# Tobacco use and its predictors among Ethiopian adults: A further analysis of Ethiopian NCD STEPS survey-2015

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## Abstract

**Background:** Consuming any form of tobacco is one of the leading causes of preventable morbidity and mortality. Tobacco smoking has been identified as one of the major risk factors for NCDs, including cardiovascular, chronic respiratory diseases, and different cancers. Although there is national information on magnitude of tobacco use, to date there is limited nationally representative data on factors associated with tobacco use. The aim of this study is to assess the distribution and predicators of tobacco use in Ethiopian adult population between 15 -59.

**Objectives:** The main aim of this study was to assess the prevalence of tobacco use and its predictor in Ethiopia.

**Methods:** A cross-sectional population based study design was employed among population age from 15- 69 years. A stratified, three-stage cluster sampling was used to identify the study subjects. Households in each cluster were selected using simple random sampling method. The sampling frame was based on the population and housing census conducted for Ethiopia in 2007. Data was collected using WHO NCD STEPS questionnaire; current tobacco use of any type was taken as the dependent variable. Five hundred thirteen enumeration areas (EAs) as primary sampling units (PSUs) (404 rural and 109 urban) were selected with probability proportionate to size, followed by selection of households as a secondary sampling units (SSUs). A total of 10,260 households were selected from the 513 EAs (20 households per EA). Eligible individuals were selected from households using Kish method (a pre-assigned table of random numbers to find the person to be interviewed). Descriptive statistics using frequency table, mean, median, interquartile range and standard deviations were computed. Step wise logistic regression was used to analyse the predictors of tobacco use. An Estimator of 95% confidence interval was used both for computing descriptive statistics as well testing associations using logistic regression.

**Results:** The prevalence of tobacco use (all tobacco products) was 4.2%. The mean age ($\pm$ SD) of starting tobacco use was 21(7) years. The mean frequency of tobacco use was 2 times per day. Hierarchical Logistic regression analysis revealed that participants in age groups 30-44 years, and 60-69 years were less likely to use any tobacco type compared to younger age group of15-29 years. Heavy episodic drinking, AOR 2.46 [95% CI= 1.4 $-$ 4.5], and khat chewing, AOR 4.71[95%= 2.26 $-$ 9.8], were independently associated with tobacco use.

**Conclusion and recommendations:** The overall prevalence of tobacco use was relatively higher in males. Factors associated with tobacco use were heavy episodic drinking and khat chewing. Although tobacco use is an important risk factor for different disease on its own, the additional use of these substances exposes individuals to increased risk of NCDs. The findings warrant the need to implement existing anti-tobacco laws in the country, enhance anti-tobacco awareness raising efforts, and implement interventions to help current tobacco users, focusing attention more on regions with high rates of tobacco use and males. [*Ethiop. J. Health Dev.* 2017;31(Special Issue):331-339]

**Key words:** Ethiopia, NCDs, Predictors, Risk factors, Tobacco use, WHO STEPS

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**Background**
Smoked, sucked, chewed or snuffed material made of leaf tobacco are tobacco products (1). All contain the highly addictive psychoactive ingredient, nicotine. Globally, approximately six million people a year die from diseases caused by tobacco use, including 600,000 from exposure to secondhand smoke. Every single death from tobacco is a preventable tragedy (2).

Tobacco use is one of the main risk factors for a number of chronic diseases, including cancer, lung diseases, and cardiovascular diseases, as described by the World Health Organization (WHO) (3). Despite these facts, its use is common throughout the world (1). Since tobacco use behavior can be affected by different socio-demographic and economic characteristics, comparable data on the prevalence of tobacco consumption (in all its forms) are not widely available and are often misleading due to lack of disaggregation by age and sex (4).

A number of countries have legislation restricting tobacco advertising, and regulating who can buy and use tobacco products, and where people can smoke (1). In Ethiopia, signatory to the United Nations Framework Convention on Tobacco Control (5), passed a proclamation banning advertisement of cigarette or other tobacco products to the public (6). In the Food, Medicine and Healthcare Administration and Control Authority (FMHACA) guideline, tobacco use policy is boldly presented to control the harm from tobacco use (7).

The 2015 WHO report disclosed that over 1.1 billion people smoked tobacco; far more males than females smoked tobacco and although there is declining trend worldwide, the prevalence of tobacco smoking appears to be increasing in the WHO Eastern Mediterranean and the African Regions (8, 9).

