

## Secondhand tobacco smoke exposure among adolescents in an Ethiopian school

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### Abstract

Tobacco use is responsible for 6 million deaths globally per year, of which 600,000 deaths are due to secondhand smoke (SHS) mainly among women and children. This study aims to determine the prevalence of SHS exposure among school-going adolescents and highlights the essential determinants in developing successful strategies to prevent adverse health effects in Ethiopia. The analysis is based on a school based cross sectional study where 1673 students with 98.2% of response rate from grade 9-12, aged 13-19 were included. Data was collected by a self-administered questionnaire that is adapted from the global youth tobacco survey questionnaire. Proportions and 95% confidence intervals were obtained as estimates of prevalence. Bivariate and multivariate analyses were made using logistic regression on SPSS version 20.0 software in order to predict factors associated with SHS exposure. About 17% of adolescents were exposed to tobacco smoke in their home, whereas more than half (60.8%) of adolescents were exposed to tobacco smoke in public places. In multivariate analysis, sex, parent smoking, peer smoking, and absence of discussion in the classroom about dangers of smoking were seen significantly associated with SHS exposure. The prevalence of SHS exposure among adolescents in Ethiopia is highest. Moreover, exposure to SHS in public places is much higher than at home.

### Introduction

Secondhand smoke (SHS) consists of exhaled smoke as well as side-stream smoke that is released from the burning cigarette between inhalations and it has a very similar composition.<sup>1</sup> It contains significant levels of nicotine and other toxic ingredients which are carcinogenic and are risk factors for different health problems and deaths.<sup>2,3</sup> Strong evidence links SHS exposure to some diseases in adults

and children. Additionally, preliminary evidence suggests that SHS contributes to other serious health effects. It can be particularly dangerous for women and children.<sup>4,5</sup>

Tobacco-attributable mortality is increasing rapidly in developing countries, and by 2030 about 83% of the world's tobacco deaths will occur in low- and middle-income countries.<sup>6,7</sup> Secondhand smokes was estimated to have caused 603,000 premature deaths globally. The largest number of estimated deaths attributable to SHS exposure in adults was caused by ischemic heart disease, followed by lower respiratory infections in children, and asthma in adults.<sup>8</sup>

Worldwide, 40% of children, 33% of male non-smokers, and 35% of female non-smokers were exposed to SHS. The highest proportions exposed were estimated in Europe, the western Pacific, and south East Asia, with more than 50% of population exposed. Proportion of people exposed was lowest in Africa.<sup>9</sup>

A study done in Iraq among school adolescents and children showed that the prevalence of secondhand smoking was 34.2%, and that females were more exposed than males (18.7, 15.4%) respectively with statistically significant difference. This study also showed that indoor exposure to SHS was significantly higher than outdoor public places exposure (24.6 and 9.2% respectively), and the main predictors of SHS exposure were age, gender, place of exposure and, knowledge about health effects of SHS.<sup>10</sup>

Secondhand smoke exposure occurs either at home or in public places/outside home. For example a study done in 2006 in Burkina Faso found that 36% of youngsters live with a smoker, and 50% were exposed to SHS outside their home.

Another cross-sectional study done in 2008 in South African school-going adolescents found that 26% of students were exposed to SHS at home and 34% outside. Further, this study showed how parental and close friends smoking status, allowing someone to smoke around you, and perception that passive smoking was harmful were significant determinants of adolescent's exposure to both SHS at home and outside.<sup>11</sup>

Secondhand smoke affects the family, friends, and associates but also those who are employed in public settings, such as retail, transportation, and food service settings. These employees, who are often women, are exposed not only involuntarily, but also at high level.<sup>12</sup>

The World Health Assembly adopted the WHO Framework Convention on Tobacco Control (FCTC) on 21 May 2003 and it entered into force on 27 February 2005. It has been ratified in many of the African countries; only Eritrea, Malawi, Mozambique and Zimbabwe are yet to ratify the Convention.<sup>13,14</sup> Even if

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Ethiopia ratified the convention in late January 2014, there is a need to commitment, strength, and urge by all health development partners to intensify their support for the speedy implementation of the WHO FCTC and the placement of legislations to ensure that the public is protected from exposure to tobacco smoke. To do so, reliable evidences are important for Ethiopian government; however the country lacks this evidence. Therefore this paper can help magnificently different stakeholders and the government by revealing the magnitude of SHS exposure and associated factors among the adolescents of Ethiopia, who are the future of the country.

