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St. Paul's Hospital Millennium Medical College

Graduate Study Program

School of Public Health

**Title:** Prevalence of Chronic Bronchitis and Associated Factors among People  
Living around “Koshe” Municipal Solid Waste Disposal Area  
in Addis Ababa, Ethiopia.

**Investigator:** Wastina Desta (MD, BA)

A thesis submitted to the school of Public Health, Saint Paul's Hospital Millennium Medical College, in partial fulfillment of the requirements for the degree of masters in General public health

November, 2023  
Addis Ababa, Ethiopia

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## Abbreviations

|                       |                                                                         |
|-----------------------|-------------------------------------------------------------------------|
| <u>AOR</u>            | <u>Adjusted Odds Ratio</u>                                              |
| <u>COPD</u>           | <u>Chronic Obstructive Pulmonary Disease</u>                            |
| <u>COR</u>            | <u>Crude Odds Ratio</u>                                                 |
| <u>DM</u>             | <u>Diabetes Mellitus</u>                                                |
| <u>DALY</u>           | <u>Disability Adjusted Life Years</u>                                   |
| <u>EPA-USA</u>        | <u>Environmental Protection Agency of United States of America</u>      |
| <u>GBD</u>            | <u>Global Burden of Disease</u>                                         |
| <u>GOLD</u>           | <u>Global Initiative for Chronic Obstructive Lung Disease</u>           |
| <u>HTN</u>            | <u>Hypertension</u>                                                     |
| <u>MW</u>             | <u>Mega Watt</u>                                                        |
| <u>NO<sub>2</sub></u> | <u>Nitrogen Dioxide</u>                                                 |
| <u>OR</u>             | <u>Odds Ratio</u>                                                       |
| <u>PM 2.5</u>         | <u>Particulate Matters that have Diameter less than 2.5 micrometres</u> |
| <u>PM10</u>           | <u>Particulate Matters that have Diameter less than 10 micrometres</u>  |
| <u>SO<sub>2</sub></u> | <u>Sulfur Dioxide</u>                                                   |
| <u>SPHMMC</u>         | <u>Saint Paul Hospital Millennium Medical College</u>                   |
| <u>SWM</u>            | <u>Solid Waste Management</u>                                           |
| <u>WHO</u>            | <u>World Health Organization</u>                                        |

## Abstract

**Background:** Chronic bronchitis is a long term inflammation of the bronchial tubes. Smoking and persistent exposure to other lung irritants are considered among the major risk factors. Despite the fact that many researches on respiratory disease merely suggest an outdoor pollution as a remote cause, its association to solid waste disposal site deserves an extensive exploration.

**Objective:** The general objective of this study is to assess the prevalence of chronic bronchitis and associated factors among residents around Koshe municipal solid waste disposal area in Addis Ababa, Ethiopia.

**Methods:** Community based, cross-sectional study design was carried out among systematically selected 197 individuals who are living within the 1<sup>st</sup> kilometers of 'Koshe'/ Reppi solid waste disposal site which is located in south western part of Addis Ababa city. Pretested structured questionnaires were used to collect the data. Data entry and analysis was done by Epi-info version 7 and SPSS version 26 respectively. Bivariable and multivariable binary logistic regression analysis was used to control for confounders and identify factors associated with the outcome of interest. Odds ratio alongside 95%confidence intervals (CIs) were estimated to measure the strength of the association between dependent and independent variables. Level of statistical significance was declared at  $p\text{-value} \leq 0.05$ .

**Result:** The prevalence of chronic bronchitis was found to be 12.18% (95% CI: 11.87%-12.52%). Occupational exposure to smoke/dust, active cigarette smoking, history of Tuberculosis and Pneumonia are the factors significantly associated with chronic bronchitis.

**Conclusion:** There's a high prevalence of chronic bronchitis among people who live around solid waste disposal areas. Smoking, occupational smoke exposure, pneumonia and tuberculosis showed a significant impact in the development of chronic bronchitis.

**Recommendation:** An urban plan rearrangement is highly recommended so that the responsible government agencies may consider organizing relocation of the afflicted residents. Additionally, awareness creation on the preventive mechanisms and initiation of early medical check-up and follow up has to be established by health bureaus and by broadcasting Medias. Lastly, further researches are highly recommended to be performed by other researchers.

**Key words:** Chronic bronchitis, solid waste disposal, Addis Ababa

# **1. Introduction**

## **1.1. Background**

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory disorder that is usually characterized by progressive and not fully reversible airflow limitation[1]. It is one of the leading causes of morbidity and mortality worldwide. Chronic bronchitis is a phenotype of chronic obstructive pulmonary disease (COPD) which is clinically defined by chronic cough and sputum production for at least 3 months in 2 or more consecutive years[2]. Patients with Chronic Bronchitis present with a range of respiratory symptoms. The most common respiratory symptoms include dyspnea, cough and/or sputum production [3]..

Geo-environmental assessment and geophysical investigations were carried out over the only functional municipal solid waste disposal site of the city of Addis Ababa, Ethiopia, known locally as Koshe. The accumulated wastes from Koshe have impact on the surrounding human and physical environment since the disposal site was not designed [4]. The original aim of regulating waste disposal is to reduce the introduction of polluting substances into the atmosphere since protection of the environment is a major challenge facing developing countries[5]. Various researches have shown that the contribution of solid waste disposal to the total air pollutant health effect is around 10 percent[6]. The relationship between short-term air pollution exposure and acute respiratory symptoms and hospitalizations is well established, but limited data suggest a relationship between long-term ambient pollution exposure and the development of chronic respiratory diseases[7]. It has been revealed that PM<sub>2.5</sub> and NO<sub>2</sub> have the ability to go through the lung's defensive barrier and to affect the alveoli. These pollutants irritate the mucosal membrane of the respiratory organs and affect defenses that indirectly increase the risk of infection[8]

There are so many risk factors which are related to the occurrence of chronic bronchitis. This include smoking, which is the main one; long term exposure to other lung irritants such as passive smoking, air pollution, chemical fumes and dusts from the environment or workplace. Age and genetics are also considered to have a certain role[7]. A lot of remote factors such as industrialization and lack of adequate air pollution regulatory systems are said to be associated with the increment of chronic respiratory problems [9]. Piles of waste can be a breeding ground for pests and a potential source for an outbreak of an epidemic disease. In addition, emissions

from dumpsites will contaminate the entire natural environment[10]. As there has not been any proper record of the amount of waste being dumped at the Koshe municipality solid waste disposal site and there has not been any leachate or emission collection system; therefore, the amount of damage it has caused cannot be estimated. The dumpsite is causing a serious damage to the environment and is a significant threat to the health and lives of many living around the area. Regardless of the harmfulness of the waste, solid waste management has not been given the amount of attention it requires [11].

There is consistency in the findings which indicate the acute increment in urban air pollution and short term health effects (i.e. mortality and hospital admissions) on patients suffering from chronic bronchitis and chronic obstructive pulmonary disease COPD[6]. But, beyond the acute effects, a relevant public health and scientific question is to what extent chronic exposure to air pollution is related with lung function impairment and development of Chronic bronchitis[6]. The aim of this research is to identify the prevalence of chronic bronchitis among people living who have been exposed to solid waste disposal areas and may indicate the magnitude of association between chronic bronchitis and exposure to air pollution as well.

## 1.2. Statement of problem

Chronic Bronchitis is one of the leading causes of morbidity and mortality worldwide and the burden of the disease is growing globally as well as nationwide with a prevalence estimate in the general population of adults ranging from 3.5 to 27%[12]. Once regarded as a disease of high-income countries, is now recognized as common in low-income and middle-income countries reflected by more than 90% of COPD deaths worldwide[13]. More than 90% of chronic bronchitis and COPD deaths occur in low and middle-income countries. In Ethiopia, Chronic bronchitis and Chronic obstructive pulmonary disease (COPD) is being increased by annual growth rate of about 53.44%[3]. Additionally, there are several other unspecified diseases of the respiratory system which are currently being recorded at healthcare centers[14].

The prevalence of Chronic Bronchitis varies widely in different countries and it represents a large public health problem in Africa [14]. In a cross-sectional study of consecutive adult patients with chronic respiratory symptoms (8 weeks) attending hospital outpatient departments in Ethiopia, Kenya and Sudan, diagnoses of the reviewing clinicians were ascertained that 25% (95% CI 21–29) had chronic bronchitis[15]. Before several population-based surveys conducted in the early 2000s, information on respiratory diseases was very scarce, beyond the compulsory data provided by the World Health Organization (WHO), mostly based on mortality statistics[9]. In Sub-Saharan Africa, knowledge of chronic bronchitis is very poor; many people (healthcare workers, government officials, and the public) are unaware of the damage to respiratory health. Data for the burden of chronic bronchitis and related risk factors are scarce or not available. Some surveys have been done; however, they have often been of poor quality[13].

National surveys have shown that exposure to vapors, gas, dust, fumes, grain dust, organic dust, inorganic dust, ammonia, hydrogen sulfide, diesel exhaust, environmental tobacco smoke, and chemicals increases the risk for COPD morbidity and mortality among persons who have never smoked[16]. Previous studies have examined the prevalence of COPD in either rural or urban settings, but none has investigated how the pattern of chronic respiratory disease varies across different residential settings, with the aim of evaluating the impact of the urban environment. Little is known about the association between urbanization and the shifting burden of chronic respiratory disease in low- and middle-income countries, particularly those in sub-Saharan Africa[17].

On top of that, Chronic Bronchitis is one of the costliest diseases, particularly among patients with severe disease and those hospitalized in intensive care. Specialists are needed to provide advanced care to patients with more severe disease or increased complexity due to comorbidities [9]. In addition, respiratory conditions increased substantially as contributing causes of death among cardiovascular deaths occurring in days with high pollution levels. The greatest increase in the association between mortality and air pollution was observed for deaths due to respiratory conditions[6].

Addis Ababa is going through a rapid change. Continuous improvement parallel to changes is required. Sustainability and constant improvement are not familiar strategies in Ethiopia [10]. Even though the city administration is working to tackle these problems through different initiatives the result is not clear and not that much perceived by the society. Although some studies were conducted on waste management of the city, they are either old or focused on some parts of the city[10]. In Koshe, which is one of the few functional municipal solid waste disposal sites in Addis Ababa, Ethiopia; it was found out that the leachates from the site contain high concentration of biological oxygen demand, chemical oxygen demand, chloride and sulphate in addition to high concentration of cobalt, nickel and zinc in the surrounding soils. The accumulated wastes from Koshe have a huge impact on the surrounding human and physical environment[4].