In a study done in rural area of Bangalore Urban district Karnataka, India using a cross-sectional study, the prevalence of tobacco use was found to be 39.3% of which 17.3% were current tobacco smokers, and 22% used smokeless form of tobacco. There was a significant association between smoking and age, literacy, and socioeconomic status. The study found that 59% of smokers had attempted to quit in the past 12 months as compared to 44% in smokeless tobacco users (10).

Another study involving Nepalese women reported that more than two in five were tobacco users, and among them 4 in 5 used smoked form of tobacco. The study showed early initiation of tobacco using habit (mean age: 14.96 year) where higher to 92%, participants initiated below 19 years of age. Influencing factors for initiation of tobacco use was peer's pressure (95.8%), and respondents reported that they used tobacco to reduce stress (37.5%) (11).

A review of prevalence, distribution, and social determinants of tobacco use in 30 sub-Saharan African countries reported diverse prevalence of tobacco smoking in the countries included in the study: smoking prevalence were high, particularly among men in Sierra Leone (37.7%), Lesotho (34.1%), and Madagascar (28.5%); while it was low (<10%) in Ethiopia, Benin, Ghana, Nigeria, and Sao Tome & Principe (12). In a systematic review represented 13 countries, current smoker prevalence varied widely ranging from 1.8% in Zambia to 25.8% in Sierra Leone (13). Male take the higher proportion (32%) (11).

In the 2016 Ethiopian Demographic and Health Survey (EDHS), 4 percent of adult men aged 15-49 reported using tobacco products of some kind. Highest (8 percent) prevalence was in 40-44 age group (14). There are also wide regional variations in cigarette smoking, ranging from less than 1% in Amhara to 13% in Dire Dawa and 18% in Somali.

Most tobacco users have the desire to quit although they can't; for instance, a study done in Ethiopia involving 548 smokers reported, 68% expressed desire to quit while 34% reported attempt to quit (15).

Different factors were identified in different literature as a predictors of tobacco use, in the study done in Ethiopia revealed that current smoking was strongly associated with male sex and being a student (Unpaid) was found to be protective from smoking (15).

The main aim of the national STEPS survey was to determine the prevalence of risk factors for NCDs including tobacco use and associated factors; this report is limited to tobacco use and predictors of tobacco use. The findings from this nationally representative study are expected to inform policy and practice towards preventing tobacco use and reduce the health harms associated with it.

**Methods**
*Survey design and area*:   A community-based cross sectional study was carried out using a WHO stepwise approach. The study included all the 9 regions and the two city administrations (Addis Ababa and Dire Dawa) in Ethiopia.

*Survey population*: The study population included individuals 15-69 years old and residing for at least six months in selected geographic areas of the country.

*Sample size determination and sampling procedure I*: Sample size was determined using a single population-proportion formula and to adjust the design effect, a complex sampling design effect coefficient of 1.5 was used. In order to have an adequate level of precision for each age-sex estimate and place of residence, the sample was multiplied by the number of age, sex, and place of residence groups for which the estimates were reported. Thus, Z-score=1.96; proportion =35.2% (16); marginal error=0.04; design effect =1.5; age-sex estimate and place of residence - sex estimate =10 groups, and non-response rate=20%.   Thus, 10,260 study participants were included in the study. A stratified, three-stage cluster sampling was used to identify the study subjects. Households in each cluster

were selected using simple random sampling method. Kish sampling (a pre-assigned table of random numbers to find the person to be interviewed) method was used to identify the study participant from the selected households; this method is commonly used for selecting a participant to a survey from a household using a table of random numbers (17). The sampling frame was based on the population and housing census conducted for Ethiopia in 2007 (18).

The primary sampling units (PSUs) were the Enumeration Areas (EAs) both in rural and urban settings. At the first stage, 513 PSUs (404 rural and 109 urban) were selected with probability proportionate to size. This was followed by a random selection of households as a secondary sampling units (SSUs) per selected PSU in the second stage. Twenty households were selected from each EA using systematic random sampling, with the assumption that each EA comprised 100 household. Thus, a total of 10,260 households were selected from the 513 EAs; fresh listing was done prior to sampling in all EAs. In the third stage, one eligible individual (15-69) was selected from each household using Kish method as described above. In this method, eligible participants in each household were ranked in order of decreasing age, starting with men and followed by women.