### Materials and Methods

The school based cross sectional study was conducted from May 10 to 15, 2014 in school adolescents aged 13-19 years who were enrolled in grade 9-12 in the public and private schools of Hawassa and Jimma town in Ethiopia.

Sample size was calculated by using single population proportion formula with the assumption of 50% proportion of tobacco use among adolescents, 5% margin of error, and 95% confidence interval. Hence the sample size calculated was 1704 samples. Multi stage sampling of students on grade 9-12 who were

enrolled in the private and public schools of Hawassa and Jimma town were included in the sampling frame. At the first stage, three high schools from each town and each sector (total of 12 schools) in Hawassa and Jimma town were selected randomly. Then at the second stage students from grade 9-12 were selected based on proportion to student size and included to the final study subjects by using simple random sampling from the registrar list of all students in their specific class until the desired sample size.

Global Youth Tobacco Survey (GYTS) questionnaire that were adapted to the Ethiopian context were used to conduct the survey. This questionnaire is a self-administered type of questionnaire, which consisted of a core component and an optional component. All the questions were multiple choices and were translated to the official language, Amharic. Both the data collectors and supervisors were trained for three days on the objective and methodology of the research, and data collec-

tion approach. Moreover, survey procedures were designed to protect the student's privacy by allowing for anonymous and voluntary participation.

Secondhand tobacco smoke exposure was assessed using question: during the past 7 days (one week), how many days somebody smoked at your presence in your home or outside your home? Data from 1673 students with 98.2% response rate were analyzed using SPSS version 20.0 software and Proportions and 95% confidence intervals were obtained as estimates of prevalence.

Ethical clearance was obtained from the program coordinating parties and Jimma University Ethical review board. Permission from the officials governing the town educational department and the respective schools were obtained, and then informed consent was obtained from the study participants after explaining the purpose of the study.

## Results

A total of 1673 students responded to our questionnaires, while 31 students refused to respond, *i.e.* we had a response rate of 98.2%, and data were analyzed. Among them, 47.7% were males and 52.3% were females, and majority of them were in the age category of 16-17 years (60.2%) (Figure 1).

### Exposure to secondhand tobacco smoke

About 17% [95% confidence interval (CI) 21.9-38.3] of adolescents who were non-smokers were exposed to tobacco smoke in their home (12.2% males and 4.8% females) (Figure 2). On the other hand, 16.2% of total surveyed adolescents live with parents who were both smoker and one of them was smoker (Figure 3). Accordingly, 14% of them live with parents whose father only was smoker and 2.2% live with parents whose both father and mother

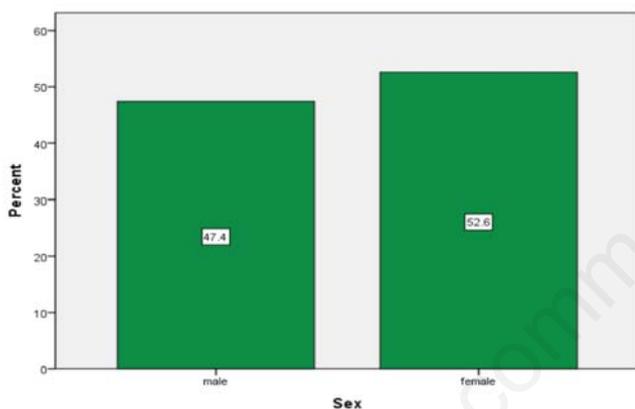


Figure 1. Proportion of study participants by sex.