Dumpsites usually ignite; the smoke and methane gas from their decomposition will pollute the atmosphere. Air pollution causes several lung and respiratory tract diseases [10]. Protection of human health and the environment is one of the major challenges facing developing as well as developed countries of the world [5]. Discernibly, there has never been a sufficient waste management system capable of addressing the multidirectional waste problem in the city. For many years, the need for a waste management system has not been recognized by the administrators. In the beginning, the administrators were not concerned with the matter as the number of habitants was relatively low and the waste generated was not grave in both amount and type. Therefore, disposing of waste at a far site was an easy tactic. However, with the fast expansion of the city, the far site has become somebody's back yard[11].

Despite an increasing burden of chronic bronchitis in the world, it is often a neglected disease in low income countries and prevalence studies are rare in Sub-Saharan Africa including Ethiopia.

Considering the cost and the burden of the disease in general, its association to air pollution in parallel with the concomitant industrialization and waste production deserves an earnest investigation in our setup.

### **1.3. Significance of study**

Knowledge of the prevalence of chronic bronchitis is still incomplete because of many methodological problems in epidemiological studies, above all imprecise and variable definitions of the disease[13]. The inability to get adequate and comparable studies regarding the problem has made it quiet impossible to determine the extent of the situation. This study will try to reflect the real scenario and it's anticipated to fill this gap being a pioneer in studying chronic bronchitis in Addis Ababa. More on that, it will suggest the burden of chronic bronchitis in municipal solid waste disposal area of 'koshe'. This in turn will help sustainable interventions be issued by health bureaus in preventing chronic respiratory diseases in people who are vulnerable. In addition to that, it will serve as an inspiration as well as a landmark of comparison to other researchers so that they perform prevalence studies regarding chronic bronchitis in our country.

## **2. Literature Review**

### **2.1. Prevalence of chronic bronchitis**

The burden of Chronic Bronchitis and Chronic Obstructive Pulmonary Disease (COPD) across many world regions is high[9]. Chronic Bronchitis is currently the fourth leading cause of death in the world[10]. More than 3 million people died of COPD in 2012 accounting for 6% of all deaths globally[12].

The Third National Health and Nutrition Examination Survey (NHANES III) estimated that the prevalence of chronic bronchitis was 6.8 to 8.5% within the general U.S. population. The estimated prevalence of chronic bronchitis at the Cincinnati VAMC is 8.7% on the basis of the recorded diagnosis of chronic bronchitis in the EMR and is similar to the U.S. population prevalence [18].

The Global Burden of Disease (GBD) project (the latest conducted in 2013) provided estimates for mortality and disability-adjusted life years (DALY) lost in multiple Latin American countries. The PLATINO and PREPOCOL population-based studies documented the prevalence of chronic bronchitis and COPD in several Latin American (Mexico City, Sao Paulo, Montevideo, Santiago and Caracas) and Colombian (Medellin, Bogota, Barranquilla, Bucaramanga and Cali) cities. COPD ranged between 6.2 and 19.6% in individuals  $\geq 40$  years of age[9]. The overall prevalence of chronic bronchitis in china was 7.8% (95%CI, 7.9-8.6) according to GOLD diagnostic criteria[12].

Respiratory symptoms and pulmonary function were assessed in 17,966 subjects (20 – 44 yrs), randomly selected from the general population, in the frame of the European Community Respiratory Health Survey. The median prevalence of chronic bronchitis was 2.6%, with wide variations across countries [6].

According to the Global Initiative for Chronic Obstructive Lung Disease criterion, COPD prevalence was 12.4% in rural Uganda[13]. In a cross-sectional study which was conducted among 417 randomly selected Akaki textile factory workers, Addis Ababa, Ethiopia, the Overall prevalence of chronic bronchitis was 32% [19]. In Abeshge district, Ethiopia, The prevalence of chronic bronchitis was estimated to be 17.8%[3]. The rate of annual growth of chronic bronchitis

and COPD in Addis Ababa is about 53.44%. Only 8 incidents were recorded in 2013 for the first time and then increased to 1871 incidents by 2017[13]. Not many studies are actually available to be cited regarding prevalence of chronic bronchitis in Ethiopia as well as in East Africa.

## **2.2. Factors associated with the occurrence of chronic bronchitis**

### **2.2.1. Personal and biological factors**

Tobacco smoking is a major risk factor for chronic bronchitis, a debilitating respiratory condition with high mortality and morbidity[20]. The lifetime risk of chronic bronchitis among smokers is approximately two in five [21]. The prevalence of chronic bronchitis and the distribution of its major risk factor, cigarette smoking, seem to vary widely across countries. However, available data are not easily comparable [22].

Chronic bronchitis and COPD prevalence was estimated to be greater in current (12.5%) and former (9.4%) smokers than in never smokers (5.8%). Although smoking is the major cause of COPD, other factors including age, gender, and occupational exposures contribute to its development[18].

According to GOLD criteria, prevalence varied between 6.2% in Barranquilla, Colombia to 19.6% in Montevideo, Uruguay, both at sea level, but the latter, with an older population, mostly of European origin. As observed in other studies, prevalence increased with aging and male gender [9]. In China, the prevalence of chronic bronchitis was significantly higher in men than in women[12].

In 2007, The Burden of Lung Disease study in South Africa showed a high prevalence of stage 2 or higher chronic bronchitis (22.2% in men and 16.7% in women) in an urban population older than age 40 years, associated with previous tuberculosis and occupational exposure in addition to smoking[13]. A study from Columbia has reported that the association between TB and airway obstruction was stronger than that observed between smoking and airway obstruction [23].

In 2008–09, a survey done in urban and rural Rwanda reported a COPD prevalence of 9.6% in people older than age 45 years. Contributing risk factors for chronic bronchitis in low-income and middle-income countries are a history of tuberculosis, untreated asthma, respiratory infections and malnutrition[13].

Most surveys show that 20–30% of individuals with airflow obstruction, regardless of the definition used, are never smokers, emphasizing important additional causes of airway obstruction[9].

### **2.2.2. Socio-economic and environmental factors**

The number of chronic bronchitis and COPD cases increased from 227.3 million in the year 1990 corresponding to a global prevalence of 10.7% to 384 million in 2010 with a global prevalence of 11.7%. This increase of 68.9% was mainly driven by global demographic changes[21].

The WHO (World Health Organization) evaluated the magnitude of urban air pollution using four main indicators: PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, and troposphere ozone in 24 mega cities of the world. The study showed the presence of increased level of urban air pollution in larger cities of developing countries compared to those of the developed nations[9].

Latin America is one of the areas in the world with the widest disparity in income within and between countries, leading to a coexistence of diseases of poverty with those seen in developed countries[9]. COPD associated with biomass smoke exposure was a common clinical phenotype in Latin America, found as a risk factor in PREPOCOL and other observational studies in the region[9].

Previously during the 1950s, researchers in the UK had shown that air pollution was not only the cause of sudden exacerbation in patients suffering from chronic obstructive pulmonary disease (COPD), but also that prevalence of chronic bronchitis and cor pulmonale appeared to be greater in postmen from areas with higher pollution than in postmen from other areas[6]. A higher prevalence of respiratory diseases compatible with chronic bronchitis in areas with higher air pollution was also observed in the US and Poland. In the Netherlands, it was found that living in highly polluted areas had effects independent of smoking[6].

Annual particulate matter was the single most important pollutant of ambient air, often exceeding 4-5 times the WHO guideline (20 µg /m<sup>3</sup>), in Asian mega cities. Cairo had the highest PM<sub>10</sub>, nearly 150 µg/m<sup>3</sup>; Johannesburg and Cape Town had less than 40 µg/m<sup>3</sup>. The continued use of

coal and biomass fuel in Beijing was a factor that contributed to the annual PM<sub>10</sub> level of 140 µg/m<sup>3</sup> that labeled the city as the most polluted in the World[8].

Generally, Asian and African cities have about 4 times higher concentrations of ambient air pollutants than cities in developed countries. It will take far longer time for the developing countries to reach the current level that developed nations have attained [4]. The quality of air is now becoming a serious issue of cities. The death of 6.5 million people (More than 11% of the deaths) worldwide is linked with air pollution[2].

The primary contextual factors associated with respiratory health outcomes were crowding socioeconomic status (assessed using total household income), indoor air quality, and outdoor environment (assessed by responses to questions about having an outdoor corral or feedlot, bales, grain bins, sewage pond or manure lagoon, garbage dump, lumber yard or saw mill near the home)[24].

With industrial progress, growing urban areas and rapid growth, solid-waste management has become a major concern in many developing countries. In the larger towns or cities like New Delhi, the availability of land for waste disposal is also very limited. In the majority of urban centers, solid waste is disposed of by depositing it in low-lying areas outside the city without following the principles of sanitary landfilling such as leachate collection and monitoring that make this disposal method unsustainable[25].

When Repi/’Koshe’ was established in 1964, it was considered far enough not to be anybody’s problem; however, with the fast expansion of the city, now the dumpsite has been surrounded by settlements. The dumpsite does not have any proper gas or leachate collection system. The boundaries of the dumpsite are not exactly known as it does not even have a proper fence, however the waste at the site covers an area of 36 ha.[11].

Domestic solid waste is becoming a threat to Addis Ababa city’s environment, as only 65% of the waste produced per day is collected and disposed, 5% is recycled, 5% is composted and the remaining 25% is uncollected and dumped in unauthorized areas. Since domestic waste dominate the municipality’s waste category, its management and associated environmental impacts is worthy of attention[10].

Communities in developing countries often turn to waste disposal methods that have proven to be destructive to human health and the environment, such as open dumping and burning (or unregulated landfills) because they feel they have no other options to manage their solid waste[25]. Disregarding the waste issue can also be observed among the people. Getting the waste out of site has been a well-embedded approach for long. The waste has been piling and causing damage silently[11].

As it was reported by Addis Ababa Health birroue, air pollution related respiratory diseases are increased alertly[14]. In spite of this fact, Waste management was never considered a pressing matter as the country has been going through numerous international and civil wars and there were always more important matters to address. Unfortunately, when the true magnitude of the problem was recognized the damage has already been done[11].

### **2.2.3. Political and administrative factors**

The adverse impact of air pollution on environment and health for which it has threatened the living conditions of human beings and existence of all creatures in the world is well understood by the international community at global level[3].

WHO provides international air quality guidelines that can be adopted or modified by each member country based on socio-economic conditions. Individual countries, depending on their resource and technological feasibilities, have their own standards adopted or modified from the international practice[21].