*Survey tool*:    The survey was conducted using the WHO NCD STEPS instrument version 3.1 (19). The questionnaire consisted of three STEPS for measuring the NCD risk factors. Of these, modified version of STEP-1 with expanded and optional questions to suit local needs was used. Data on demographics and behavioural risk factors such as tobacco use, alcohol consumption, dietary behaviours such as fruit and vegetable intake and salt and sodium intake, and physical inactivity, as well as history of NCDs and related conditions such as raised blood pressure, diabetes, raised cholesterol, cardiovascular diseases; cervical cancer screening coverage in women; and provision of general lifestyle advice to tackle NCDs were collected using a questionnaire. Additional optional questions were added to the instrument because they were deemed locally relevant, for instance Khat chewing. All the modifications were done in accordance with the WHO STEPS manual (18). The questionnaires were translated into local languages (Amharic, Tigrigna, and Oromifa) then back translated into English and then to local languages before they were administered to the participants.

*Training and pre-test*:    Qualified field data collectors (nurses and laboratory technicians) and field supervisors (medical doctors, health officers or nurses) were recruited. A week-long training on the STEPS survey was organized by the Ethiopian Public Health Institute (EPHI), in collaboration with the Ministry of Health and the WHO Country Office in Ethiopia from 2nd-9th April 2015. The training was provided by members of the technical working group who have been trained by WHO for four days from 30th March to 1stApril, 2015. The pre-test took place in Adama town, about 100 Kms east of the capital Addis Ababa, from

7th -9th April, 2015, involving EAs which were not sampled for the main survey.

*Data collection procedure*:    The survey data were collected between 14th April and June 26th, 2015. Thirty-five teams comprised of three people, a supervisor and two data collectors, were formed to conduct the data collection. Local field guides (either health extension worker or a community volunteer) were used to reach the selected households. On the day of data collection, the selected households were visited and the data collectors gave general information verbally on the objectives of the survey. This was followed by selection of one study subject from all eligible adults 15–69 years old in each household using Kish method. Further information was given to the selected participant to obtain consents. Show cards were used depicting types of commonly used tobacco products and other necessary pictures.

*Data quality assurance*:    Standard data quality control procedures were implemented for each critical stage of the study. Quality assurance was taken into consideration starting from, the design of the data collection instrument and translation to local language of all filed instruments, training field staff and pre-testing, the physical handling of survey instruments and data, to the final data entry and analysis. Checklist was also prepared for field staff to check their performance against the time allotted. Intensive monitoring and follow-up during each phase of data collection was also undertaken by central staff. The quality of data was further ascertained during the data management process.

*Data management and analysis*:    The survey data were collected entirely using Personal Digital Assistant (PDAs). eSTEPs software was used to design and program the data collection tools in the PDAs. The use of the software and PDAs to collect the data helped to generate the final dataset quickly following the completion of data collection. Data were transferred to a central server using Internet file streaming system (IFSS) software.

Outcome measures, prevalence and differences between groups (age, sex and urban/ rural groups) were calculated. As the result outputs were adjusted using population, non–response, and sample weights they are representative for the target population. Multi-collinearity was also checked using variance inflation factor (VIF). Further statistical analysis was done using logistic regression models. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Statistical significance was accepted at the 5% level (p<0.05). Uni-variable and multi variable logistic regression were done using SPSS 23 and STATA 14.

*Ethical considerations*:    The project is intended to collect community based primary data across the country. Principles of Ethics were considered. Data were collected unlinked anonymously, without any personal identifiers.

Informed consent was obtained from the study participants before administering the questions and for under eighteen children (age <18 years) survey participants informed assent and consent from their parents or guardians was obtained. Ethical clearance was obtained first from the EPHI Institutional review board (IRB) then from National research and Ethics review committee. Furthermore, official letter was produced and delivered to the respective regional health bureaus from EPHI during fieldwork.

## Results

*Socio-demographic characteristics of respondents*: Out of the 10,260 planned samples, 10, 029 individuals were approached, and 9,801 participated in the STEPS survey, giving a response rate of 95.5%. As indicated in Table 1, of the 9,800 respondents, majority of the respondents 5,823 (59.4 %) were women and highest (40%) proportion was to the lower age groups (15-29) with a mean age of 35, the and lowest number of participants from the highest age group (60-69) which was found to be 6.6%. Seventy three percent of the respondents resided in rural areas. Of all survey respondents, 28.3% were Oromo, 27.2% were Amhara, 10.8% were Tigre, 6.1% were Somali, and less than 4%

was for other ethnic groups.

