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Original Article

Secondhand smoke exposure among nonsmoking adults in two Nigerian cities

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Abstract

Background: Tobacco control policy can only succeed if the burdens of smoking are known. The objective of this study was to determine the prevalence and correlates of secondhand smoke (SHS) exposure among nonsmoking adults in two Nigerian cities.

Materials and Methods: We carried out a cross-sectional study from October 2009 to April 2010 among adult population of two Nigerian cities: Enugu and Ilorin. A semi-structured questionnaire was administered by interviewers to obtain socio-demographic information; and information regarding pattern of SHS exposure, awareness of tobacco control policy and the harmful effects of SHS. SHS exposure was defined as regular exposure to tobacco smoke in the previous 30 days in a nonsmoking adult.

Results: Of the 585 nonsmoking adults that completed the study, 38.8% had regular exposure to SHS; mostly, in public places (24.4%). More men were exposed at public places when compared with women (27.0% *vs.* 19.5%). The strongest factor associated with exposure to SHS in women was having a smoking spouse [prevalence rate (PR) ratio-7.76; 95% confidence interval (CI), 3.08-9.42]; and in men, it was lack of home smoking restriction (PR ratio-6.35; 95% CI, 4.51-8.93). Among men, SHS exposure at any location was associated with lack of secondary school education, residing in slum apartment (house with many households), living with a smoking family member (non-spouse), lack of home smoking restriction, and alcohol intake. Among women, SHS exposure at any location was associated with having a smoking spouse, residing in slum apartment and lack of home smoking restriction. Seventy-two percent of respondents were aware of the harmful effects of SHS on their health. Lack of awareness of the harmful effects was significantly associated with increasing age (r= +0.45; P = <0.01), lack of secondary school education (r= −0.10; P = 0.04), residing in slum apartment (r =-0.12; P = 0.03) and being a widow/ widower (r= +0.24; P < 0.01). Only 17.4% of the employees reported availability of outdoor smoking area at their workplaces.

Conclusion: Our results show that prevalence of SHS exposure was the highest in public places. These findings underscore the need for enactment of comprehensive smoke-free legislation and implementation of educational strategies to reduce SHS exposure in homes.

Keywords: Environmental tobacco smoke, Nigeria, secondhand smoke, smoking ban, tobacco control

Résumé

Background: Politique de contrôle du tabac ne peut réussir que si les charges du tabagisme sont connus. L'objectif de cette étude était de déterminer la prévalence et les corrélats de l'exposition de la fumée secondaire (SHS) chez les non-fumeurs adultes dans deux villes nigérians.

Matériaux et procédés: Nous avons effectué une étude transversale d'octobre 2009 à avril 2010 chez les adultes population des deux villes nigérians: Enugu et Ilorin. Un questionnaire semi-structurées fut administré par les intervieweurs pour obtenir des renseignements socio-démographiques. et de l'information au sujet du patron de l'exposition SHS, sensibilisation de tabac politique de contrôle et les effets nocifs de SHS. SHS exposition était defi

