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Prevalence of Chronic Respiratory Symptoms and Associated Factors among Kitchen Workers in Food and Drinking Service Establishments in Kellem Wollega Zone, Western Ethiopia, 2021

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Abstract

Background: Kitchen workers in Food and Drinking Service Establishments are at high risk while exposed to toxic compounds from burning fuel and fumes from cooking. However, there is inadequate Evidence on the issue in developing country like Ethiopia. Therefore, assessing this information was aimed to fill this gap.

Objective: To assess prevalence of chronic respiratory symptoms and associated factors among Kitchen workers in food and drinking service establishments in Kellem Wollega Zone, Western Ethiopia

Methods: An Institution based Cross-sectional study was conducted in Kellem Wollega Zone from August 30-September 15/2021. Six towns were selected from the zone using simple random sampling and total of 649 kitchen workers were selected using simple random sampling after proportional allocation. Interviewer administered structured questionnaires were used to collect the information and the data were entered in to Epi info version 7 and exported to SPSS Version 20 for further analysis. Bivariable and multivariable Binary logistic regression with 95% C.I was used to assess the factors.

Result: The overall prevalence of chronic respiratory symptoms was 170(27.3%) with 95%CI (23.8-30.7). Average working hour per a day (AOR= 2.09, 95% CI: 1.30-3.37), being used firewood and charcoal as energy source (AOR= 2.23, 95% CI: 1.05-4.71), Separated kitchen room in work place (AOR=0.46, 95% CI:0.31-0.68), Windows in the home kitchen (AOR= 0.48, 95% CI: 0.33-0.71) and service years in kitchen (AOR=1.83,95% CI:1.04- 3.21) were significantly associated with chronic respiratory symptoms

Conclusion and recommendation: The prevalence of Chronic Respiratory Symptoms was low. Average working hour per a day, being used firewood and charcoal as energy source, separated kitchen room in work place and Windows in the home kitchen were significantly associated with chronic respiratory symptoms. Therefore, efforts should be done to minimize Chronic Respiratory Symptoms through promoting limited work hours per a day, avoid using firewood and charcoal as energy source and using separated and ventilated kitchen.

Keywords: kitchen workers; respiratory symptoms

Introduction

Chronic respiratory symptoms such as chronic cough, chronic phlegm, wheezing, shortness of breath, and chest pain are manifestations of respiratory problems that are mainly developed as the result of occupational exposures [1]. 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 2018 [2].

Food and drinking establishments'' workers are at risk from exposure to toxic compounds from burning of fuel and fumes from cooking. Nitrogen dioxide, carbon monoxide and particulate matter from fuel combustion may affect the development or exacerbation of chronic respiratory symptoms, for example [3]. Some 3 million deaths a year linked to exposure to outdoor air pollution and indoor air pollution can be just as deadly. In 2012, an estimated 6.5 million deaths (11.6% of all global deaths) were associated with indoor and outdoor air pollution together [4]. Smoke from cooking activities is so dangerous that it has been called "the killer in the kitchen". (WHO) estimated that 3.8 million people have died prematurely from indoor air pollution associated with inefficient cooking practices. Of these deaths, considered premature, 27% were from pneumonia, 18% from stroke, 27% from heart disease, 20% from chronic obstructive pulmonary disease (COPD), and 8% from lung cancer 5. It has been reported that smoke from burning fuel and

fumes from cooking contain many toxic substances, some of which are carcinogenic, such as polycyclic aromatic hydrocarbons (PAHs), amines, benzene and formaldehyde [6,7]. For thousands of years, wood served as the sole source of energy for humankind [8].Although increasing modernization has led to the supplementation of wood by fossil fuels (such as coal and petroleum products) and electricity, it is still a major source of energy for the population in developing countries accounting for 50 to 90% of the fuel used for cooking and heating purposes in this population [9].

About 83% of the populations in WHO African region were estimated to be primarily reliant on polluting cooking options [10]. Of all the solid fuels (wood, coal, charcoal, dung, crop residues), wood fuels (firewood, charcoal and other crop residues) are predominantly used among the population in sub-Saharan Africa (SSA), accounting for more than 90% of energy consumption 11. Chronic respiratory symptoms represent a public health problem in both developed and developing countries because of their health and economic impacts [12]. Occupational and environmental exposures increase the risk of asthma, COPD, and other respiratory diseases and epidemiological studies have identified high-risk occupations and harmful exposures, but there are still many unknown workplace exposures causing respiratory problems [12]. The prevalence of respiratory symptoms in populations varies widely according to environmental factors, with occupational exposures being among the most important. In all countries, occupational chronic respiratory symptoms represent a public health problem and in low and middle income countries, occupational illnesses are generally less visible and are not adequately recognized as a problem13. According to the (WHO), cooking smoke-induced diseases are responsible for the death of 4.3 million people every year—more deaths than caused by malaria or tuberculosis making it one of the most lethal environmental health risks worldwide [14].