Majority of the respondents (67.8 %) were married, followed by single (17.4 %); 49.4 % had no formal education while 28.8 % attended formal education with less than primary level. The percentages of respondents who completed primary, secondary, and college or university were around 10%, 7.0 %, and 5.1 %, respectively; while very small number (0.1%) of all respondents completed college or university level education. Among all the respondents, 38.8 % of men and 56.6 % of women had no formal education. Regarding household income, for those who were able to estimate their household earning, the median reported per household annual income was Birr 8,400.79. For individuals who were not able to estimate the exact annual income of their household, quintiles of estimated household earnings was set and respondents were asked which quintile best fits their household income category. Accordingly, 49.9% of survey respondents fell under first quintile with annual earning of less than 4597 Birr. Of all survey respondents, majority of the respondents were self-employed (52.6%), similarly large proportion (34.38%) were classified as unpaid.

Table 1: **Socio demographic characteristics of the study population, Ethiopia NCD STEPS survey, 2015.**

| Characteristics | Number | Percentage (95% CI) |
|---|---|---|
| **Age (N=9,800)** | | |
| 15-29 | 3,959 | 40.40 (39.4-41.4) |
| 30-44 | 3,499 | 35.70 (34.8-36.7) |
| 45-50 | 1,690 | 17.24 (16.5-18.0) |
| 60-69 | 652 | 6.65 (6.-7.2) |
| Mean±SD | 34.5 (13.1 | |
| **Gender (N=9800)** | | |
| Male | 3,977 | 40.58 (39.6-41.6) |
| Female | 5,828 | 59.42 (58.4-60.4) |
| **Residence (N=9800)** | | |
| Rural | 2.687 | 27.42 (26.5-28.3) |
| Urban | 7,113 | 72.58 (71.7-73.50 |
| **Ethnicity** | | |
| Oromo | 2773 | 28.3 (27.4-29.2) |
| Amhara | 2666 | 27.2 (26.3-28.1) |
| Tigray | 1059 | 10.8 (10.2-11.4) |
| Somali | 597 | 6.1 (5.6-6.6) |
| Wolayita | 222 | 2.3 (2.0-2.6) |
| Sidama | 339 | 3.5 (3.1-3.8) |
| Gurage | 316 | 3.2 (2.9-3.6) |
| Hadiya | 156 | 1.6 (1.4-1.8) |
| Afar | 334 | 3.4 (3.1-3.8) |
| Gamo | 159 | 1.6 (1.4-1.9) |
| Others | 1175 | 12 (11.2-13.1) |
| **Marital status** | | |
| Single | 1,705 | 17.40 (16.7-18.1) |
| Married/Cohabiting | 6,634 | 67.72 (66.8-68.6) |
| Separated/divorced | 788 | 8.04 (7.5-8.6) |
| Widowed | 669 | 6.83 (6.3-7.3) |
| **Education** | | |
| No formal schooling | 4,843 | 49.42 (48.4-40.4) |
| Less than primary school | 2817 | 28.76 (27.9-29.7) |
| Primary school completed | 975 | 9.95 (9.4-10.6) |
| Secondary school completed | 653 | 6.66 (6.2-7.2) |
| College/University completed | 499 | 5.09 (4.7-5.5) |
| Post graduate degree | 12 | 0.12 (0.07-0.2) |
| **Monthly income** | | |
| 1st Quintile | 4597 | 46.9 (52.6-54.7) |
| 2nd Quintile | 1364 | 13.9 (15.2-16.) |
| 3rd Quintile | 1220 | 12.4 (13.5-14.9) |
| 4th Quintile | 1373 | 14.0 (15.3-16.8) |
| 5th Quintile | 18 | 0.2 (0.1-0.3) |
| **Occupation** | | |
| Employed | 956 | 0.89 (9.3-10.5) |
| Self employed | 5,087 | 52.63 (51.6-53.6) |
| Unpaid | 3323 | 34.38 (33.4-35.3) |
| Unemployed | 300 | 3.10 (2.8-3.5) |

*Prevalence of tobacco use*
Overall, about 4% (4.2%, 95% CI: 3.5-4.9) of the survey participants were found to be current smokers (daily, and non-daily smokers) of all types of tobacco products. There were more men smokers 7.3% (95% CI: 6.1-8.6) than women 0.4% (95% CI: 0.3-0.6). There was also a notable increase in the proportion of smokers in the 45-59 age groups, observed in both men and women respondents. There was only slight difference between the percentage of current smokers in urban and rural areas, aside from a slightly higher prevalence of smoking among the rural population (4.3%, 95% CI: 3.5-5.1 vs. 3.9%, 95% CI: 2.6-5.1). Urban resident women had higher magnitude of smoking 0.9%, (95% CI: 0.4-1.4) than their rural counterparts 0.3% (95% CI: 0.1-0.5) (Table 2).