Accordingly, Ethiopian environmental policy has been crafted to address the environmental issues including pollution[14]. Pollutants that have health importance on the basis of epidemiological research are regulated and monitored. Guidelines provide an average exposure that is required to protect the general public from short and long term health effects[8].

National Ambient Air Quality Standards developed by the Environmental Protection Agency of USA (EPA-USA) is widely cited and used by many researchers. Environmental Protection Agency of USA (EPA-USA) uses two types of air quality guidelines: primary ambient air quality standards which are required to safeguard the health of population, and secondary ambient air

quality standards required to protect the public welfare such as buildings, soil, water, visibility, and vegetation[8].

As the urban population in East Africa grows, so does the solid-waste management burden, a situation worsened by poor funding for urban sanitation departments and a lack of enforcement of sanitation regulations. Without proper controls, solid waste is often dumped in abandoned quarries or similar sites[25].

In Nairobi, for example, municipal waste is taken to the Dandora dumping site, a former quarry. Residents living close to the dumpsite are therefore exposed to environmental and disease risks. More often than not, the urban poor have to make do with living amid waste despite the health risks. Similar situations exist in many other developing nations where population and industrial growth are on the rise and systems are too weak and ineffective to handle the added strain[25].

The process of implementing regulations in the Federal Democratic Republic of Ethiopia (FDRE) goes as follows: a proclamation is first passed by the president; according to the proclamation the council of ministers issues regulations for effective implementation, and the authorities issue directives. Girma Wolde Giorgis (President 2001-2013) passed the first proclamation regarding specifically to solid waste in 2007. The proclamation may be cited as Solid Waste Management Proclamation No.513/2007[11].

Environmentally sound management of the increasing amounts of municipal solid wastes generated in cities is of main concern to city administrators. Limited technological and economic resources result in the prevalent low standards of waste management which is exacerbated by public perception of waste disposal. Involvement of the private sector and communities in waste management services is very limited[10].

The current solid waste management system mainly relies on the municipality to address it. The method used by the municipality is crude open dumping after collection from households and institutions at a place called Reppie about 15 km from the city center. The dump has been running for the last 50 years without proper management[11]. Waste to energy is internationally recognized as a powerful tool to prevent the emission of greenhouse gases and to mitigate climate change. The Reppie waste to energy project which was built at the cost of 95 million USD began in 2014 under an agreement signed between UK based Cambridge industries and the

Ethiopian government, was found to be a misguided investment starting from the initial decision making process.

Due to the insufficient waste management system in Addis Ababa, the habitants suffer the site and consequences of accumulated waste piles on the streets and drains all around the city. These piles pollute the surrounding vegetation, ground water and soil from the leachate. Due to weather variation and chemical reaction between materials fire ignites. The emission from the smoke pollutes the atmosphere[11].

In general, various legislations including proclamations, regulation and standard guidelines have been developed. Many countries including Ethiopia agreed and signed an agreement to reduce emission of gaseous pollutants. Kyoto protocol, Montreal protocol, Stockholm convention, Copenhagen Summit, South Africa Summit and Paris Agreement are some of the multilateral agreements that Ethiopia has taken the lead and signed at the forefront[14].

However, issue was understood properly and, environmentalist and epidemiologist have studied its effect intensively; and also noticed by WHO and policy makers, the problem is aggravated in developing country related to the increasing industrialization and rate of urbanization[14].

The prevalence and burden of COPD are projected to increase over the coming decades due to continued exposure to COPD risk factors and aging of the world's population; as longevity increases more people will express the long-term effects of exposure to COPD risk factors[12].

### **2.3. Conceptual Framework**

Various distal and proximal risk factors are known to have a great impact in the occurrence of chronic bronchitis. Distal factors include socio-economic factors and political factors whereas personal and biological factors such as age greater than 40 and cigarette smoking can be considered as proximal factors with a direct relationship with chronic bronchitis.

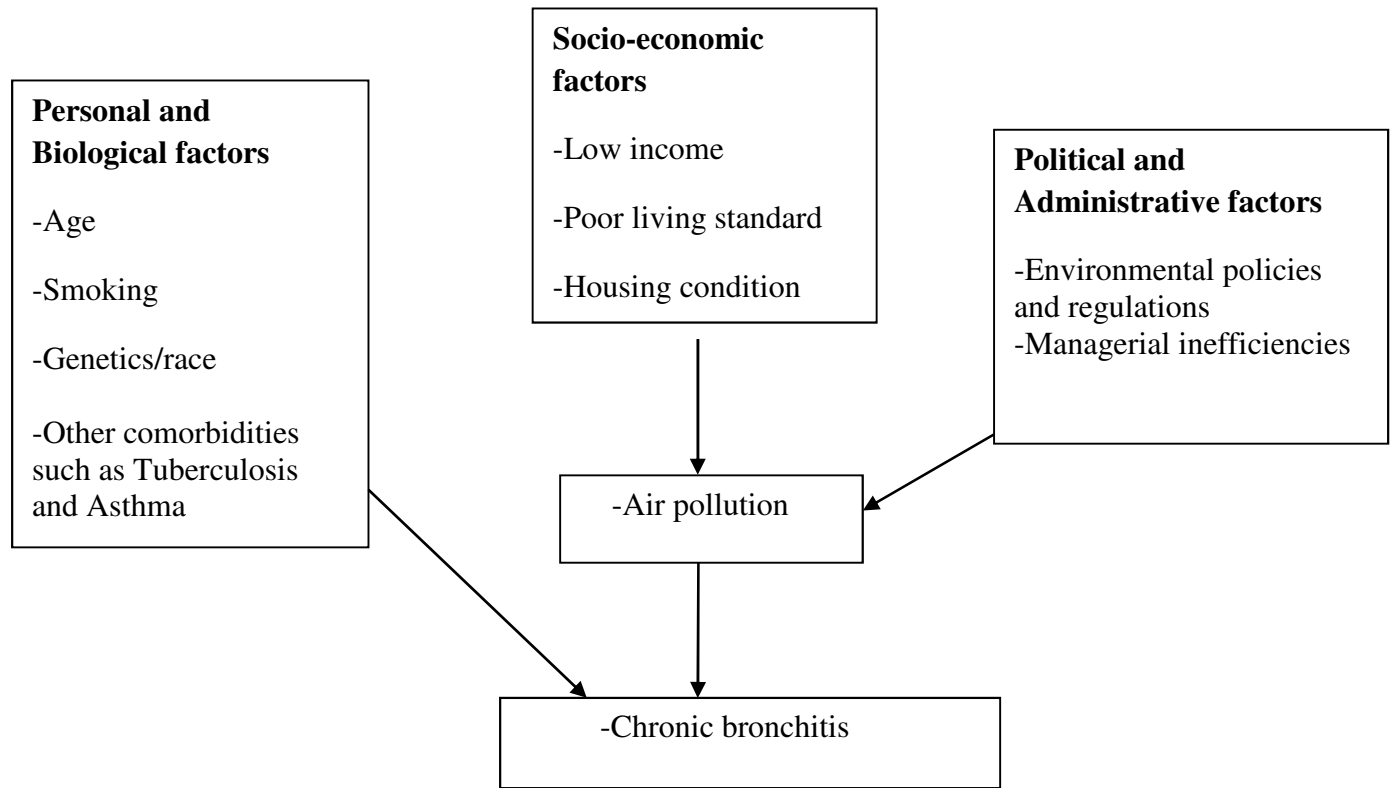


Figure 1:- Conceptual Framework of different factors associated to chronic bronchitis

### **3. Objectives**

#### **General Objective**

- To assess the prevalence of chronic bronchitis and associated factors among residents around municipal solid waste disposal areas in Addis Ababa, Ethiopia

#### **Specific Objectives**

- To determine the prevalence of chronic bronchitis among adults living around “koshe” solid waste disposal site
- To identify factors associated with the occurrence of chronic bronchitis among people living around “Koshe” municipal solid waste disposal site

## 4. Method

### 4.1. Study setting and period

Kolfe keranio is one of the 10 subcities of Addis Ababa, Ethiopia. As of 2022, its population was 604,226. It is located in the western suburb of the city, near the Gefersa Reservoir. It borders with the districts of Gullele, Addis Ketema, Lideta and Nifas silk-Lafto. There are 15 woredas or districts, which are the third-level administrative divisions of Ethiopia[4].

The study area of this research, ‘Koshe’ or ‘Rappi’, is located in the south west part of Addis Ababa, residing in Woreda 01 of kolfe keranio sub city, 13 kms from the center of the city with a total surface area of 36 hectares has been well known to be one of the major solid waste disposal sites of the city[11]. It has been established in 1964 when it was supposed to be remote from the central area[10].

The study was conducted from March to May, 2023.



Figure 2:- Koshe waste disposal site, Addis Ababa, Ethiopia

### 4.2. Study design

Community based cross sectional study was conducted.

### **4.3. Source population**

Residents living within 1 km from 'Koshe' solid waste disposal site, estimated to be in the area which extends from 'Jemo michael' upto 'China camp area'; and from 'Mekanissa Kore' upto 'Zenebework' are the source population of this research.

### **4.4. Study population**

All systematically selected men and women above age 40 among residents living around "Koshe" solid waste disposal area were the focus of this research since one of the major risk factors to develop chronic bronchitis is age greater than 40[13].

### **4.5. Inclusion criteria**

All individuals aged 40 and above who have lived around 'Koshe' waste disposal site for more than a period of two and a half consecutive years. Two years is necessary to clinically define the diagnosis of chronic bronchitis and the additional 6 months is the standard criteria of the municipality to proclaim that a certain individual is a resident of his/her respective woreda.

### **4.6. Exclusion criteria**

All individuals who have mental disorders; or individuals who are unable to give appropriate information because of health problems such as neurological and auditory deficits were excluded.

### **4.7. Sample size determination**

Sample size was calculated using sample size calculation formula for single population proportion by considering 95% confidence level, 15% prevalence of chronic bronchitis[3] and 5% level of precision

$$N = \frac{(Z_{\alpha})^2 (P*q)}{d^2}$$

Where p is the prevalence of chronic bronchitis

q is 1-p

d is the precision of the estimate

$Z_{\alpha}$  is the value of z from the probability table

$$N = \frac{(1,96)^2 (0.15)(0.85)}{(0.05)^2} \dots\dots\dots$$

Considering a non-response rate of 10% makes the sample size 218

#### **4.8. Sampling procedure**

The initial phase of the data collection commenced with the training of data collectors. The trainees were 3 in number and all of them have graduated with Bachelor of Science degree in Public Health. Systematic sampling was implemented to select study participants. Households were selected in every 5<sup>th</sup> house interval from the source population of people who inhabit one kilometer surrounding the Koshe municipal solid waste disposal area. A single individual who is aged above 40 years old is taken as a respondent from each and every sampled household. Among the 218 households, 13 households were unavailable and 8 households were lacking an individual within the age limit of the inclusion criteria of the study.