Combusting solid fuel affects health in various ways and may contribute to acute respiratory infections, stunted growth in children, pneumonia, chronic bronchitis, COPD, cataracts and other visual impairments, tuberculosis, and perinatal diseases [5,15-17]. Estimates from the WHO (2014) suggest that the exposure to kitchen air pollution from cooking with solid fuels causes 4.3 million premature deaths annually [5]. Restaurant workers had a significantly higher prevalence of all chronic respiratory symptoms and the three Chronic respiratory symptoms with highest prevalence were Dsypenea, Cough and wheeze which was (52.3%), (32.5%) and (25.5%) respectively [18]. Also other study showed that the most common respiratory symptoms complained by the kitchen workers was Breathlessness which accounts for 33.7% followed by wheezing (14.0%) and chest illness (10.3%) [19]. To the best of my knowledge, in Ethiopia, there is no adequate data and recording of occupational chronic respiratory disorders among Kitchen workers in food and drinking establishments, and Great emphasis was not given before to control and prevent the problems due to lack of scientific information. Therefore, this study aims to fill this gap by assessing the Current prevalence of chronic respiratory symptoms and its associated factors.

Methods

Study Area and period

The study was carried out on Kitchen workers in food and drinking service establishments which were found in towns of Kellem Wollega Zone. Kellem Wollega Zone is one of Oromia Regional state Zones which is found at 652 km to the west From Addis Abeba, Capital of Ethiopia. The zone has eleven Districts and one zonal town and the total population of selected study areas were 552377 and there are 120 rural and 12 urban towns and 489 food and drinking service establishments. The study was conducted from August 30-September 15 /2021.

Study design

Institution based Cross-sectional study was conducted to assess the prevalence of chronic respiratory symptoms and associated factors among Kitchen workers in food and drinking service establishments.

Population

Source population. All Kitchen workers in food and drinking establishments in Kellem Wollega Zone.

Study Population

All randomly selected Kitchen workers in food and drinking establishments of the selected towns

Study Unit: Individual Kitchen worker.

Inclusion and Exclusion Criteria

Inclusion Criteria

Individuals who had worked in kitchen of food and drinking establishments for more than one year.

Exclusion Criteria

Workers who recently had surgery of thorax, abdomen, and any acute illness. Individuals who have known chronic respiratory disease such as asthma. Individuals who are smoking/has history of smoking. Sample size determination and sampling technique. Sample Size Determination for Specific Objective One.

The sample size was determined by using a single population proportion formula by assuming 5% (0.05%) marginal error and 95% confidence level. The prevalence of respiratory symptoms among Kitchen workers in Food and drinking establishments was taken from the study conducted in Gondar town which was 44 % (21).

$$n = Z\alpha/2P\ (1-P)/d2$$

Where: n= sample size

$Z\alpha/2$ = Z value at 95% CI [1.96]

p = Proportion

d = Margin of error tolerated is (0.05)

n=1.962 *0.44(1-0.44)/0.052 =379, Adding non-response rate 10%, 416 study participants.

For Specific Objectives two (Associated Factors)

Sample size was determined using double population proportion formula using Epi Info Version 7.2 software considering the following assumptions: P1: 56.3% of kitchen workers who worked for greater than five years developed chronic respiratory symptoms, and P2:43.7% developed chronic respiratory symptoms (40), OR=1.86, 95% confidence interval, 80% power, margin of error (5%), 1:1 ratio of exposed to unexposed. The sample size becomes 394 (n=394). Adding 10% for non-response rate, total study participants are 433. Among all, maximum sample size is 433.By considering the design effect 1.5, the sample size is 649.

Sampling Technique

Kellam Wollega Zone has twelve towns including Danbidolo Town with 1819 kitchen workers. and Among them six towns (Alem Teferi, Gaba Robi, Sadi canka, Gidami, Nunu and Dambi Dollo town were selected by simple random sampling and the numbers of Food and drinking service establishments in selected towns were taken from the respective District /Town Culture and Turizm Office. A Brief Census was conducted to verify the total numbers of kitchen workers in food and drinking establishments of these selected towns to fill some gaps related with incomplete data existed during Collection of evidences from above mentioned office. Stratified sampling technique was used after proportionally allocated to categories of food and drinking service establishments based on number of kitchens workers, they had at the time of data collection. Totally there were 489 Food and Drinking service establishments Including groceries and 705 Kitchen Workers in the selected study areas.