ned que l'exposition régulière à tabac fument dans des 30 jours précédents chez un adulte non-fumeurs.
Résultats: De the 585 adultes non-fumeurs qui a terminé l'étude, 38,8% avaient une exposition régulière aux SHS; surtout, dans public place (24,4%). Plus d'hommes ont été exposés dans les lieux publics, comparativement aux femmes (27,0% *vs* 19,5%). Le facteur plus fort lié à l'exposition à SHS chez les femmes a été ayant un conjoint fumeur [les taux de prévalence Ratio (PR)-7,76. intervalle de 95% confi dence (CI), 3,08-9,42] ; et chez les hommes, c'est le manque de restriction de la maison de fumer (PR ratio-6,35 ; 95% CI, 4.51-8,93). Chez les hommes, exposition SHS à n'importe quel endroit était associée de la manque de secondaire enseignement scolaire, résidant dans l'appartement des bidonvilles (Chambre avec nombreux ménages), vivant avec un membre de la famille fumer (non-conjoint), absence de restriction de la maison de fumer et d'alcool. Chez les femmes, l'exposition SHS à n'importe quel endroit a été associée à avoir un conjoint fumeur, résidant dans l'appartement des taudis et l'absence de restriction de la maison de fumer. Soixante-deux pour cent des répondants étaient au courant des effets nocifs des SHS sur leur santé. Manque de sensibilisation les effets nocifs était signifi cativement associée à l'âge (r = +0.45 ; *P* = < 0,01), manque de l'école secondaire l'éducation (r = −0.10 ; *P* = 0,04), résidant dans l'appartement des bidonvilles (r =-0,12; *P* = 0,03) et étant une veuve / veuf (r = +0.24 ; *P* < 0,01). Seulement 17,4% des employés a signalé la disponibilité de fumoir extérieur à leurs lieux de travail.
Conclusion: Nos résultats montrent que la prévalence de l'exposition SHS était le plus élevé dans les lieux publics. Ces constatations souligner la nécessité pour l'adoption d'une législation complète de fumée et de la mise en œuvre de l'éducation stratégies pour réduire l'exposition des SHS dans les maisons.

Mots clés: La fumée de tabac, Nigéria, fumée secondaire, interdiction de fumer, lutte contre le tabagisme

Introduction

Secondhand tobacco smoke (SHS) is the combination of smoke emitted from the burning end of a cigarette or fr other tobacco products and smoke exhaled by other smokers.[1] This is sometimes referred to as environmental tobacco smoke (ETS), involuntary or passive smoking.[1-2] Secondhand tobacco smoke is a mixture of exhaled mainstream smoke and sidestream smoke. Mainstream smoke is defined as smoke that is inhaled and then exhaled into the air by smokers. Sidestream smoke is the smoke that comes directly from the burning tobacco in cigarettes, released from the smouldering cigarette or other smoking device (cigar, pipe, *bidi,* etc.) and diluted with ambient air.[1-2] The inhaled sidestream smoke contains more than 4,000 chemicals, including nicotine, 250 known carcinogens like benzene, 1, 3-butadiene, benzo[a] pyrene, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone and many other toxic components.[1-5] Mainstream and sidestream smoke contain largely the same components; however, these carcinogens have been shown to be present at higher concentrations in sidestream smoke than in mainstream smoke.[3,4] In addition, SHS has been shown to produce 10 times more particulate-matter (PM) pollution than an idling low-emission diesel engine.[6]Several authorities have documented its role as a carcinogen and also its association with respiratory and cardiovascular diseases, as well as its impact on children's health and development.[1-3] The risk of lung cancer in nonsmokers exposed to SHS is increased by between 20% and 30%; and the risk of heart disease, by 30%.[1-3,7-9] Children exposed to SHS are at particular risk of developing more respiratory symptoms like coughing and wheezing, worsening of asthma, middle ear disease, neurobehavioral impairment and cardiovascular disease in adulthood.[1-3,9-10] Exposure to SHS in pregnant women can cause prenatal problems like low birth weight, intrauterine growth retardation, missed abortion and preterm delivery; while postnatal consequences are sudden infant death syndrome and impaired lung growth.[1-3,9-11] Secondhand smoking increases the risk of death in both adults and children. In the U.S., it is estimated to kill 53,000 nonsmokers per year, making it the third leading cause of preventable death.[2] Several studies on the burden of tobacco use have been conducted in Nigeria, with a prevalence of current smoking as high as 31.9% in some urban areas and as low as 17.6% in the rural areas.[12,13] The health consequences of secondhand smoking are enormous and warrant an effective tobacco control policy, which can succeed only if the burdens of active and passive smoking are known. There is no study in Nigeria that has evaluated exposure to secondhand smoke in a specific population. The objective of this study was to determine the prevalence and correlates of secondhand smoke exposure among nonsmoking adults in two Nigerian cities.

Materials and Methods

Study setting

This is a population-based cross-sectional study that was conducted from October 2009 to April 2010 among the adult population of two Nigerian cities. The study locations selected were Enugu North and Enugu East, local government areas in Enugu city, the southeastern region; and Ilorin West, local government area in Ilorin city, the north-central region.