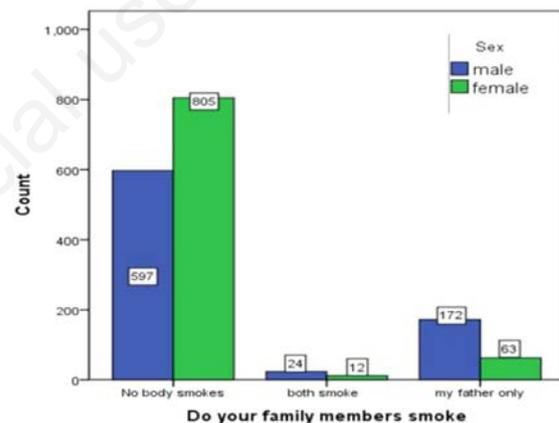


Figure 3. Proportion of respondents by sex whose family members smoke (n=1673).

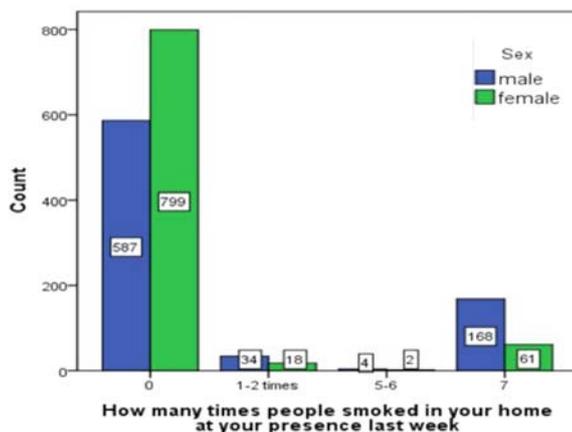


Figure 2. Secondhand tobacco smoke exposure at home by sex (n=1673).

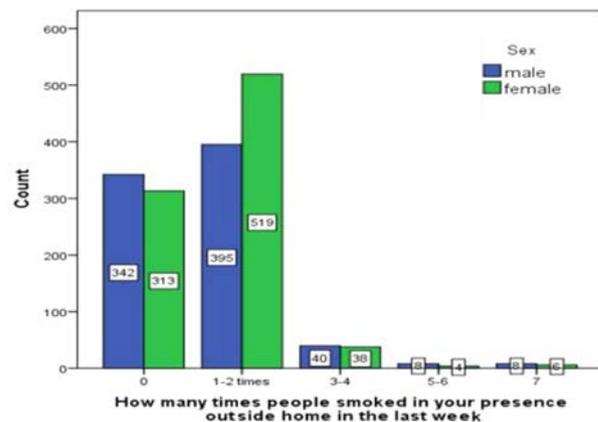


Figure 4. Secondhand tobacco smoke exposure outside respondents' home/public places (n=1673).

were smokers.

More than half (60.8%, 95%CI 11.3-16.73) of adolescents who were non-smokers were exposed to tobacco smoke in public places in the past 7 days preceding the survey, among them 27% were males and the remaining (33.8%) females (Figure 4). Among those adolescents who were exposed to SHS in public places, 19.4% have closest friends who were smokers.

Majority of the adolescents (84.6%) were thinking that smoke from others is harmful to them. Moreover almost all the adolescents (95.7%) indicated that smoking should be banned from public places; among them, 47.3% were males and the remaining 52.7% were females (Table 1).

### Factors associated with second-hand smoke exposure

Those variables with  $P < 0.25$  in bivariate analysis were entered into multivariate analysis using multiple logistic regressions in order to predict factors associated with exposure to SHS.

According to multivariate analysis, sex, parent smoking, peer smoking, and not discussing about dangers of smoking and tobacco smoke in the class room were seen as significantly associated with SHS exposure.

Female adolescents were 3.46 times more exposed to SHS than male adolescents at home [adjusted odds ratio (AOR)=3.46, 95% CI 2.62-4.57]. Likewise, adolescents having either of their parents smoking were 3.3 times more likely to expose to SHS than their counterpart adolescents (AOR=3.34, 95% CI 2.37-5.03) and similarly adolescents having their closest friends smoking were more likely to expose to SHS (SHS) (AOR=3.61, 95% CI 2.41-5.41) at their home.