Variables

Dependent variable

Chronic respiratory symptoms

Independent variables

Socio demographic Characteristics

- Age,
- Sex,
- Income,
- Educational status
- Organizational/Establishments Factors
- Separated kitchen room at work place
- Kitchen Wall constructed
- Kitchen Floor constructed
- Chimney
- Windows in the home kitchen
- Kitchen area
- Occupational related factors
- Types of cooking fuel
- Frequency of cooking
- Service years
- Cooking at residential home,
- Average duration of stay in kitchen

Past dusty working environments (such as coble stone, factory).

Operational definitions

Chronic respiratory symptom: 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 [28].

Chronic Cough: Experience of a cough for most days of the week (≥4 days) for at least three months in one year [28]. Chronic phlegm/Cough with sputum production: 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 [28].

Chronic Breathlessness: Is defined as discomfort or difficult to breathe in different activities like walking up a slight hill, when undressing, walking with speed/running.

Chronic wheezing: a condition of causing a wheezy or whistling sound heard during inhalation or exhalation (at least three months in a year).

Chronic chest pain: In the past one year/within this year, chest pain that kept off work [28].

Data Collection tools and Techniques

Data were collected by using interview administered structured questionnaire modified from British Medical Research Council (BMRC) (40). The questionnaire translated to Afan oromo, retranslated back to English to check its consistency with the original one. The questionnaire has three parts. The first part contains information on the socio-demographic characteristics of the study participants. The second part was used to assess Organizational and occupational Characteristics of study participants and the third part used to evaluate the respiratory symptoms of respondents.

Data Analysis

Data was entered using Epi-INFO version 7 and was exported to and analyzed using SPSS version 20 statistical software. Frequencies, percent, tables and graphs were used to describe the study population in relation to relevant variables and the prevalence of respiratory symptoms was obtained by descriptive analysis. Binary Logistic regression was used to assess the association between independent variables and dependent variable. All Variables with a p-value less than 0.2 in the bivariable analysis was included in the multivariable binary logistic regression analysis. Variables with $p < 0.05$ and AOR at 95% CI ≠1were considered as significant factors.

Result

Socio-demographic Characteristics

From 649 Kitchen workers projected for the study, 622 of them responded the questionnaires completely making response rate of 95.8%. Out of the total 622 respondents, 435(69.9%) were female and Majority of the study participants were married, 406(65.3%). Out of total interviewee, less than half of them 259(41.6%) attended primary school followed by secondary school 221(35.5%).

Occupational and Organizational characteristics

Among 622 study participants, 296(47.6%) were kitchen workers working in the restaurant followed by tea house 237(38.1%) and Hotel 74(11.7%). We found that 273(43.9%) of respondents had service years or work experience of 1-2 years and 112(18%) of them had service years of≥5 years in the current kitchen of food and drinking establishments. From total participants, 423(68%) of workers had worked in the kitchen for greater than or equal to 8(eight) working hours per day and 199(32%) of them had worked for less than 8(eight) working hours per day in the kitchen. Among 60(9.6%) of Kitchen workers who ever worked in environment where there is cooking fumes or dusty environment before joining current kitchen work, 25(4%) of them worked coble stone work, 23(3.7%) were worked as cleaners and 11(1.8%) of them worked in cement factory. Most commonly energy source used in the kitchen to cook food was fire wood and charcoal, fire wood and, Charcoal and electricity which was 233(37.5%), 190(30.5%) and 121(19.5%) respectively (Table 01). Regarding organizational characteristics, 397(63.8%) of kitchen workers has been working in separated kitchen room, and 255(41%) of them cook food in kitchen which had no windows.

Chronic Respiratory Symptoms

According to this study findings the most complaint respiratory symptoms by the kitchen workers in food and drinking service establishments in Kellem Wollega zone were Chronic cough, Breathlessness chest pain, Wheezing and Cough with sputum (Figure 01). Overall prevalence of Chronic Respiratory Symptoms was 170 (27.3%) with the 95%CI (23.8 – 30.7) (Figure 02)

Factors Associated with Chronic Respiratory Symptoms

In order to identify factors associated with Chronic Respiratory Symptom in the study area, we run binary logistic regression analysis at both bivariable and multivariable levels. Multivariable logistic analysis results have showed that there were six variables: Working hour per a day, Ever worked in environment where there is cooking fumes or in dusty environment before, Energy source mostly used in the kitchen, Absence of separated kitchen room in work place, Service years and Absence of windows in the home kitchen were significantly associated with chronic respiratory symptoms among kitchen workers in food and drinking service establishments at P-value less than 0.05.