#### **4.9. Study variables**

**4.9.1. Dependent variable:** Chronic bronchitis (yes/no)

**4.9.2. Independent variables:** age, sex, marital status, level of education, monthly income, occupation, Number of rooms per house is, average number of windows per room, number of family members, do you have a separate kitchen, what type of cooking utensil do you use, history of occupational exposure to smoke or dust, presence of other diagnosed respiratory disease (yes/no), duration of stay in the area, history of active smoking, history of passive smoking, previous history of chronic bronchitis, previous history of treatment for chronic bronchitis, presence of any other chronic illnesses such as TB, Asthma, Pneumonia, COVID Pneumonia, DM, HTN, cardiovascular diseases(yes/no), family history of chronic bronchitis

#### **4.10. Operational definitions**

**Clinical diagnosis of Chronic Bronchitis:** having chronic cough and sputum production for at least 3 months in 2 or more consecutive years [2].

**Pack-year:** number of packs of cigarettes smoked per day multiplied by the number of years the person has smoked; pack-year is calculated by multiplying the years of smoking by the daily number of smoked cigarettes and then dividing the product by 20 [20].

**Occupational exposure to dust/smoke:** contact with a potentially harmful airborne particles as a result of one's work

**Active Smoking:** a process of inhaling a smoke from burnt tobacco or cigarette

**Passive Smoking:** an involuntary inhalation of smoke from other people's cigarettes

**Dry Cough:** A cough which doesn't produce phlegm or sputum

**Productive Cough:** A cough which produces phlegm or sputum

**Bloody sputum:** small amounts of blood mixed with sputum or more seriously large amounts of bright red blood brought about by forceful cough

#### **4.11. Data collection method**

The data was collected from a total of 197 individuals through a face-to-face interview using pretested structured questionnaires. The questions are developed based on the objective of the research and include socio-demographic characteristics, living and housing conditions, occupational and residential history, personal and medical history.

#### **4.12. Data quality control**

To ensure the quality of the data, thorough training was given for the data collectors in the initial phase of the data quality control process. Continuous on site and off site monitoring and supervision was performed throughout the data collection. Following the data collection, further quality control method was ensured by performing data cleaning techniques using SPSS software.

#### **4.13. Data processing and analysis**

The data were entered into Epi-info version 7 and exported to SPSS version 26 for data analysis. Hosmer Lemeshow fitness model was checked and it was found to be 0.99. Variance Inflation Factor (VIF) was also calculated to scrutinize for multicollinearity and it was found to be 1.11. Means, Medians and frequencies of the different variables were computed. The prevalence of chronic bronchitis was estimated. Crude and Adjusted Odds ratios were also calculated for the different variables through logistic regression analysis to identify factors associated with the outcome variable. Level of statistical significance was declared at p-value less or equal to 0.05.

#### **4.14. Ethical considerations**

Ethical clearance was obtained from Institutional Review Board of SPHMMC and a formal letter of cooperation was written to address the respective offices in general and participants in particular. Informed and written consent was signed by each individual who took part in the study. Every aspect of the data was kept confidential and anonymity was secured throughout the study. Participants with acute and chronic respiratory symptoms were advised to seek medical attention for subsequent appropriate diagnosis and management.

## 5. Results

### 5.1. Socio demographic and Socio economic characteristics of respondents

A total of 197 individuals (109 women and 88 men) who are age 40 years and above have participated in this study. The median age (IQR) of the participants was 55 (48-65). 80.2 % of them were married. The combined percentage of those who do not have formal education or primary education is 71.6. The median income (IQR) of the participants was 3000 (2000-5000).

Among the total number of participants, 24(12.18%) of them have had symptoms of Chronic Bronchitis. Most individuals with symptoms of Chronic Bronchitis were married 21 (87.5%), but only one (4.2%) of them was single. While 9(37.5%) of them had no formal education, 8 (33.3%) participants completed primary and 2 (8.3%) of them completed college education. Additionally, 10 (41.7%) of them were unemployed while 5 (20.8%) of them were private business owners and 4 (16.7%) of them were daily laborers. (Table 1)

Table 1: Socio demographic and socio economic characteristics of residents who live in Koshe Municipal Solid Waste Disposal Area, Addis Ababa, Ethiopia, 2023

| Variables             | Categories                                | Chronic bronchitis n() |            |
|-----------------------|-------------------------------------------|------------------------|------------|
|                       |                                           | Yes n (%)              | No n (%)   |
| Age                   | 40-50years                                | 9(37.5)                | 53(30.6)   |
|                       | 50-65years                                | 9(37.5)                | 76(43.9)   |
|                       | 65-86 years                               | 6(25)                  | 44(25.4)   |
| Sex of the respondent | Male                                      | 13 (54.2)              | 75 (43.4)  |
|                       | Female                                    | 11 (45.8)              | 98 (56.6)  |
| Marital status        | Single                                    | 1 (4.2)                | 5 (2.9)    |
|                       | Married                                   | 21 (87.5)              | 137 (79.2) |
|                       | Separated                                 | 0 (0)                  | 5 (2.9)    |
|                       | Divorced                                  | 0 (0)                  | 4 (2.3)    |
|                       | Widowed                                   | 2 (8.3)                | 22 (12.7)  |
| Level of Education    | None                                      | 9 (37.5)               | 60 (34.6)  |
|                       | Primary School                            | 8 (33.3)               | 64 (37)    |
|                       | High School                               | 5 (20.9)               | 37 (21.4)  |
|                       | College                                   | 2 (8.3)                | 12 (7)     |
| Monthly Income        | 500-5000 birr                             | 17(70.8)               | 118(68.2)  |
|                       | 5000-15000 birr                           | 7(29.2)                | 46(26.6)   |
|                       | >15000birr                                | 0(0)                   | 9(5.2)     |
| Occupation            | Unemployed                                | 10 (41.7)              | 69 (39.9)  |
|                       | Daily Laborer                             | 4 (16.7)               | 19 (11)    |
|                       | Private business owner                    | 5 (20.8)               | 57 (33)    |
|                       | Professional public organization employee | 2 (8.3)                | 8 (4.6)    |
|                       | Vocational public organization employee   | 1 (4.2)                | 13 (7.5)   |
|                       | Vocational private organization employee  | 2 (8.3)                | 4 (2.3)    |

## 5.2. Living and Housing condition related characteristics of residents

The median (IQR) number of room per households of respondents was found to be 4(2-5). The median (IQR) number of average windows per rooms was 1(0). The median (IQR) number of family members was 4 (4-6). A total of 18 (75%) individuals among the respondents with Chronic Bronchitis had a separate kitchen and most of them 19 (57.6%) used electric stove as a cooking utensil. A total of 17.26% of the study participants had history of occupational exposure to smoke. The median (IQR) duration of occupational exposure to smoke/dust was 11 (8-20.25) years whereas the median (IQR) duration of stay of participants in the study area was 25 (15-35) years. (Table 2)

Table 2: Living and housing condition related characteristics of residents who live in koshe Municipal Solid Waste Disposal Area, Addis Ababa, Ethiopia, 2023

| Variables                        | Categories     | Chronic bronchitis n() |            |
|----------------------------------|----------------|------------------------|------------|
|                                  |                | Yes n (%)              | No n (%)   |
| Number of rooms per house        | 1              | 3(12.5)                | 20(11.6)   |
|                                  | 2-5            | 18(75)                 | 100(57.8)  |
|                                  | >5             | 3(12.5)                | 53(30.6)   |
| Number of family members         | 1-5            | 14(58.3)               | 91(52.6)   |
|                                  | >5             | 10(41.7)               | 82(47.4)   |
| Ownership of separate kitchen    | Yes            | 18 (75)                | 141 (81.5) |
|                                  | No             | 6 (25)                 | 32 (18.5)  |
| Type of cooking utensils         | Electric Stove | 19 (57.6)              | 156 (58)   |
|                                  | Kerosene       | 1 (3)                  | 8 (3)      |
|                                  | Charcoal       | 12 (36.4)              | 95 (35.3)  |
|                                  | Wood           | 1 (3)                  | 10 (3.7)   |
| Occupational smoke/dust exposure | Yes            | 7 (29.2)               | 27 (15.6)  |
|                                  | No             | 17 (70.8)              | 146 (84.4) |
| Duration of stay in Koshe area   | 2-15years      | 4(16.7)                | 42(24.3)   |
|                                  | 15-25years     | 7(29.2)                | 44(25.4)   |
|                                  | >25years       | 13(54.2)               | 87(50.3)   |

### 5.3. Prevalence of Chronic Bronchitis

The overall prevalence of chronic bronchitis was 12.18% (95% CI of 11.87%-12.52%) of which 45.8% of them were females and 54.2% of them were males. (Figure 3)

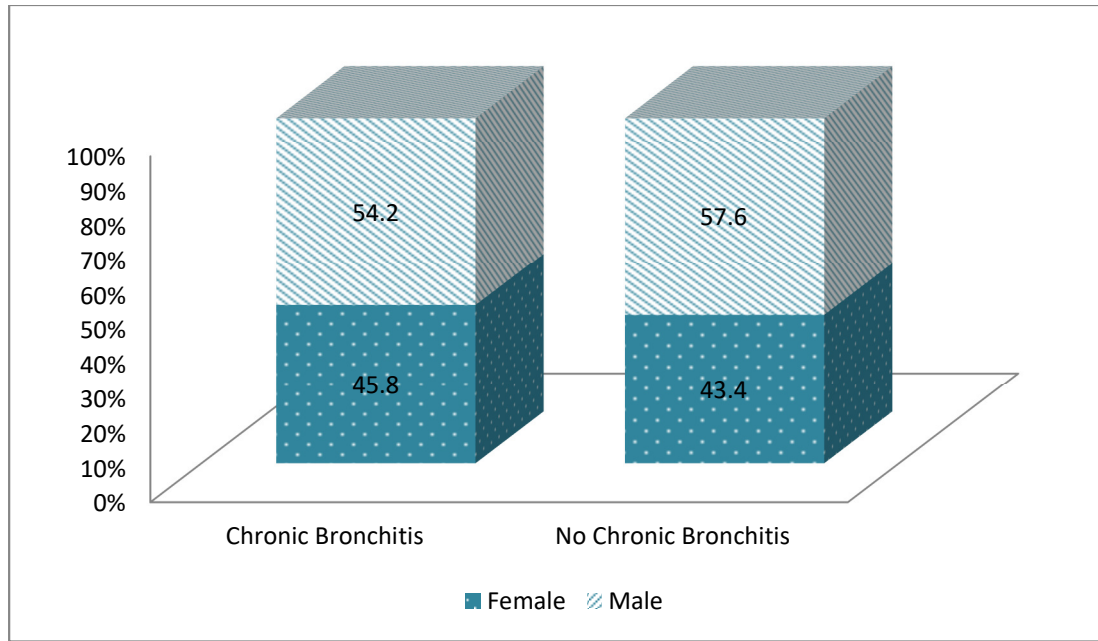


Figure 3:-Prevalence of chronic bronchitis among residents of koshe solid waste disposal area, 2023