In public places adolescents who have peer smoker were 3.70 times more exposed to SHS than those who do not have peer smokers

(AOR=3.76 95% CI 2.49-5.65). Discussing danger health effects of SHS and tobacco has also association with public places SHS exposure. That is, those adolescents who were not informed on the danger health effects of tobacco smoke were 5.30 times more exposed to it (AOR=5.32, 95% CI 4.13-6.81).

## Discussion

This study revealed that exposure of adolescents to SHS is unacceptably very high, where over 6 in 10 were exposed to SHS in public places. On the contrary, exposure to SHS at their home was about 2 in 10 adolescents. This implies that exposure in public places was higher than at home. This finding contradicts with a study done in Iraq which showed that SHS exposure at home is higher than public places exposure.<sup>10</sup>

The GYTS, assessing data from more than 130 countries and principalities, has found that: children and youths are widely exposed to SHS.<sup>9</sup> Similarly, this study has evidenced increased prevalence of SHS exposure among adolescents. This implies the need for effective strategy to prevent adolescents from SHS exposure.

Public places exposure which was over 6 in 10 in the current study is much higher than the findings of the studies conducted in Iraq, South Africa and Burkina Faso.<sup>10,11</sup> This difference could be due to high prevalence of tobacco use in the current study area and lack of tobacco control activities. Moreover, the difference might be due to behavioral characteristics of study subject and difference of study areas. In public places male adolescents are more likely exposed to SHS than female adolescents. Likewise, adolescents who have peer who use tobacco are more likely exposed to SHS smoke than those who do not have peer

who use tobacco. Those adolescents who were not discussed the danger health effects of tobacco smoke are more likely exposed to SHS. Moreover discussing the danger health effects of SHS at school is protective factor of exposure to SHS in public places.

When we see exposure to SHS at home which is about 2 in 10 adolescents were exposed it is almost consistent with percentage of adolescents whose family members use tobacco and lower than the study finding conducted in Burkina Faso and South Africa.<sup>11,12</sup>

Further the current study indicated that female adolescents are more likely exposed to SHS at home than male adolescents are, which is consistent with reviewed study conducted in Iraq.<sup>10</sup> This might be explained by the cultural and traditional background of the country, at which females spend more of their life time at home and usually responsible for the activities inside their home. Moreover adolescents whose parents and closest friends use tobacco are also more likely exposed to SHS than adolescents whose parents and closest friends do not use tobacco at home. This finding is also consistent with the findings of study conducted in South Africa.<sup>11</sup>

Even though almost all the students were favoring law-prohibiting smoking in public places and agreed in banning, the finding of the current study is much higher from the study findings conducted in many countries. Although some efforts are being made to protect non-smokers from SHS by some service providers in Ethiopia, there is a need to intensify and implement the law banning smoking in public places in order to protect non-smokers from SHS, as it causes danger to the health of individuals.

This study provides significant insight into prevalence of SHS exposure among adolescents in Ethiopia, an area relatively untouched to date. However, there has been number of limitations inherent in any cross sectional school survey where data collection is limited to a single time point, and SHS exposure was assessed by self-report and therefore, some students may have under reported their exposure. The study sample was also school-based and therefore not entirely representative of all adolescents in Ethiopia.

## Conclusions

From this study it possible to conclude that the prevalence of SHS exposure among adolescents in Ethiopia is highest. Moreover, exposure to SHS at public places is much higher than at home. Since this study is a cross sectional survey made using GYTS, it might not show cause-effect relationships. Therefore, we recommend another study in order to establish

**Table 1. Exposure to secondhand tobacco smoke and respondents' intention towards banning smoking in public places (n=1673).**

Variables	Frequency (%)
Smoke from other people's cigarettes is harmful	
Yes	84.6
No	15.4
Exposed to smoke from others in their home	
Yes	17.2
No	82.8
Exposed to smoke from others in public places	
Yes	60.8
No	39.2
Smoking should be banned from public places	
Yes	95.7
No	4.3

cause-effect relationships and attribution of the factors to SHS exposure.

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