Sampling method and size

The respondents constituting the sample were selected by multi-stage stratified random sampling. At the first stage, one or two local government areas were selected from each city depending on the size of the population of the local government area. At the second stage, three wards were randomly selected from each local government area of the study. At the last stage, households were randomly selected, and all the individuals in the selected households with age ≥ 18 years who were ready to give verbal or written informed consent were approached to participate in the study. The minimum sample size was obtained using the Cochran formulae[14]: $N = Z^2pq / d^2$, where N is the sample size, p is the prevalence of secondhand tobacco smoking in Nigeria (taken as 50% since it was unknown), $q = (1 - p)$, Z is the standard normal deviation (usually set at 1.96, which corresponds to the 95% confidence interval), and d is the desired degree of accuracy (set at 0.05 to tolerate a 5% error, N = 384). The calculated minimum sample size was 384.

Survey instrument

SHS exposure can be assessed by a questionnaire survey, airborne concentrations or biomarkers estimation.[2,15] Questionnaires are relatively inexpensive; can be easily administered in a variety of ways, including mail surveys, telephone surveys or face-to-face surveys (as in our study); and they are able to assess both current and past exposures.[2] The disadvantages include difficulties in validation, particularly of a past exposure; underestimation; and misclassification.[2] We used a semi-structured questionnaire that was prepared from Global Adult Tobacco Survey (GATS) core questionnaire, questionnaires from previously validated study of secondhand smoking among asthma patients in California, U.S.; and a general population study conducted in Spain.[16-18] It was adapted and modified for accuracy to ensure that it measured exposures in all the possible microenvironments. It was also pretested among 20 respondents in both cities and modified to enable easy administration by the field workers. The questionnaires were administered face to face by trained interviewers in English and local language depending on the respondent's preference. The survey instrument was used to obtain socio-demographic information; and information regarding types of residences, smoking status, prevalence and pattern of SHS exposure, awareness of the tobacco control policy and harmful effects of SHS, alcohol intake; and self-reported perception of their health status. Smoking restriction in the household was defined as restriction of smoking in all areas that constitute the apartment. SHS exposure was defined as answering yes to the question "Have you been regularly exposed to tobacco smoke in the last 30 days in any of the microenvironment (home, public transport, workplace and public places)? To avoid the problem of recall, the severity of SHS exposure was determined by the duration of exposure in the past 7 days. The severity of exposure was classified as low-intensity exposure if it was for < 1 hour; intermediate-intensity exposure, if for 1-4 hours; severe-intensity exposure, if for > 4 hours. The estimated number of cigarettes per day to which a respondent was exposed was obtained by dividing the total number of weekly exposure by seven.

Data analysis

Respondents with incompletely filled questionnaire and smokers were excluded. The data were analyzed using SPSS version 15.0 (SPSS Inc., Chicago, IL, 2005). Descriptive and frequency statistics were used to determine the general characteristics of the study population and the prevalence of SHS. The respondents were stratified by sex and subsequently by location of exposure. The prevalence ratios and their 95% CIs were calculated for independent variables that were associated with SHS exposure by multivariate logistic regression analyses. To reduce bias, adjustments of the crude prevalence rate ratio PR were made for confounding variables that were statistically significantly associated with SHS exposure; in particular, some variables like sex, because of the unequal distribution. The Spearman correlation coefficient was used to determine the association between the lack of awareness of risk of SHS and socio-demographic factors. *P* values < 0.05 were considered statistically significant

Ethical approval

The study was approved by the University of Ilorin Teaching Hospital, and permission was also obtained from the local chiefs before administration of questionnaire.