Table 2: **Percentage of current smokers among all respondents by age, sex, and area of residence, Ethiopia NCD STEPS survey, 2015**

| Age Group (years) | Men | | | Women | | | Both Sexes | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | % Current smoker | 95% CI | n | % Current smoker | 95% CI | n | % Current smoker | 95% CI |
| 15-29 | 1441 | 5.3 | 3.9-6.7 | 2516 | 0.4 | 0.2-0.6 | 3957 | 3.1 | 2.3-3.8 |
| 30-44 | 1437 | 10.1 | 7.7-12.5 | 2059 | 0.2 | 0.1-0.3 | 3496 | 5.3 | 4.0-6.5 |
| 45-59 | 781 | 10.4 | 7.5-13.3 | 909 | 1.0 | 0.3-1.8 | 1690 | 6.5 | 4.8-8.2 |
| 60-69 | 317 | 7.8 | 4.0-11.7 | 335 | 0.5 | 0.0-1.2 | 652 | 5.1 | 2.7-7.5 |
| Rural | 3199 | 7.3 | 5.9-8.7 | 3910 | 0.3 | 0.1-0.5 | 7109 | 4.3 | 3.5-5.1 |
| Urban | 777 | 7.6 | 5.0-10.3 | 1909 | 0.9 | 0.4-1.4 | 2686 | 3.9 | 2.6-5.1 |
| Total | 3976 | 7.3 | 6.1-8.6 | 5819 | 0.4 | 0.3-0.6 | 9795 | 4.2 | 3.5-4.9 |

Table 3 depicted that, among the current smoker 83% used tobacco product daily, this was still highly prevalent in male population. One percent of the respondents currently used any smokeless tobacco products such as snuff or chewing tobacco, of them 75.7% use daily. On average, the respondents were using snuff by mouth for 2 times a day, this is similar across both sexes. About fifty percent of the respondents ever use smokeless tobacco throughout their life time. The mean age of the respondents to initiate tobacco use was 21(SD±7) years, which was slightly late to start smoking among women 24(SD±9) years, and 0.7% of the respondents were currently using smokeless tobacco products.

Second-hand smoking at home and work was assessed. Most exposure to second-hand smoke occurs at homes and workplaces. In this regard, this study has found 10% of the respondents had reported someone smoking in their home and 12.6% at their work place. Mean years of duration of smoking among current smokers for both sexes was 14.4 years. Attempt to quit smoking was low, half (52.1%) of the respondents in this study reported they had tried to stop smoking, this is almost similar among women population. Among the smokers, 12% of males and 15.5% females reported they were advised by health workers to quit smoking.

Table 3: **Smoking characteristics of study respondents by gender, Ethiopia NCD STEPS survey, 2015**

| Characteristics | Sex | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Total | |
| | n | % | n | % | n | % |
| Currently smoke any tobacco products, such as cigarettes, cigars or pipes, gaya | 454 | 7.3 | 79 | 0.4% | 533 | 4.2 |
| Currently smoke tobacco products daily | 402 | 84.2 | 62 | 54.6 | 464 | 82.8 |
| Age at which smoking started | | 21 (7) | | 24(9) | | 21(7) |
| How long-ago smoking stared, In Years | | 16(26) | | 40(0) | | 16(26) |
| In the past, respondents ever smoke daily | 134 | 56.2 | 18 | 43.7 | 152 | 55.4 |
| Currently use any smokeless tobacco products such as snuff (Suret), chewing tobacco | 108 | 1.0 | 56 | 0.4 | 164 | 0.7 |
| Currently use smokeless tobacco products daily | 87 | 74.2 | 47 | 80.6 | 134 | 75.7 |
| On average, how many times a day/week do you use: Snuff, by mouth | 2(5) | | 2(5) | | 2(5) | |
| In the past, did you ever use smokeless tobacco products such as snuff, chewing tobacco daily | 32 | 50.6 | 11 | 43.1 | 43 | 49.1 |
| During the past 30 days, Someone smoke in your home? | 590 | 11.4 | 637 | 8.9 | 1227 | 10.3 |
| During the past 12 months, tried to stop smoking? | 182 | 52.1 | 25 | 49.4 | 207 | 52.0 |
| During any visit to a doctor or other health worker in the past 12 months, advised to quit smoking tobacco | 60 | 12.0 | 13 | 15.5 | 73 | 12.2 |

