል 6፡የሰራተኞች ባህሪን በተመለከተ**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| 601 | ሲጋራ አጨሰዉ ያዉቃሉ?<br>አጨሼ አላዉቅም ካሉ ወደ ጥያቄ 605ይለፉ | 0=አላዉቅም | |
| | | 1=አዎ | |
| 602 | የጥያቄ 601 መልስ አዎ ከሆነ፤ አሁን ያጨሳሉ? | 0=አላጨስም | |
| | | 1=አዎ | |
| 603 | የጥያቄ 602 መልስ አላጨስም ከሆነ፤ማጨስ አቁመዋል? | 0=አላቆምኩም | |
| | | 1=አዎ | |
| 604 | የጥያቄ 603 መልስ አዎ ከሆነ፤መቼ ነበር ማጨስ ያቆሙት? | _____አመት በፊት | |
| 605 | አልኮል ጠጥተው ያውቃሉ?<br>ጠጥቼ አላዉቅም ካሉ ወደ ጥያቄ 607 ይለፉ | 0=አላዉቅም | |
| | | 1=አዎ | |
| 606 | የሚጠጡ ከሆነ በምን ያክል ጊዜ? | 0=በየቀኑ | |
| | | 1=በሳምንት ከ1-3 ቀን | |

| | | | |
|---|---|---|---|
| | | 2 = አልፎ አልፎ | |
| 607 | ጫት ቅመው ያውቃሉ ?<br>ቅሜ አላዉቅም ካሉ ወደ ጥያቄ 609 ይለፉ | 0=አላዉቅም | |
| | | 1=አዎ | |
| 608 | የጥያቄ 607 መልስ አዎ ከሆነ በምን ያክል ጊዜ? | 0=በየቀኑ | |
| | | 1=በሳምንት ከ1-3 ቀን | |
| | | 2 = አልፎ አልፎ | |
| 609 | የአፍና የአፍንጫ መሸፈኛ ይጠቀማሉ? | 0=አልጠቀምም | |
| | | 1=አዎ | |

**ክፍል 7፡ የስራ እና አካባቢያዊ መንስኤዎችን በተመለከተ**

| ተ.ቁ | ጥያቄ | የአማራጭ መልስ መለያ | መልስ |
|---|---|---|---|
| 701 | የሚሰሩበት ክፍል ምን ይባላል? | 0=ምርምር እና ዝግጅት | |
| | | 1=ምርት | |
| | | 2=ጥራት ቁጥጥር | |
| 702 | በሳምንት የሚሰሩበት ሰአት ምን ያክል ነዉ? | 0. ≤48 ሰዓት | |
| | | 1. >48 ሰዓት | |
| 703 | በተመደቡበት ክፍል ምን ያክል ጊዜ ሰርተዋል? | 0= 1- 5 አመት | |
| | | 1= ከ 5 አመት በላይ | |
| 704 | ከስራዎ ጋር በተገናኘ ስለመተንፈሻ አካላት ችግር የሙያ ደህነትና ጤንነት ስልጠና ወስደዋል? | 0=አልወሰድኩም | |
| | | 1=አዎ | |
| 705 | በአብዛኛዉ ጊዜ በቤትዎ ለምግብ ማብሰያነት የምትጠቀሙት የነዳጅ ኀይል ምንድ ነዉ? | 0=ኤሌክትሪክ | |
| | | 1=ነጭ ጋዝ | |
| | | 2=እንጨት | |
| | | 3=ከሰል | |
| | | 4=ባዮጋስ | |
| | | 5=በቤት ዉስጥ ምግብ አይዘጋጅም | |
| | | 6=ሌላ ካሉ ይጠቀስ---------- | |

**ይህ የመጠየቁ መጨረሻ ነዉ:: ለትብብርዎ በጣም አመሰግናለሁ::**