### 5.4. Personal characteristics of study participants

The total number of respondents who have had history of active cigarette smoking was 9 (4.7%) with the median (IQR) duration of cigarette smoking being 8 years (4.5-12.5). The median (IQR) duration of exposure to passive smoking was 13.5 years (5.75-20). From the total number of respondents with evidences of Chronic Bronchitis, 5 (20.8%) of them had history of active smoking while 4 (16.7%) of them had a history of passive smoking exposure. Only one (4.2%) individual reported to have history of bloody sputum. Five (20.8%) of them had previous history of Chronic Bronchitis and 4 (16.7%) of them were treated for Chronic Bronchitis. Among the total participants, 9 individuals (4.6%) had Asthma, while 20 (10.2%), and 9 (4.6%) had history of Pneumonia and Tuberculosis respectively. (Table 3)

Table 3: Personal and medical characteristics of residents who live in koshe Municipal Solid Waste Disposal Area, Addis Ababa, Ethiopia, 2023

| Variables               | Categories  | Chronic bronchitis n() |            |
|-------------------------|-------------|------------------------|------------|
|                         |             | Yes n (%)              | No n (%)   |
| Active Smoking          | Yes         | 5 (20.8)               | 4 (2.3)    |
|                         | No          | 19 (79.2)              | 169 (97.7) |
| Passive Smoking         | Yes         | 4 (16.7)               | 8 (4.6)    |
|                         | No          | 20 (83.3)              | 165 (95.4) |
| Bloody Sputum           | Yes         | 1 (4.2)                | 0 (0)      |
|                         | No          | 23 (95.8)              | 173 (100)  |
| Ever been told to have  | Yes         | 5 (20.8)               | 0 (0)      |
|                         | No          | 19 (79.2)              | 173 (100)  |
| Previous treatment for  | Yes         | 4 (16.7)               | 0 (0)      |
|                         | No          | 20 (83.3)              | 173 (100)  |
| Tuberculosis            | Yes         | 4 (16.7)               | 5 (2.9)    |
|                         | No          | 20 (83.3)              | 168 (97.1) |
| Completion of Anti-TB   | Yes         | 4 (16.7)               | 5 (2.9)    |
|                         | No          | 20 (83.3)              | 168 (97.1) |
| Asthma                  | Yes         | 4 (16.7)               | 5 (2.9)    |
|                         | No          | 20 (83.3)              | 168 (97.1) |
| Medication for Asthma   | Yes         | 4 (16.7)               | 4 (2.3)    |
|                         | No          | 20 (83.3)              | 169 (97.7) |
| Pneumonia               | Yes         | 7 (29.2)               | 13 (7.5)   |
|                         | No          | 17 (70.8)              | 160 (92.5) |
| Completion of treatment | Yes         | 7 (29.2)               | 12 (6.9)   |
|                         | No          | 17 (70.8)              | 161 (93.1) |
| COVID-Pneumonia         | Yes         | 2 (8.3)                | 8 (4.6)    |
|                         | No          | 22 (91.7)              | 165 (95.4) |
| Type of management      | Out patient | 2 (100)                | 6 (75)     |
|                         | Inpatient   | 0 (0)                  | 2 (25)     |
| Intranasal Oxygen       | Yes         | 7 (100)                | 64 (98.5)  |
|                         | No          | 0 (0)                  | 1 (1.5)    |

## 5.5. Medical characteristics of study participants

Additionally, 14 (7.2%) of the study participants were diabetic and 29 (14.7%) of the respondents were hypertensive. Only 2 (8.3%) of those respondents had history of COVID pneumonia. Prevalence of Diabetes Mellitus and Hypertension among the participants with Chronic Bronchitis was 1 (4.2%) and 4 (16.7%) respectively while Cardiac disease and Family history of Chronic Bronchitis was found on only One (4.2%) of those respondents. (Table 4)

Table 4: Medical characteristics of residents who live in koshe Municipal Solid Waste Disposal Area, Addis Ababa, Ethiopia, 2023

| Variables                                          | Categories | Chronic bronchitis n() |            |
|----------------------------------------------------|------------|------------------------|------------|
|                                                    |            | Yes n (%)              | No n (%)   |
| Diabetes Mellitus                                  | Yes        | 1 (4.2)                | 13 (7.5)   |
|                                                    | No         | 23 (95.8)              | 160 (92.5) |
| Treatment for DM                                   | Yes        | 1 (4.2)                | 13 (7.5)   |
|                                                    | No         | 23 (95.8)              | 160 (92.5) |
| Hypertension                                       | Yes        | 4 (16.7)               | 25 (14.5)  |
|                                                    | No         | 20 (83.3)              | 148 (85.5) |
| Anti-hypertensive medication                       | Yes        | 3 (12.5)               | 22 (12.7)  |
|                                                    | No         | 21 (87.5)              | 151 (87.3) |
| Cardiac Disease                                    | Yes        | 1 (4.2)                | 1 (0.6)    |
|                                                    | No         | 23 (95.8)              | 172 (99.4) |
| Usage of medication for cardiac disease            | Yes        | 1 (4.2)                | 1 (0.6)    |
|                                                    | No         | 23 (95.8)              | 172 (99.4) |
| Family history of Chronic Bronchitis               | Yes        | 1 (4.2)                | 8 (4.6)    |
|                                                    | No         | 23 (95.8)              | 165 (95.4) |
| Family history of treatment for Chronic Bronchitis | Yes        | 1 (4.2)                | 9 (5.2)    |
|                                                    | No         | 23 (95.8)              | 164 (94.8) |

## 5.6. Factors associated with chronic bronchitis

### 5.6.1. Results of bivariable analysis

The variables which were considered significant with a P value cut off point of 0.25 include usage of electric stove ( $p=0.118$ ), occupational exposure to smoke/dust ( $p=0.11$ ), history of active smoking ( $p=0.001$ ) and history of passive smoking. Previous diagnosis of tuberculosis ( $p=0.01$ ), asthma ( $p=0.03$ ), pneumonia ( $p=0.01$ ) and cardiac disease ( $p=0.16$ ) are also found to be significant. These variables were further calculated to find out that the variables which are statistically significant are Occupational exposure to smoke with a p value of 0.05, history of active smoking with a p value of 0.01, history of pneumonia with a p value of 0.01 and history of tuberculosis with a p value of 0.02.(Table 5)

Table 5: Factors associated with chronic bronchitis on bivariable analysis among residents who live in Koshe solid waste disposal area, Addis Ababa, Ethiopia, 2023

| Variables                        | Categories | Chronic bronchitis n (%) |            | COR               |
|----------------------------------|------------|--------------------------|------------|-------------------|
|                                  |            | Yes n (%)                | No n (%)   |                   |
| Electric Stove                   | Yes        | 19 (79.2)                | 156 (90.2) | 0.41(0.14-1.25)   |
|                                  | No         | 5 (20.8)                 | 17 (9.8)   |                   |
| Occupational smoke/dust exposure | Yes        | 7 (29.2)                 | 27 (15.6)  | 2.23(0.84-5.88)   |
|                                  | No         | 17 (70.8)                | 146 (84.4) |                   |
| Active Smoking                   | Yes        | 5 (20.8)                 | 4 (2.3)    | 11.12(2.75-44.98) |
|                                  | No         | 19 (79.2)                | 169 (97.7) |                   |
| Passive Smoking                  | Yes        | 4 (16.7)                 | 8 (4.6)    | 4.13(1.14-14.94)  |
|                                  | No         | 20 (83.3)                | 165 (95.4) |                   |
| Tuberculosis                     | Yes        | 4 (16.7)                 | 5 (2.9)    | 6.72(1.67-27.09)  |
|                                  | No         | 20 (83.3)                | 168 (97.1) |                   |
| Asthma                           | Yes        | 4 (16.7)                 | 5 (2.9)    | 0.15(0.04-0.60)   |
|                                  | No         | 20 (83.3)                | 168 (97.1) |                   |
| Pneumonia                        | Yes        | 7 (29.2)                 | 13 (7.5)   | 9.17(0.07-0.57)   |
|                                  | No         | 17 (70.8)                | 160 (92.5) |                   |
| Cardiac Disease                  | Yes        | 1 (4.2)                  | 1 (0.6)    | 7.48(0.45-12.36)  |
|                                  | No         | 23 (95.8)                | 172 (99.4) |                   |

### 5.6.2. Results of multivariable analysis

Based on the subsequent multivariable logistic regression analysis, the odds of developing Chronic Bronchitis among those who had occupational exposure to smoke/dust is 3.8 times (95% CI: 1.16-12.7) higher than those who had no occupational exposure to smoke/dust while the odds of developing Chronic Bronchitis among those individuals who had history of active cigarette smoking is 10.1 times (95% CI: 1.99-51.16) greater than those who never smoked cigarettes. Moreover, the odds of developing Chronic Bronchitis among the participants who were diagnosed to have Tuberculosis in the past is 10.68 (95% CI: 1.66-68.76) times more than those who have never been diagnosed to have Tuberculosis while the odds of developing Chronic Bronchitis among the respondents who had pneumonia is 7.04 times (95% CI: 0.06-0.93) more than those who had no history of Pneumonia in the past. (Table 6)