Results

A total of 739 respondents, out of the 885 informed about the survey, who had completed the questionnaire were recruited in the study, giving a response rate of 82.1%. One hundred fifty-four (20.8%) respondents that were current smokers were excluded from the total number of respondents who completed the questionnaire, leaving 585 (79.2%) nonsmokers for analysis. Of the 585 nonsmokers, 385 (65.8%) were males and 200 (34.2%) were females; their mean age was 32.9 ± 17.7 years (range, 18-81 years). Two hundred twenty-seven (38.8%) respondents reported regular exposure to SHS in the past 30 days at the time of the study [Table 1]. Of the 227 secondhand smokers, 154 (67.8%) were males and 73 (32.2%) were females.

Prevalence by sex and location of secondhand smoke exposure

Considering stratification by gender and location of SHS exposure, it was found that 85 (22.1%) men reported SHS exposure at home, 104 (27.0%) reported exposure at public places (bar, nightclub, sport arena, concert arena, etc.), 35 (9.1%) reported exposure at their workplaces, and 14 (3.6%) men reported SHS exposure while using public transport. Forty-one (20.5%) women reported SHS exposure at home, 39 (19.5%) reported exposure at public places, 22 (11.0%) reported exposure at their workplaces and 15 (7.5%) women reported exposure while using public transport [Table 2]. More women were exposed at workplaces when compared with men (11.0% *vs.* 9.0%). The average daily cigarette exposure at workplaces was 2.1 ± 1.3 cigarettes; and at home, from their spouses, it was 1.8 ± 1.4. The exposure at all locations was of low intensity (<1 hour); except exposure at home, which was of intermediate intensity (1-4 hours) [Table 3].

Table 1: General characteristics of the study subjects

Characteristics	Mean (SD), *n* (%)
Age	32.9±17.7
Sex	
Male	385 (65.8)
Female	200 (34.2)
Education	
None	57 (9.7)
Primary/Arabic	54 (9.2)
Secondary/high school	146 (25.0)
Tertiary	328 (56.1)
Occupation	
Unemployed	58 (9.9)
Retired	101 (17.3)
Student	207 (35.4)
Employed	219 (37.4)
Marital status	
Single	288 (49.2)
Married	271 (46.3)
Divorced/widowed	26 (4.4)
Types of homes	
Slum apartment	436 (74.5)
Flat apartment	86 (14.7)
Luxury home/duplex	63 (10.8)
Regular exposure to SHS in past 30 days	
Yes	227 (38.8)
No	358 (61.2)

Awareness of tobacco control policy and harmful effects of secondhand smoke

Among 585 nonsmoking adults, 422 (72.1%) were aware of the harmful effects of SHS on their health, 401 (68.6%) were aware that SHS exposure can cause respiratory diseases, and 266 (45.5%) were aware of the ban on tobacco smoking in all public places in Nigeria. Lack of awareness of the risks from SHS was significantly associated with increasing age (r= +0.45; P=<0.01), lack of secondary school education (r= −0.10; P= 0.04), residing in slum apartment (r-0.12; P= 0.03) and being a widow/ widower(r= +0.24; P< 0.01). Sex and occupation were not significantly associated with lack of awareness of the risks from SHS. Four hundred thirty-one (73.7%) respondents had received information on the harmful effects of secondhand smoking on health in the previous 3 months. The major sources of information were television (37.5%) and radio (34%) [Figure 1]. In addition, 490 (83.8%) respondents reported there was restriction on smoking in their homes. Out of the 219 employed respondents, 38 (17.4%) reported the availability of outdoor smoking area at their workplaces [Table 4].

Correlates of secondhand smoke exposure at different locations according to socio-demographic and other characteristics

The risk of secondhand smoke exposure at home among the men was significantly more for respondents residing in slum apartment (i.e., house

Table 2: Prevalence of secondhand tobacco smoke exposure by gender and location in the study

Location	Male (*n*=385) *n* (%)	Female (*n*=200) *n* (%)	Total *n* (%)
Home	85 (22.1)	41 (20.5)	126 (21.5)
Public places	104 (27.0)	39 (19.5)	143 (24.4)
Workplaces	35 (9.1)	22 (11.0)	57 (9.7)
Public transport	14 (3.6)	15 (7.5)*	29 (5.0)
Other locations	32 (8.3)	13 (6.5)	45 (7.8)