The proposition of tobacco smoke in each region was calculated and it was found to be higher in Oromia region 24.4%, followed by Somali region 16.7%. A slightly high prevalence was recorded in SNNPR and Gambella. The lowest was recorded in Tigray region (0.4%), while the rest had closer proportion in prevalence of use of smoke tobacco. On the contrary, the use of smokeless tobacco was more common in Afar (36.6%), followed by Oromia region 19.5%, and both Somali and SNNP had similar rates at 11.0% (Figure 1).
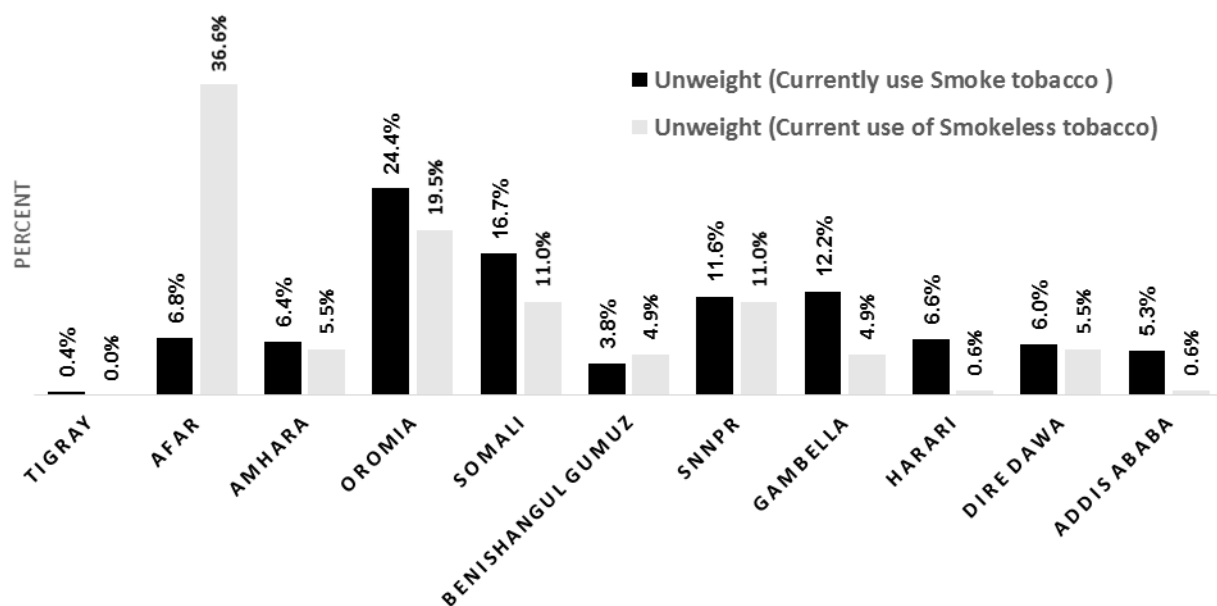


Figure 1: **Distribution tobacco use by region and its type among respondents, NCDs STEPS survey, Ethiopia, 2015**

Exposure to the media and advertisement on cigarette promotions, health warnings and cigarette purchases were assessed. About three percent (3.1%, 95% CI: 2.4-3.7) of the survey participants reported that they have noticed information on the dangers of smoking cigarettes or that encourages quitting in the newspapers or magazines. Nearly eight percent (7.8%, 95% CI: 6.4-9.3) reported obtaining information about the dangers of smoking cigarettes or that encourages quitting from television while (16.5%, 95% CI: 14.4-18.7) of the participants reported listening information on the dangers of smoking cigarettes or that encourage quitting from the radio. There were more men who noticed information about dangers of tobacco or encourage quitting on any of these media newspapers or magazines, radio and television, which were 72.0%. 60.4% and 66.6% respectively in the survey than women respondents. The percentage of respondents who noticed information on the media about the dangers of smoking or encouraged to quit was higher in lower age group from 15 to 29 years. Higher percentage of (78.3%) of the male respondents have noticed any advertisement or sign promoting cigarettes in store where cigarettes are sold than women respondent, and which was inversely related with age group, where the lower age group (15-29) had noticed the advertisement than the older age group (60-69) (Table 4). Overall, the exposure for different cigarette promotion was very low among study respondents.