The odds of having Chronic Respiratory Symptom among kitchen workers who work more than or equal to 8 hours per a day was 2.09 times more likely as compared to kitchen workers who work less than 8 hours per a day (AOR= 2.09, 95% CI: 1.30 –3.37). Kitchen workers who had greater than or equal to five years of work experience had odds of developing

chronic respiratory symptoms about 1.83 times more likely than those workers with work experience of 1-2 years (AOR=1.83, 95% CI: 1.041.03-3.21). Table 02: Logistic regression analysis to identify factors associated with chronic respiratory symptoms among kitchen workers in food and drinking establishments in Kellem Wollega zone, 2021(Attached at the end of text file, page 23).

Discussion

The study findings showed that the prevalence of respiratory symptoms by the kitchen workers in food and drinking establishments in Kellem Wollega zone were Chronic cough (13.7%), Breathlessness (12.9%), chest pain (11.6%), Wheezing (8.5%) and Cough with sputum (8.2%). Overall prevalence of Chronic Respiratory Symptoms was 170 (27.3%) with the 95%CI (23.8 – 30.7). The prevalence reported in this study was lower than the prevalence of respiratory symptoms among kitchen workers in Gondar town which was 44% [20]. The findings of this study was also lower than (Shortness of breath:12.9%, wheezing:8.5%) the findings of study done in Malaysian (shortness of breath:33.7%, wheezing:14%) and the study done in Iran which shortness of breath was 65% and wheezing was 20% [19,20]. This discrepancy might associate with amount of food cooked, cooking frequency and previous exposure to cooking fumes.

The study identified factors responsible for the developments of chronic respiratory symptoms. Working hours per day, Work experience/service years, ever worked in environment where there is cooking fumes or in dusty environment before, separated kitchen room from establishments, using fire wood and charcoal as main source of energy and Windows in the kitchen room were the factors identified for chronic respiratory symptoms of kitchen workers in food and drinking service establishments. This study showed that socio demographic characteristics such as sex, age, religion, marital status, educational status 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 [5,17,18]. This difference may account for existence of variation among countries culture, living and earning conditions.

Another finding from this study was that having longer years of service in the kitchen was significantly associated with risk of developing respiratory symptoms. This study has similarity with different other studies done in Thailand and Nigeria (18) which indicated having longer years of experience of working in kitchen had significant association with respiratory symptoms. Kitchen workers who mostly used firewood and Charcoal as energy source had higher odds of having Chronic Respiratory Symptom as compared with those who mostly used only charcoal. This study result was supported with other studies conducted in Cameroon in which using fire wood as energy source was factor for development of chronic respiratory symptoms [2,4). Regarding of having separated kitchen room in work place, kitchen workers who experienced working in the separated kitchen room were 54% less likely had CRS as compared to those who did not experienced working in the separated kitchen room from food and drinking establishment. This study result was different from study conducted in Thailand in which having separated kitchen work was not associated with chronic respiratory symptoms (23). The possible reason for this difference might be because of working environment and sociocultural difference.

Limitation of the study

Response to the Chronic Respiratory Symptoms was depend only on the participants compliant/self-report (lack of clinical confirmation for the diagnoses)

Conclusion

This study findings showed that Chronic cough, Breathlessness, chest pain, Wheezing, and Cough with sputum were respectively the main chronic respiratory symptoms developed among kitchen workers in food and drinking service establishments in Kellem Wollega zone and Overall prevalence of Chronic Respiratory Symptoms was low in this study area. Average working hour per a day, work experience, ever worked in environment where there is cooking fumes or in dusty environment before, Energy source mostly used in the kitchen, separated kitchen room in work place and Windows in the home kitchen were significantly associated with chronic respiratory symptoms among kitchen workers in food and drinking establishments.

Recommendations

Workplace health and safety measures providing greater health protection of the kitchen workers are

needed and the issue should receive more public attention. Authorized body need to enforce food and drinking service establishments' owners and managers to reduce working hours per day for kitchen workers, to have separated kitchen room from establishments and to have windows.

Follow up study is recommended to know level of exposure among the kitchen workers of different food and drinking establishments

Declarations

Acknowledgments

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Competing interests

No conflicts of interest in this work among authors.

Ethics approval and consent to participate

All methods of this study were carried out under the Declaration of Helsinki's ethical principle for medical research involving human subjects. Ethical approval to conduct this study was obtained from the ethical review board of Ambo University (Ref. No: DRE/004/21). An official letter was sent to the Kellam Wollega zonal health office. A permission letter was delivered to the Woreda health office. Then, the woreda health office sent supportive letters to respective public health facilities. For uneducated participants informed consent was obtained from their parents or friends and for educated participants it was taken from the participants themselves. Confidentiality and privacy of the information was maintained. The participants were informed that participation is voluntary

Publication consent

All authors of the study agreed to publish the study in Dove Press. Publication consent was obtained from the publication office of Dambi Dollo University after reviewing the mother document.

Availability of Data

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Authors contribution

GF has been working on data analysis and writing up the final results, HM has been working on proposal preparation and AT has been working on overall activities.

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