*P< 0.05; NB- Some respondents had multiple-location exposures

Table 3: Intensity of secondhand tobacco smoke exposure by location among nonsmokers

	Location *n*	Intensity of exposure n (%)	Low Intermediate	Severe
Home	126	39 (31.0)	73 (57.9)	14 (11.1)
Public places	143	84 (58.7)	54 (37.8)	5 (3.5)
Workplaces	57	36 (63.2)	9 (15.8)	12 (21.1)
Public transport	29	20 (68.9)	4 (13.8)	3 (10.3)
Other locations	45	33 (73.3)	12 (26.7)	-

Low- <1 hour; intermediate- 1-4 hours; high- >4 hours; NB - Some respondents had multiple-location exposures

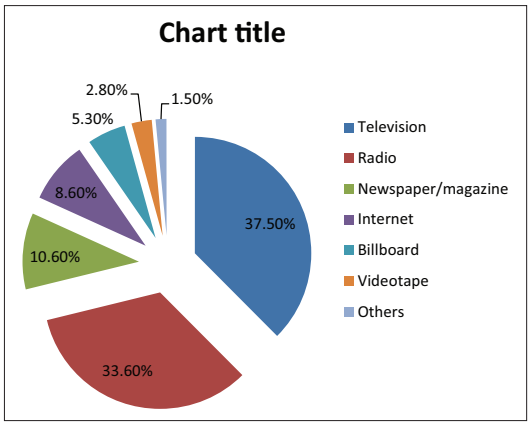

Figure 1: Sources of information on secondhand smoking

with many households), having smoking spouses and smoking family members (non-spouse), living in homes without smoking restriction and those consuming alcohol. Workplace exposure among men was significantly more likely in those with lack of secondary school education and those consuming alcohol. SHS exposures in public places in men were significantly more likely among those who were alcohol drinkers [Table 5].

With regard to women, SHS exposure at home was more likely among those who were married, having smoking spouses and family members (non-spouse), living in homes without smoking restriction and those consuming alcohol. Workplace exposures among women were significantly more likely among those reporting no self-perceived health concern. Among both sexes, awareness of the ban on smoking in public places was negatively associated with SHS [Table 6].

Discussion

Our study has attempted to explore the burden of secondhand smoking in two Nigerian cities. The overall prevalence of SHS in the study population was 38.8%. The prevalence of SHS found in our survey is low when compared with that found in many other studies that adopted similar methodology. Although our result is closer to 37% in Cambodia,[19] yet it is lower than 48.3% in China,[20] 68% in Seoul city of South Korea[21] and 69.7% in Spain.[22] In studies done in Italy and USA that determined SHS exposure by the measurement of serum or urinary cotinine level, the prevalence reported was 57.6% and 45%, respectively.[23,24] The result reported in USA was an aftermath of the enactment and enforcement of the smoke-free law banning tobacco smoking in public places.[2,24] The disparities between our result and similar studies may be due to higher prevalence of tobacco smoking

Table 4: Awareness of tobacco control policy and the harmful effects of secondhand smoke (*n*= 585)

Awareness	*n* (%)
Aware of harmful effects of SHS on health	422 (72.1)
Aware that SHS can cause respiratory diseases	401 (68.6)
Aware of tobacco ban in public places	266 (45.5)
Received health information on the harmful effects of SHS in the previous 3 months	431 (73.7)
Smoking restriction at home	490 (83.8)

in Europe and Asia as compared to Nigeria. The ban of smoking in public places in Nigeria at the time of this study is yet to be supported by a smoke-free law, which needs to be enacted by the country legislature; therefore, the enforcement of the ban on smoking is not stringent.