Table 6: Factors associated with chronic bronchitis on multivariable analysis among residents who live in Koshe solid waste disposal area, Addis Ababa, Ethiopia, 2023

| Variables                        | Categories | Chronic bronchitis n (%) |            | COR               | AOR (95% CI)      |
|----------------------------------|------------|--------------------------|------------|-------------------|-------------------|
|                                  |            | Yes n (%)                | No n (%)   |                   |                   |
| Electric Stove                   | Yes        | 19 (79.2)                | 156 (90.2) | 0.41(0.14-1.25)   | 0.44(0.12-1.61)   |
|                                  | No         | 5 (20.8)                 | 17 (9.8)   |                   |                   |
| Occupational smoke/dust exposure | Yes        | 7 (29.2)                 | 27 (15.6)  | 2.23(0.84-5.88)   | 3.83(1.16-12.7)   |
|                                  | No         | 17 (70.8)                | 146 (84.4) |                   |                   |
| Active Smoking                   | Yes        | 5 (20.8)                 | 4 (2.3)    | 11.12(2.75-44.98) | 10.1(1.99-51.16)  |
|                                  | No         | 19 (79.2)                | 169 (97.7) |                   |                   |
| Passive Smoking                  | Yes        | 4 (16.7)                 | 8 (4.6)    | 4.13(1.14-14.94)  | 2.62(0.55-12.37)  |
|                                  | No         | 20 (83.3)                | 165 (95.4) |                   |                   |
| Tuberculosis                     | Yes        | 4 (16.7)                 | 5 (2.9)    | 6.72(1.67-27.09)  | 10.68(1.66-68.76) |
|                                  | No         | 20 (83.3)                | 168 (97.1) |                   |                   |
| Asthma                           | Yes        | 4 (16.7)                 | 5 (2.9)    | 0.15(0.04-0.60)   | 0.08(0.02-0.35)   |
|                                  | No         | 20 (83.3)                | 168 (97.1) |                   |                   |
| Pneumonia                        | Yes        | 7 (29.2)                 | 13 (7.5)   | 9.17(0.07-0.57)   | 7.04(0.06-0.93)   |
|                                  | No         | 17 (70.8)                | 160 (92.5) |                   |                   |
| Cardiac Disease                  | Yes        | 1 (4.2)                  | 1 (0.6)    | 7.48(0.45-12.36)  | 4.21(0.08-13.35)  |
|                                  | No         | 23 (95.8)                | 172 (99.4) |                   |                   |

## 6. Discussion

Respiratory diseases can be classified into acute and chronic based on the onset and the duration of the disease [3]. Chronic bronchitis is associated with narrowing and mucus plugging of the non alveolated conducting airways. Chronic airway epithelial inflammation and mucus metaplasia are the pathologic basis of chronic bronchitis [7]. In this particular study, the prevalence of chronic bronchitis among people who live around 'Koshe' was found to be 12.18% (95% CI: 11.87%-12.52%). This finding may serve as an implication that the issue of respiratory diseases can certainly be a concerning situation considering the rate of morbidity and mortality which can be ensued from it; as well as the socio economic burden it can embark upon the respective society. Additional outcomes of this research implies that active cigarette smoking, occupational exposure to smoke, tuberculosis and pneumonia are associated to the occurrence of chronic bronchitis.

Smoking is the primary risk factor for chronic bronchitis [2]. The prevalence of smokers ranged 20.1 – 56.9% (P 0.001) with a median value of 40% [6]. A systematic review and meta-analysis, including studies carried out in 28 countries between 1990 and 2004, provided evidence that the prevalence of COPD is appreciably higher in smokers and ex-smokers compared to non-smokers [12]. COPD prevalence was estimated to be greater in current (12.5%) and former (9.4%) smokers than in never smokers (5.8%)[18]. In this study, despite the fact that very few participants 4.7% has explicitly declared to have had history of active smoking, the association between developing chronic bronchitis and history of smoking was significant ( $p=0.005$ ).

Occupational exposures were related to chronic bronchitis. Associations between occupational exposures and chronic bronchitis are consistent with findings in previous studies [24]. Our study has witnessed this strong association between occupational smoke exposure and occurrence of Chronic Bronchitis. More than 200-300 waste pickers per day work continuously and obviously living nearby the site for collection of salvageable materials such as wood, scrap metals and discarded food [4]. It's an income source for most families in the vicinity. A lot of individuals are dependent on the income generated by selling products which they get from the waste disposal site. Since most of our study participants are waste pickers who live in the Koshe vicinity, it makes a great deal of sense that their continuous occupational exposure has led them develop chronic bronchitis.

Chronic airway diseases contribute considerably to the burden of chronic morbidity in adults, and occupational exposures play a role in the onset of several chronic airway diseases. Most respiratory diseases are said to coexist due to shared risk factors or cause-effect associations. For instance, the interrelationship between TB and COPD is very complex. A substantial number of TB patients develop post tubercular airway disease or TB-associated COPD. This is the most commonly reported relationship. However, many different associations have also been published [23]. According to this study, Tuberculosis and pneumonia are significantly associated to the prevalence of chronic bronchitis.

Owing to the enhancement in urbanization, population growth and changes in the patterns of life, the amount of solid waste generated is increasing in developing countries such as ours. Nonetheless, the current Municipal Solid Waste management practices in most of such countries are found to be inefficient leading to various environmental and health related problems[11]. Considering the fact that there have not been many studies about respiratory diseases and their relationship with solid waste disposal sites, we can speculate that the issue has been neglected for long. As long as the problem stays in the shadow, it will increase in intensity directly and indirectly enhancing the socio-economic burden of the country. The absence of solid studies signifies that subsequent extensive and sophisticated researches including comparison studies with more samples to be conducted to show the impact of chronic bronchitis and its associated factors.

Though the exact amount of burden is not estimated, respiratory problems comprise the vast majority among the morbidities and mortalities encountered by residents living around open solid dump sites. Respiratory diseases such as chronic bronchitis and Pneumonia are common incidents that are seriously affecting the population of Addis Ababa City [11]. Despite the lack of background studies on this specific topic in our country, this research will absolutely be paving the way to unravel the burden of the problem and to encourage succeeding researches. Additionally, it awakens the different responsible organizations such as regional health bureaus and administrative offices by demonstrating the magnitude of the issue in the respective society.

As a prevalence study, the outcome of this research depicts the real picture of the problem in a way that will benefit the society. It cannot be denied that a lot of challenges have been faced in the process. One of the biggest challenges was the fact that it was hard to find many other

previously done researches in this specific topic, particularly in such a setup. This has made it quite cumbersome to be able to make a valid comparison when it comes to the prevalence of chronic bronchitis in our country, Ethiopia. Moreover, since the area is a slum surrounding, the issue of security was uncertain and a bit frustrating for some of our data collectors. On the contrary, since not so many studies are available when it comes to the topic at hand, having the courage to be a pioneer is an outstanding accomplishment not to mention how inspirational this research can be for other researchers who would like to make prevalence studies in our community.

## **7. Conclusion**

In this research, the prevalence of chronic bronchitis is found to be high. The factors which are found to be associated to the occurrence of Chronic Bronchitis are occupational exposure to smoke/dust, active cigarette smoking, history of pneumonia and tuberculosis.

## **8. Recommendations**

Collateral effective revision and legislation of healthcare intervention policies regarding chronic bronchitis prevention has to be implemented by the Ministry of Health of the Ethiopian government. Comprehensive national chronic bronchitis awareness strategies on prevention as well as management and follow up have to be enforced by regional health departments, different Broadcasting Medias and Social media outlets to promote preventive mechanisms against the different causative factors and to drop off the burden of the problem in general. Every health professional shall also be responsible to provide special consideration to patients who have risk factors such as smoking and Tuberculosis so that they are continuously supervised for the development of Chronic Bronchitis in the long run. Further researches on this particular topic are also strongly recommended to be carried out by researchers.

# References

1. Raheerison, C. and P. Girodet, *Epidemiology of COPD*. European Respiratory Review, 2009. **18**(114): p. 213-221.
2. Mejza, F., et al., *Prevalence and burden of chronic bronchitis symptoms: results from the BOLD study*. European Respiratory Journal, 2017. **50**(5).
3. Woldeamanuel, G.G., A.B. Mingude, and T.G. Geta, *Prevalence of chronic obstructive pulmonary disease (COPD) and its associated factors among adults in Abeshge District, Ethiopia: a cross sectional study*. BMC Pulmonary Medicine, 2019. **19**(1): p. 1-9.
4. Haile, T. and T.A. Abiye, *Environmental impact and vulnerability of the surface and ground water system from municipal solid waste disposal site: Koshe, Addis Ababa*. Environmental earth sciences, 2012. **67**: p. 71-80.
5. Jerie, S., *Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe*. Journal of Environmental and Public Health, 2016. **2016**.
6. Sunyer, J., *Urban air pollution and chronic obstructive pulmonary disease: a review*. European Respiratory Journal, 2001. **17**(5): p. 1024-1033.
7. Hooper, L.G., et al., *Ambient air pollution and chronic bronchitis in a cohort of US women*. Environmental health perspectives, 2018. **126**(2): p. 027005.
8. Kumie, A., *Air pollution in Ethiopia: Indoor Air Pollution in a rural Butajira and Traffic Air Pollution in Addis Ababa*. 2009, Addis Ababa University.
9. Perez-Padilla, R. and A.M.B. Menezes, *Chronic obstructive pulmonary disease in Latin America*. Annals of global health, 2019. **85**(1).
10. Mohammed, A. and E. Elias, *Domestic waste management and its environmental impacts in Addis Ababa City*. African Journal of Environmental and Waste Management, 2017. **4**(3): p. 206-216.
11. Cheru, M., *Solid Waste Management in Addis Ababa: A new approach to improving the waste management system*. 2016.
12. Halpin, D.M., et al., *Global initiative for the diagnosis, management, and prevention of chronic obstructive lung disease. The 2020 GOLD science committee report on COVID-19 and chronic obstructive pulmonary disease*. American journal of respiratory and critical care medicine, 2021. **203**(1): p. 24-36.
13. van Gemert, F., et al., *Prevalence of chronic obstructive pulmonary disease and associated risk factors in Uganda (FRESH AIR Uganda): a prospective cross-sectional observational study*. The Lancet Global Health, 2015. **3**(1): p. e44-e51.
14. Tarekegn, M. and T. Gulilat, *Trends of ambient air pollution and the corresponding respiratory diseases in Addis Ababa*. Res. Rep. Toxi, 2018. **2**(5).
15. Binegdie, A., et al., *Chronic respiratory disease in adult outpatients in three African countries: a cross-sectional study*. The International Journal of Tuberculosis and Lung Disease, 2022. **26**(1): p. 18-25.
16. Syamlal, G., B. Doney, and J.M. Mazurek, *Chronic obstructive pulmonary disease prevalence among adults who have never smoked, by industry and occupation—United States, 2013–2017*. Morbidity and Mortality Weekly Report, 2019. **68**(13): p. 303.
17. Siddharthan, T., et al., *Prevalence of chronic respiratory disease in urban and rural Uganda*. Bulletin of the World Health Organization, 2019. **97**(5): p. 318.