Table 4: **Distribution of exposure to any tobacco related information through media and other means of advertising during the past 30 days, NCDs STEPS survey, Ethiopia, 2015**

| In the past 30 days, respondents noticed information about the dangers of smoking cigarettes or that encourages quitting through: | Gender | | | | Age Group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | 15 - 29 | | 30 – 44 | | 45 - 59 | | 60 - 69 | |
| | UW | % | UW | % | UW | % | UW | % | UW | % | UW | % |
| Newspapers or magazines | 198 | 72.0 | 135 | 28.0 | 156 | 61.6 | 115 | 26.2 | 44 | 9.1 | 18 | 3.1 |
| Radio | 418 | 60.4 | 514 | 39.6 | 407 | 62.6 | 333 | 23.4 | 145 | 11.3 | 47 | 2.7 |
| Television | 851 | 66.6 | 816 | 33.4 | 689 | 59.7 | 627 | 25.9 | 265 | 11.2 | 86 | 3.3 |
| Respondents noticed any advertisements or signs promoting cigarettes in stores where cigarettes are sold in the past 30 days | 79 | 78.3 | 29 | 21.7 | 44 | 55.5 | 39 | 26.6 | 20 | 17.0 | 5 | 0.9 |

## *Predictors of tobacco smoking*

To outline the independent predictors of tobacco use, variables including sociodemographic characteristics (age, sex, educational status etc…), alcohol consumption, and khat and other related factors were analyzed to check the association with tobacco use. The bivariate analysis revealed that age, marital status, occupation, alcohol consumers, and khat chewing, were found to be significantly associated with current tobacco use.

The multivariable logistic regression models result showed that older age groups had significantly lower rates compared with the age group 15-29. Unpaid respondents had 76% reduced risk of tobacco use [AOR=0.24, 95% CI: (0.1 – 0.8)] compared to employed respondents. Respondents who ever consumed alcoholic beverages (such as beer, Tella, Bordie, Tej, Arake, wine, spirits, beherawi, and ye bale zaf) were 4.7 times more likely to use tobacco than participants who never consumed alcohol [AOR=4.7, 95% CI: (2.3 – 9.8)]. Similarly, participants who experienced binge drinking (more than or equal to 6 standard drink for males and more than standard drink for female in the last 30 days were 2.46 times more likely to use tobacco than those who were not taking binge drink within 30 days period.

However, gender and residence were retained in the multivariate model as confounders of independent predictors of current use of tobacco. Large number of the current smokers were from male gender and resides in urban part of the country.

Table 5: **Predictors of tobacco use among participants in the Ethiopia NCD STEPS survey, 2015**

| Characteristics | COR (95% C.I) | AOR (95% C.I) |
|---|---|---|
| **Age** | | |
| 15-29 | 1 | 1 |
| 30-44 | 1.73 [1.4 – 2.2]* | 0.41 [0.2 – 0.8] ** |
| 45-50 | 2.32 [1.8 – 2.8] * | 0.45 [0.2 – 1.0] |
| 60-69 | 2.31 [1.7 – 3.2]* | 0.07 [0.01 – 0.6] ** |
| **Gender (N=9800)** | | |
| Male | 10 [7.14-12.5] | 1.54 [0.67-3.33] |
| Female | 1 | 1 |
| **Residence (N=9800)** | | |
| Urban | 1 | 1 |
| Rural | 1.44 [1.2 – 1.8] * | 1.20 [0.6 – 2.5] |
| **Occupation** | | |
| Employed | 1 | 1 |
| Self-Employed | 1.04 [0.8 – 1.4] | 1.20 [0.5 – 2.6] |
| Unpaid | 0.21 [0.2 – 0.3] * | 0.24 [0.1 – 0.8] ** |
| Un-Employed | 1.18 [0.7 – 1.9] | 2.05 [0.5- 5.8] |
| **Khat consumption** | | |
| Yes | 3.24 [2.1 – 4.9] * | 4.71[2.26 – 9.8] ** |
| No | 1 | 1 |
| **Ever consumed any alcohol** | | |
| Yes | 0.85 [0.7 -1.0] * | 4.7 [2.3 – 9.8] ** |
| No | 1 | |
| **Heavy Episodic Drinking** | | |
| Above end level | 3.84 [2.8 – 5.2] * | 2.46 [1.4 – 4.5] ** |
| Below end level | 1 | 1 |

NB:  ** significantly

* & ** all are P-value less than 0.001

## Discussion

This study, which was part of the national STEPS survey for NCD risk factors, presented the first report on national prevalence of tobacco use and associated factors among the Ethiopian population aged 15-69 years.

The overall prevalence of tobacco use was found to be low as compared to the previous times. It was predominantly high among men than women. The prevalence showed in increment in rate with age and a decline in old age. Smoked tobacco was frequented by the majority of tobacco users.