This study also showed that the average daily cigarette exposure at workplaces was 2.1 ± 1.3 cigarettes; and at home, from their spouses, it was 1.8 ± 1.4 cigarettes. The intensity of exposure at all locations was low (exposure for < 1 hour); except the exposure in homes, which was of intermediate intensity (exposure for 1-4 hours). This intensity of exposure is lower when compared with a study in south Korea wherein an average daily exposure of 9 cigarettes was reported at workplaces; 6 cigarettes, in homes; and 1 cigarette, at other locations.[21] The duration of exposure in hours per day in our study is also lower than the 3.8 hours per day reported in a previous study.[23]

By gender stratification, men were commonly exposed at public places (27.0%), while women were commonly exposed at home (20.5%). Other workers have reported highest exposures at sites other than homes or workplaces.[17,21] However, in USA and Norway, workplaces and homes are the major sources of SHS exposure.[2,25] The public places (24.4%) were the commonest site of SHS exposure, although our findings may just be a tip of the iceberg, as people are not always conscious of their exposure that occurs in most public places. The contribution of public places as the major source of exposure in this study may be due to lack of awareness of the ban on smoking in public places, as only 45.5% were aware of the ban on tobacco smoking in all public places in Nigeria. Although majority (72.1%) of the respondents were aware of SHS being harmful to health and had received information about the harmful effects of secondhand smoking on health in the previous three months, their major sources of the information regarding the harmful effects of SHS were television (38.6%) and radio (34.5%).

Table 5: Adjusted prevalence rate ratios and 95% confidence intervals of exposure to secondhand smoke in different settings according to the variables in men

Characteristics	Home	Workplaces	Public places	Public transports
Age range, years				
18-29	1.00	1.00	1.00	1.00
30-39	0.17 (0.07-0.39)	1.14 (0.60-2.18)	0.54 (0.31-0.94)	1.43 (0.61-3.36)
40-49	0.93 (0.47-1.84)	0.97 (0.31-3.00)	0.47 (0.19-1.17)	-
50-59	0.55 (0.27-1.10)	1.11 (0.36-3.48)	1.80 (1.00-3.25)	0.68 (0.10-4.60)
60+	0.60 (0.06-5.00)	1.09 (0.51-2.35)	0.46 (0.10-1.12)	0.90 (0.24-3.31)
Education				
<Secondary	1.00	1.00*	1.00*	1.00
≥Secondary	0.75 (0.47-2.06)	0.31 (0.16-0.61)	0.81 (0.66-1.01)	0.98 (0.92-1.27)
Occupational status				
Unemployed	1.00	-	1.00	1.00
Student	0.86 (0.55-1.34)	-	0.53 (0.27-1.03)	1.18 (0.64-2.20)
Retired	0.78 (0. 26-2.49)	-	1.37 (0.75-2.50)	1.12 (0.40-3.11)
Employed	0.56 (0.36-0.88)	-	1.34 (0.93-1.94)	0.97 (0.47-1.97)
Marital status				
Divorced/widowed	1.00	1.00	1.00	1.00
Single	0.55 (0.37-0.82)	0.64 (0.33-1.21)	0.72 (0.55-0.93)	1.42 (1.00-2.00)
Married	1.86 (1.27-2.73)*	1.17 (0.62-2.20)	1.40 (1.12-1.74)	0.63 (0.27-1.46)
Residence				
Flat apartment	1.00	1.00	1.00	1.00
Slum apartment	2.12 (1.03-4.36)*	1.69 (0.88-3.23)*	1.27 (0.96-1.69)	1.23 (0.69-2.19)
Luxury/duplex apartment	0.41 (0.10-1.69)	0.14 (0.02-0.98)	0.29 (0.07-1.14)	0.52 (0.09-3.06)
Spouse smoking				
No	1.00	1.00	1.00	1.00
Yes	1.12 (1.42-11.93)*	0.83 (0.14-4.76)	0.81 (0.23-2.89)	-
Family smoking				
No	1.00	1.00	1.00	1.00
Yes	1.89 (1.27-2.79)*	1.08 (0.77-1.51)	1.07 (0.84-1.32)	1.04 (0.61-1.78)
Home smoking				
Restriction	1.00	1.00	1.00	1.00
No restriction	6.35 (4.51-8.93)*	1.93 (1.12-3.32)*	4.37 (2.83-6.74)*	1.22 (0.44-3.42)
Alcohol intake				
No	1.00	1.00	1.00	1.00
Yes	2.71 (0.37-4.13)*	1.75 (1.44-2.13)	1.83 (1.50-2.22)*	1.07 (0.62-1.82)
Health concern				
Yes	1.00	1.00	1.00	1.00
No	0.90 (0.49-1.33)	0.80 (0.49-1.33)	1.08 (0.67-1.60)	1.79 (0.88-3.67)
Awareness of ban on smoking in public places				
No	1.00	1.00	1.00	1.00
Yes	0.95 (0.65-1.39)	0.97 (0.76-1.23)	0.63 (0.48-0.84)	0.84 (0.46-1.55)