18. Murphy, D.E., et al., *High prevalence of chronic obstructive pulmonary disease among veterans in the urban midwest*. Military medicine, 2011. **176**(5): p. 552-560.
19. Alemu, K., A. Kumie, and G. Davey, *Byssinosis and other respiratory symptoms among factory workers in Akaki textile factory, Ethiopia*. Ethiopian Journal of Health Development, 2010. **24**(2).
20. Forey, B.A., A.J. Thornton, and P.N. Lee, *Systematic review with meta-analysis of the epidemiological evidence relating smoking to COPD, chronic bronchitis and emphysema*. BMC pulmonary medicine, 2011. **11**(1): p. 1-61.
21. Adeloye, D., et al., *Global and regional estimates of COPD prevalence: Systematic review and meta-analysis*. Journal of global health, 2015. **5**(2).
22. Pelkonen, M.K., et al., *Twenty-five year trends in prevalence of chronic bronchitis and the trends in relation to smoking*. Respiratory Medicine, 2014. **108**(11): p. 1633-1640.
23. Jain, N.K., *Chronic obstructive pulmonary disease and tuberculosis*. Lung India: official organ of Indian Chest Society, 2017. **34**(5): p. 468.
24. Pahwa, P., et al., *Prevalence and associated risk factors of chronic bronchitis in First Nations people*. BMC pulmonary medicine, 2017. **17**(1): p. 1-10.
25. McAllister, J., *Factors influencing solid-waste management in the developing world*. 2015.

# Annexes

## Annex I : INFORMATION SHEET

Dear respondent, my name is \_\_\_\_\_. I am here to collect data for a study entitled “Prevalence of chronic bronchitis and its associated factors among people living around Koshe municipal solid waste disposal area in Addis Ababa, Ethiopia”. It is being conducted by **Wastina Desta (MD, BA)** who is a Masters student at **Saint Paul’s Hospital Millennium Medical College school of Public health**. The interview asks about your personal and medical history and will require about **25 to 30** minutes to be completed.

As a study participant you will be benefited when the result is utilized. The study will be carried out in the form of interview and do not cause any harm to you. The result will be displayed in general form not in individual. To achieve the study, your honest and genuine participation by responding to the question prepared is very important and highly appreciated. You have also a right to continue or to discontinue as a participant and there is no influence that insists you to participate unless you permit.

**We will proceed to the interview after you understand the following points**

**Objective of the study:** To assess the prevalence of chronic bronchitis and its associated factors among people living around Koshe municipal solid waste disposal area in Addis Ababa, Ethiopia.

**Benefit:** The information generated from the study help policy makers to improve health care guidelines and implement them in a way which will substantially contribute to the general wellbeing of our society.

**Harm:** The participants do not have any harm by participating to the study.

**Duration of the study and interview:** The study will be conducted for one month; the total data collection will be taking place for 4 days tentatively from March 21<sup>st</sup> up to March 24<sup>th</sup> and the interview may take from **25-30 minutes**.

**Alternatives to participation:** You do not have to take part in this research if you do not wish to do so. You have the right to terminate from the study by any reason, related to the study or personal reason.

**Confidentiality:** We would like to assure you that the privacy will strictly be maintained throughout. Your responses to any of the questions will not be given to anyone else and no reports of the study will ever identify you. If a report of the results is published, only information about the total group will appear.

**Persons to contact:** If you have any question you can contact the investigator at the following address and you may ask at any time you want:

Name: Wastina Desta (MD, BA)

Tel: 0913-09-13-01/0911-13-11-65

E-mail: wastinamd@gmail.com

## **Annex II: CONSENT FORM**

It has been read to me by the data collector as I can understand all conditions stated above.

Therefore, I have decided to:

1. Agree \_\_\_\_\_

2. Disagree \_\_\_\_\_ on participation of the study.

Name of the interviewer: \_\_\_\_\_ Sign. \_\_\_\_\_ Date of interview \_\_\_\_\_

Name of the supervisor: \_\_\_\_\_ Sign. \_\_\_\_\_ Date \_\_\_\_\_

Thank You for willingness to participate!

Serial #: \_\_\_\_\_

### **Annex III: Questionnaire format sheet**

#### **Part 1: Socio demographic characteristics**

101. Age in years

\_\_\_\_\_

103. Marital Status

Single ☐

Married ☐

Separated ☐

Divorced ☐

Widowed ☐

102. Sex

Male ☐

Female ☐

104. Highest level of education attained

None ☐

Primary School ☐

High School ☐

College ☐

105. What's your monthly income in birr? \_\_\_\_\_

106. What's your occupation?

Unemployed ☐

Daily laborer ☐

Private business owner ☐

Professional public organization employee ☐

Professional private organization employee ☐

Vocational public organization employee ☐

Vocational private organization employee ☐

## Part 2: Living and Housing condition

201. Number of rooms per house is \_\_\_\_\_

202. Average number of windows per room \_\_\_\_\_

203. Number of family members \_\_\_\_\_

204. Do you have a separate kitchen? Yes ☐

No ☐

205. What type of cooking utensil do you use?

Electric stove ☐

Kerosene based utensil ☐

Charcoal ☐

Wood ☐

Other (Specify) ☐

## Part 3: Occupational and Residential History

301. Have you ever had an occupational exposure to smoke or dust?

Yes ☐

No ☐

302. If the response to the above question is 'yes', for how long has that exposure lasted?

\_\_\_\_\_

303. How many years have you stayed in the area (around koshe)? \_\_\_\_\_

#### Part 4: Personal and Medical History

401. Do you have any history of active smoking?      Yes ☐      No ☐

402. If the response to the above question is 'yes', for how long have you smoked (in pack year)  
\_\_\_\_\_

403. Do you have any history of Passive Smoking?      Yes ☐      No ☐

404. If the response to the above question is 'yes', for how long have you been exposed as a passive smoker? \_\_\_\_\_

405. Have you ever had cough which lasted more than 3 months in 2 consecutive years?

Yes ☐

No ☐

406. If the response to the above question is 'yes', what type of cough was it?

Dry ☐

Productive ☐

407. Have you ever had bloody sputum?      Yes ☐      No ☐

408. Have you ever been told to have Chronic Bronchitis

or Emphysema by a health care provider?

Yes ☐      No ☐

409. If the response to the above question is 'yes', how was the diagnosis made?

Diagnosis was made based on

Symptom ☐

Chest X-Ray ☐

Spirometry ☐

Do not know ☐

410. Have you ever been treated for Chronic Bronchitis or Emphysema?

Yes ☐      No ☐

☐

411. Have you ever been diagnosed with Tuberculosis? Yes ☐ No ☐

412. If the response to the above question is 'yes', how was the diagnosis made?

Symptom based ☐

AFB sputum test ☐

Chest X-Ray ☐

Gene expert test ☐

Do not know ☐

413. Did you complete your treatment with Anti-TB? Yes ☐ No ☐

414. Have you ever been diagnosed with Asthma? Yes ☐ No ☐

415. If the response to the above question is 'yes', have you ever been treated with anti-asthmatic medications? Yes ☐ No ☐

416. Have you ever been diagnosed with Pneumonia? Yes ☐ No ☐

417. If the response to the above question is 'yes', have you completed your treatment regimen? Yes ☐ No ☐

418. Have you ever been diagnosed with COVID-pneumonia? Yes ☐ No ☐

419. If the response to the above question is 'yes', how were you managed?

As an outpatient ☐

As an inpatient ☐

420. If the response to the above question is 'as an inpatient', was there any requirement for intranasal oxygen? Yes ☐ No ☐

421. Have you ever been diagnosed with Diabetes Mellitus? Yes ☐ No ☐

422. If the response to the above question is 'yes', are you getting treated? Yes ☐ No ☐

423. If the response to the above question is 'yes', what kind of medications are you on?

Life style modification ☐

Oral hypoglycemic agents ☐

Insulin ☐

424. Have you ever been diagnosed with Hypertension? Yes ☐ No ☐

425. If the response to the above question is 'yes', are you taking any anti-hypertensives? Yes ☐ No ☐

426. Have you ever been diagnosed with cardiac disease? Yes ☐ No ☐

427. If the response to the above question is 'yes', are you currently taking medications? Yes ☐ No ☐

428. Has anyone in your family ever been diagnosed with Chronic Bronchitis?

Yes ☐ No ☐

429. Has anyone in your family ever been treated for Chronic Bronchitis?

Yes ☐ No ☐

## **የመረጃ ቅፅ**

ውድ ምላሽ ሰጪ፣ ስሜ \_\_\_\_\_ ነው። እዚህ የመጣሁት ለጥናት መረጃ ለመሰብሰብ ነው። የጥናቱ ርዕስ በአዲስ አበባ ኢትዮጵያ በቆሼ ማዘጋጃ ቤት የደረቅ ቆሻሻ አወጋገድ አካባቢ በሚኖሩ ሰዎች ላይ ሥር የሰደደ ብሮንካይተስ መስፋፋት እና ተያያዥ ምክንያቶች ሲሆን ፤ እየተካሄደ ያለው በWastina Desta (MD ፣ BA) በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ የህዝብ ጤና ትምህርት ቤት የማስተርስ ተማሪ ነው። ቃለ-መጠይቁ ስለግል እና የህክምና ታሪክዎ የሚጠይቅ ሲሆን ለማጠናቀቅ ከ25 እስከ 30 ደቂቃዎችን ይወስዳል።

እንደ የጥናት ተሳታፊ ውጤቱ ጥቅም ላይ ሲውል ተጠቃሚ ይሆናሉ። ጥናቱ የሚካሄደው በቃለ መጠይቅ መልክ ሲሆን ምንም አይነት ጉዳት አያስከትልም. ውጤቱ በግለሰብ ሳይሆን በአጠቃላይ መልክ ይታያል. ጥናቱን ለማሳካት ለተዘጋጀው ጥያቄ ምላሽ በመስጠት እውነተኛ ተሳትፎዎ በጣም አስፈላጊ እና በጣም የተመሰገነ ነው። እንዲሁም እንደ ተሳታፊ የመቀጠል ወይም የማቋረጥ መብት አልዎት እና ካልፈቀዱ በስተቀር እርስዎ እንዲሳተፉ የሚያስገድድ ምንም ተጽእኖ የለም።