The purpose of this research finding is to inform magnitude then to call for solution for the problem. Thus, this study contextualizes its findings within the larger population in the country and would also suggest concerned body to target which population for interventions.

The finding is comparable with the further analysis report of 2011 EDHS on tobacco which found a national prevalence rate of 4.1% (19). But, prevalence of tobacco use varies from place to place; for instance, a study done on tobacco use in Butajira in 2003, rural Ethiopia, involving sample of 1895 individuals aged 15 years and above, reported 11.8% men and 0.2% women were current smokers (21). The prevalence of women smokers in Butajira was half the national average for women; on the contrary, the rate in men was higher. STEPS survey of adults conducted in Addis Ababa in 2006 reported prevalence of tobacco of 11%, nearly triple the national average (22), showing the importance of geographical variation and culture. The overall age standardized report on tobacco use by the

WHO in Addis Ababa from age 15 and above, the prevalence was 4.7% for any smoked tobacco use, slightly higher than the current report (22), but much lower that the report by Tesfaye et al. (23), the difference could be due to different target groups included in the two studies.

Attempt to quit was reported by more than half of the participants, but the proportion of tobacco users who received advice by health professionals was very law. The reported quit attempt in the current study is slightly higher than a report from Dire Dawa which reported a quit attempt prevalence of 34% (15), but comparable reports from elsewhere (24).

Tobacco use prevalence disaggregated by region showed participants from Oromia reported highest rate of smoked tobacco use; whereas, highest rate of non-smoked tobacco use was reported by participants from Afar. Overall, the lowest rate of tobacco use was reported from Tigray region. In the 2011 EDHS report, Gambella region reportedly had the highest rates of tobacco use; whereas, similar to the current study, Tigrai region reported the lowest rate of tobacco use (20).

Participants didn't report noticing open tobacco advertisements; similarly, anti-tobacco messages educating the public about the harm associated with tobacco use were also minimal. The lack of open tobacco advertisement in Ethiopia could explain why the rate of growth of tobacco smoking remained stable in the past five years. But, a reduction in the prevalence of tobacco use would have been possible had there been consistent anti-tobacco media campaigns (25). Advertisement campaigns is known to increase smoking rate as reported by several studies, the reason which prompted the banning of advertisement as stipulated in the FCTC (5).

The two factors that were independently associated with tobacco use were heavy episodic drinking and khat chewing. These combinations of tobacco and khat; tobacco and alcohol; or all of the three used by the same person are common phenomena as reported by several studies (22, 26, 27). Although it is difficult to establish the direction of causality in cross-sectional studies, some reports suggest khat serving as a gateway drug for tobacco smoking (28, 29). The adverse physical health and psychocial risks associated with tobacco (2), khat (30), and excessive alcohol use (31) are well documented. The combined behavior smoking of tobacco and heavy episodic drinking will increase the risk for NCDs and other adverse outcomes significantly; according to some studies the concurrent use of khat and tobacco were associated with higher frequency of oral and gastric cancer (32, 33) and higher rates of cerebrovascular accident and mortality (34).

### Strengths of the study
The study used locally contextualized standard WHO STEPS survey tool. Furthermore, the report is based on nationally representative sample on tobacco use and associated factors in Ethiopia which generated useful data for policy and planning interventions.

### Limitation of the study
First, being a cross-sectional study, it is not possible to establish direction of causal relationship between the dependent and outcome variables. Moreover, personal health and psychosocial consequences as well as social harms associated with tobacco were not investigated. Underreporting of tobacco use may be another potential limitation, as smoking may not be a culturally acceptable behaviour for some of the participants.

### Conclusion and recommendation:
The prevalence of current tobacco use was relatively high, especially among males; regional variations on tobacco use rates were observed. Smoked tobacco was frequented the majority of tobacco users. Attempt to quit was reported by more than half of the participants, but the proportion of tobacco users who received advice by health professionals was very law. Factors independently associated with tobacco use were heavy episodic drinking and khat chewing, which pose triple heath threat.

Thus, comprehensive public health interventions aiming at reducing tobacco use heavy alcohol consumption and khat chewing are recommended, including enforcement of existing anti-tobacco laws in the country. Interventions need to pay more attention to regions with very high rates of tobacco use and men. Further studies that will explore the physical health, psychosocial and other adverse impacts of multiple substance use are recommended.

### Declaration of Conflict of Interest
The authors declare that there is no financial or non-financial conflict of interest.

### Authors' contributions
All authors made significant contribution during design, implementation of the study and production of the manuscript.

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