Prevalence ratio- Adjusted for age, sex, educational status, type of residence and marital status; Slum apartment: Multiple rooms–shared houses or single house with many households. *$P < 0.05$

We also found that more women were exposed at workplaces when compared with men (11.0% *vs.* 9.0%). This result is in contrast to results of other studies, wherein more men were found to be exposed at workplaces when compared with women.[17,21,25-27] One explanation for this trend is that workplaces, like market, cafeteria and bars, can also be considered as public places.

In homes, the prevalence ratio in this study also showed that for men, lack of home smoking restriction (PR ratio-6.35; 95% CI, 4.51-8.93) was the strongest factor associated with SHS exposure; while for women, it was the presence of a smoking spouse (PR ratio-7.76; 95% CI, 3.08-9.42). The risk of exposure from a smoking spouse or smoking family members may be due to the normal human activity pattern, as the home is the setting where most people often spend a large number hours in a day and it requires a home with no smoking restriction to facilitate SHS exposure.[28] Lack of home smoking restriction has also been associated with SHS exposures.[20-21,29] Therefore, it is mandatory and imperative to create a smoke-free home, which is ideal for healthy living.

Among men, SHS exposure at workplace was more likely among those who lacked secondary school education, lived in homes without smoking restriction and those who consumed alcohol; while among women, it was more likely among those who were spouses of smokers and those living in homes with without smoking restriction. Poor education is associated with low socioeconomic

Table 6: Adjusted Prevalence rate ratios (PR) and 95% confidence intervals (CI) of exposure to second-hand smoke in different settings according to variables in women

Characteristics	Home	Workplaces	Public places	Public transports
Age range				
18-29	1.00	1.00	1.00	1.00
30-39	0.94(0.47-1.88)	0.87(0.35-2.22)	0.59(0.25-1.40)	0.97(0.34-2.79)
40-49	1.45(0.61-3.48)*	1.28(0.41-3.97)	0.41(0.10-1.68)	1.23(0.32-4.78)
50-59	1.11(0.49-2.57)	0.65(0.17-2.55)	1.17(0.51-2.71)	0.47(0.07-3.26)
60+	0.60(0.06-5.00)	0.85(0.21-3.39)	1.21(0.50-2.86)*	-
Education				
<Secondary	1.00	1.00	1.00	1.00
≥Secondary	0.84(0.67-.1.05)	0.81(0.57- 1.14)	0.95(0.78-1.16)	0.99(0.86-1.13)
Occupation status				
Not employed	1.00	-	1.00	1.00
Student	0.12(0.03-0.46)	-	0.72(0.41-1.28)	0.74(0.33-1.84)
Retired	0.52(0. 06-4.83)	-	1.01(0.76-2.61)	0.44(0.07-3.05)
Employed	0.63 (0.28-1.42)	0.91 (0.51-1.63)	0.49(0.26-0.93)	0.90(0.46-1.75)
Marital status				
Divorced/widowed	1.00	1.00	1.00	1.00
Single	0.34(0.17- 0.67)	1.06(0.65- 1.73)	0.92(0.60-1.42)	0.92(0.49-1.75)
Married	1.69 (1.32-2.16)*	0.96(0.63-1.51)	0.98(0.70-1.39)	1.04(0.27-1.71)
Residence				
Flat apartment	1.00	1.00	1.00	1.00
Slum apartment	1.58 (1.08- 2.31)	1.01(0.63-1.60)	1.77(1.25-2.52)	1.61(1.03-2.52)
Luxury/duplex Apartment	0.46(0.11- 1.77)	0.13 (0.02-0.90)	0.28(0.04-1.89)	-
Spouse smoking				
No	1.00	1.00	1.00	1.00
Yes	7.76(3.08-9.42)*	3.82(1.59-9.42)*	1.62(0.62-4.27)	3.11(1.18-8.20)*
Family Smoking				
No	1.00	1.00	1.00	1.00
Yes	1.18(0.82- 1.69)*	0.81(0.53-1.25)*	1.09(0.72-1.59)	1.49(1.02-2.13)
Home Smoking				
Restriction	1.00	1.00	1.00	1.00
No restriction	1.69(0.17-3.21)*	1.99(1.43-4.62)*	3.28(1.67-6.44)*	2.14(0.85-5.39)
Alcohol intake				
No	1.00	1.00	1.00	1.00
Yes	1.80 (1.32-2.46)*	0.75(0.40-1.41)	1.99(1.47-2.68)	1.36(0.82-2.26)*
Health concern				
Yes	1.00	1.00	1.00	1.00
No	0.62(0.30- 1.28)	0.16(0.02-1.10)*	1.15(0.65-2.04)	1.66(0.85-3.26)
Awareness of ban of smoking in public places				
No	1.00	1.00	1.00	1.00
Yes	1.13(0.73-1.75)	0.75(0.38-1.52)	0.83(0.50-1.39)	1.14(0.59-2.18)