## **የሚከተሉትን ነጥቦች ከተረዱ በኋላ ወደ ቃለ መጠይቁ እንቀጥላለን**

**የጥናቱ ዓላማ :** ሥር የሰደደ ብሮንካይተስ ስርጭትን እና ተያያዥ ምክንያቶችን ለመገምገም በአዲስ አበባ፣ ኢትዮጵያ በቆሼ ማዘጋጃ ቤት የደረቅ ቆሻሻ አካባቢ የሚኖሩ ሰዎች ላይ የተደረገ ጥናት

**ጥቅም :** ከጥናቱ የተገኘው መረጃ ፖሊሲ አውጪዎች የጤና አጠባበቅ መመሪያዎችን ለማሻሻል እና ለህብረተሰባችን አጠቃላይ ደህንነት ከፍተኛ አስተዋፅኦ በሚያደርግ መልኩ እንዲተገበሩ ያግዛል።

**ጉዳት :** በጥናቱ ላይ በመሳተፍ ተሳታፊዎች ምንም ጉዳት የላቸውም.

**የጥናቱ እና የቃለ መጠይቁ ቆይታ:** ጥናቱ ለአንድ ወር ይካሄዳል; አጠቃላይ የመረጃ አሰባሰብ ከማርች 21 እስከ ማርች 24 ድረስ ለ 4 ቀናት የሚቆይ ሲሆን ቃለ መጠይቁ ከ25-30 ደቂቃ ሊወስድ ይችላል።

**የተሳትፎ አማራጮች:-**ይህንን ለማድረግ ካልፈለጉ በዚህ ጥናት ውስጥ መሳተፍ የለብዎትም። ከጥናቱ ወይም ከግል ምክኒያት ጋር በተገናኘ በማንኛውም ምክንያት ጥናቱን የማቆም መብት አልዎት።

**ሚስጥራዊነት:** ሚስጥሩ በጥብቅ እንደሚጠበቅ ልናረጋግጥልዎ እንወዳለን። ለማንኛቸውም ጥያቄዎች የሰጡት ምላሾች ለሌላ ሰው አይሰጡም እና ምንም የጥናቱ ዘገባ የእርስዎን ስም አይጠቅስም። የውጤቶቹ ሪፖርት ከታተመ ስለ አጠቃላይ ቡድኑ መረጃ ብቻ ይታያል።

ማንኛውም አይነት ጥያቄ ካሎት ተመራማሪውን በሚከተለው አድራሻ ማነጋገር እና በፈለጉት ጊዜ መጠየቅ ይችላሉ።

ስም: Wastina Desta (MD, BA)

ስልክ: 0913-09-13-01/0911-13-11-65

ኢሜል:-wastinamd@gmail.com

**የስምምነት ቅፅ**

ከላይ የተጠቀሱትን ሁኔታዎች በሙሉ ለመረዳት እንድችል መረጃ ሰብሳቢው አንብቦልኛል።

ስለዚህም በጥናቱ ተሳትፎ ላይ

1. እስማማለሁ \_\_\_\_\_

2. አልስማማም \_\_\_\_\_

የቃለ መጠይቁ ጠያቂው ስም፡ \_\_\_\_\_ ፊርማ \_\_\_\_\_ የቃለ መጠይቁ ቀን \_\_\_\_\_

የተቆጣጣሪው ስም፡- \_\_\_\_\_ ፊርማ \_\_\_\_\_ ቀን \_\_\_\_\_

ለመሳተፍ ፈቃደኛ ስለሆኑ እናመሰግናለን!

ተ.ቁ. #: \_\_\_\_\_

## መጠይቅ

### ክፍል 1: የስነ ሕዝብ አወቃቀር ባህሪያት

101. እድሜ

\_\_\_\_\_

103. የጋብቻ ሁኔታ

ያላገባ/ች ☐

ያገባ/ች ☐

የተለያየ/ች ☐

ባል/ሚስት የሞተ/ች ☐

የተፋታ/ች ☐

102. ጾታ

ወንድ ☐

ሴት ☐

104. ከፍተኛ የትምህርት ደረጃ

ምንም ☐

የመጀመሪያ ደረጃ ትምህርት ቤት ☐

ሁለተኛ ደረጃ ትምህርት ቤት ☐

ኮሌጅ ☐

105. ወርሃዊ ገቢዎ በብር ስንት ነው? \_\_\_\_\_

106. ሥራዎት ምንድን ነው?

ሥራ አጥ ☐

የቀን ሰራተኛ ☐

የግል ንግድ ባለቤት ☐

ፕሮፌሽናል የመንግስት ድርጅት ሰራተኛ ☐

ፕሮፌሽናል የግል ድርጅት ሰራተኛ ☐

የሙያ የመንግስት ድርጅት ሰራተኛ ☐

የሙያ የግል ድርጅት ሰራተኛ ☐

## ክፍል 2: የአኗኗር እና የቤት ሁኔታ

201. የአንድ ቤት የክፍሎች ብዛት \_\_\_\_\_ ነው

202. አማካይ የመስኮች ብዛት በአንድ ክፍል \_\_\_\_\_

203. የቤተሰብ አባላት ብዛት \_\_\_\_\_

204. የተለየ ወጥ ቤት አለዎት? አለኝ ☐

የለኝም ☐

205. ምን ዓይነት የምግብ ማብሰያ ይጠቀማሉ?

የኤሌክትሪክ ምድጃ ☐

የጋዝ ምድጃ ☐

ከሰል ☐

እንጨት ☐

ሌላ (ይግለጹ) ☐

## ክፍል 3: የስራ እና የመኖሪያ ሁኔታ

301. በስራ ቦታዎት ለጭስ ወይም ለአባረር መጋለጥ አጋጥሞዎት ያውቃል?

አዎ ☐

አይደለም ☐

302. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ ተጋላጭነትዎ ለምን ያህል ጊዜ ቆይቷል?

\_\_\_\_\_

303. በአካባቢው (ቆሼ አካባቢ) ስንት አመት ቆዩ? \_\_\_\_\_

ክፍል 4: የግል እና የህክምና ሁኔታ

401. ሲጋራ አጢሰው ያውቃሉ? አዎ ☐ አይደለም ☐

402. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ፣ ለምን ያህል ጊዜ አጢሱ (በጥቅል ዓመት)

\_\_\_\_\_

403. ሲጋራ ከሚያጤስ ሰው ጋር ኖረው ያውቃሉ? አ ☐ አ ☐

404. ከላይ ላለው ጥያቄ ምላሹ 'አዎ' ከሆነ ለምን ያህል ጊዜ ኖረዋል?

\_\_\_\_\_

405. በ2 ተከታታይ አመታት ውስጥ ከ3 ወር በላይ የሚቆይ ሳል አጋጥሞት ያውቃል?

አዎ ☐

አይደለም ☐

406. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ ምን አይነት ሳል ነበር?

ደረቅ ☐

አክታ ያለው ☐

407. ደም የቀለቀለ አክታ ነበረት? አዎ ☐ አ ☐

408. ሥር የሰደደ ብሮንካይቲስ ወይም ኤምፊዚማ እንዳለበት

በጤና እንክብካቤ አቅራቢ ተነግሮት ያውቃል?

አዎ ☐ አይ ☐

409. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ፣ በሽታው በምን ተረጋገጠ?

በምልክት ☐

በደረት ኤክስ-ሬይ ☐

በSpirometry ☐

አላውቅም ☐

410. ለከባድ ብሮንካይተስ ወይም ለኤምሬዚማ ታ ክመው ያውቃሉ?

አዎ ☐ አይ ☐

411. ሳንባ ነቀርሳ ይዞት ያውቃል?

አዎ ☐ አይ ☐

412. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ፣ በሽታዎ እንዴት ተረጋገጠ?

በምልክት ላይ የተመሰረተ ☐

በአክታ ምርመራ ☐

በደረት ኤክስ-ሬይ ☐

በጂን ኤክስፐርት ☐

አላውቅም ☐

413. ህክምናዎን ተከታትለው ጨርሰዋል?

አዎ ☐ አይ ☐

414. አስም እንዳለብዎት ተነግሮት ያውቃል?

አዎ ☐ አይ ☐

415. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ፣

አዎ ☐ አይ ☐

በፀረ-አስም መድኃኒቶች ታክመዋል?

416. የሳንባ ምች በሽታ ይዞዎት ያውቃል?

አዎ ☐ አይ ☐

417. ከላይ ላለው ጥያቄ መልሱ 'አዎ' ከሆነ፣

አዎ ☐ አይ ☐

ሕክምናዎን ጨርሰዋል?

418. በኮቪድ-19 ምች ተይዘው ያውቃሉ?

አዎ ☐ አይ ☐

419. ከላይ ላለው ጥያቄ ምላሹ 'አዎ' ከሆነ ህክምናው እንዴት ነበር?

እንደ ተመላላሽ ታካሚ ☐

እንደ ተኝቶ ታካሚ ☐

420. ከላይ ላለው ጥያቄ የተሰጠው ምላሽ 'እንደ ተኝቶ ታካሚ' ከሆነ፣

☐ ☐

የአፍንጫ ውስጥ ኦክሲጅን አስፈጻሚነት ነበር?

421. የስኳር ህመም አለብዎት? አዎ ☐ አይ ☐

422. ከላይ ላለው ጥያቄ ምላሹ 'አዎ' ከሆነ ፤ ታክመዋል? አዎ ☐ አይ ☐

423. ከላይ ላለው ጥያቄ ምላሹ 'አዎ' ከሆነ ምን ዓይነት መድሃኒቶችን እየወሰዱ ነው?

የአኗኗር ዘይቤ ማሻሻያ ☐

የሚዋጥ ክኒን ☐

ኢንሱሊን ☐

424. ከፍተኛ የደም ግፊት አለብዎት? አዎ ☐ አይ ☐

425. ከላይ ለቀረበው ጥያቄ መልሱ 'አዎ' ከሆነ፣ አዎ ☐ አይ ☐

የደም ግፊት መከላከያ መድሃኒት ይወስዳሉ?

426. የልብ ሕመም አለብዎት? አዎ ☐ አይ ☐

427. ከላይ ለቀረበው ጥያቄ መልሱ 'አዎ' ከሆነ፣ አዎ ☐ አይ ☐

መድሃኒቶችን እየወሰዱ ነው?

428. ከቤተሰብዎ ውስጥ ሥር የሰደደ የብሮንካይተስ በሽታ እንዳለበት የተረጋገጠ ሰው አለ?

አዎ ☐ ☐

429. ከቤተሰብዎ ውስጥ ሥር የሰደደ ብሮንካይተስ ታክሞ የሚያውቅ ሰው አለ?

አዎ ☐ አይ ☐