Prevalence ratio -Adjusted for age, sex education status, type of residence and marital status; Slum apartment: Multiple rooms shared houses or single building with many household. *$P < 0.05$

status and with blue-collar jobs which often have no workplace smoking restriction. SHS exposures have been associated with belonging to lower socioeconomic class in many studies.[17,20,30-31] Tobacco smoking has been found to be higher among individuals belonging to low socioeconomic class in Nigeria.[12-13]

Among men, exposures to SHS in public places were more likely among respondents living in homes with no smoking restriction, consuming alcohol and those who were not aware of ban on smoking in public places, although the awareness of smoking restriction in public places was not a statistically significant factor; while among women, those consuming alcohol were more likely to have SHS exposure.

This result supports a similar study in Spain,[17] The association of alcohol with secondhand smoking may be due to the fact that in most of the public places, cigarette and alcohol are simultaneously sold. Moreover, some studies have strongly associated tobacco smoking with alcohol intake.[12,32]

Regarding exposures in public transport, lack of respondents' self-perceived concern for their health was associated with SHS. We found a similar result in a similar study in South Korea.[21] In view of the highest levels of exposures existing in public places, stringent smoke-free polices are needed to protect the public from SHS exposures.

Individuals who were not concerned about their

health were more likely to not forbid tobacco smoking at home and to ignore information about the adverse effects of tobacco smoking on health. Furthermore, for men, exposure to SHS anywhere was found to be more likely among those with lack of secondary education, lack of smoking restriction at home, living in slum apartment (single house with many households), living with a smoking non-spouse family member and those consuming alcohol. For women, exposure to SHS anywhere was found to be more likely among those with a smoking spouse, with lack of smoking restriction at home and living in slum apartment (single house with many households).

However, this study has some limitations. Some of these limitations are non-validation of our survey instrument and non-measurement of the urinary or serum cotinine among the respondents, as self-reported exposure has been associated with underestimation and misclassification.[2] Despite these limitations, we have been able to identify the correlates of secondhand smoking in specific Nigerian populations.

Conclusion

The prevalence of secondhand smoking in our study was not very high when compared with similar studies elsewhere but was the highest in public places. These results underscore the need for enactment of a simple and comprehensive smoke-free legislation, which is mandatory for enforcement of regulations that make workplaces and public places smoke free in order to protect public health. Public awareness should be increased by implementing educational strategies, which will reduce SHS exposure in homes. Since the home is often the highest source of SHS exposure for children and for adults who do not work outside the home, policies need to be developed to address this setting if public health is to be adequately protected.

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