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Exposure to Environmental Tobacco Smoke in Hormozgan province Residents' Southern Iran

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ABSTRACT

Aims Environmental Tobacco Smoke (ETS) implies one's inevitable inhale of smoke within a polluted environment. The present Study aimed to investigate the extent to which Hormozgan province residents were exposed to ETS.

Materials & Methods In the present cross-sectional study, a sample of 3962 residents of Hormozgan province (Urban-rural) was selected through a stratified clustering method and entered the study. The data collection instrument was a questionnaire developed by the researcher which was comprised of two sections. The first section contained demographic information and also enquired about subject's exposure to ETS as well as the smoking site. Chi-squared test and binary regression were used. The collected data were analyzed via SPSS 19.0.

Findings 984 subjects (24.8%) were exposed to ETS and women were significantly more exposed to ETS than men (p<0.001). The most probable sites of exposure to ETS were found to be respectively home (52.6%), public places (25.5%) and workplace (21.9%). The highest degree of exposure to ETS was found in Bashagard County (69.6%) while the lowest degree showed to belong to Khamir (14.1%). A statistically significant correlation was found between exposure to ETS and age (p<0.001) and education level (p<.019).

Conclusion Awareness raising towards the hazards of ETS, warning against smoking indoors, monitoring how anti-smoking rules are applied in public places and workplace, the formation of domestic anti-smoking campaigns, informing the youth through mass media especially women and teenagers are all suggested to cut down on exposure to ETS.

Keywords Passive Smokings; Smoking; Environmental Exposure; Iran

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Introduction

The world is faced with an increasing rate of smoking and Environmental Tobacco Smoke (ETS) is regarded as an issue that endangers public health [1]. Exposure to ETS implies one's inevitable inhale of smoke within a polluted environment. It is associated with cardiovascular diseases, lung cancer, emphysema and asthma among adults and sudden infant death syndrome (SIDS) among children Smoking annually accounts for about six million mortalities worldwide. More than 600,000 cases occur among those exposed to environmental tobacco smoke [2].

The number of secondhand smokers in the U.K. has been reported to be over ten thousand people while the healthy enjoy no defense against ETS [3]. World Health Organization (WHO) has estimated that tobacco use is currently responsible for the death of about 6 million people across the world each year. This total includes about 600,000 people are also estimated to die year due to environmental tobacco smoke [4]. Some research in Bangladesh reported a high prevalence of ETS at home (54.9%), at work (63%) and public places (57.8%) [5]. Some other research maintained that 10.9 million disabilities worldwide were induced by exposure to ETS during one's life. The U.S. toxicology plan recognized at least 250 toxic chemicals in ETS that are cancerous [2]. An investigation in Iran showed that mothers' exposure to tobacco smoke during pregnancy led to their infant's loss of weight [6]. Moreover, among secondhand smokers, the risk of breast cancer was 4.86 times as high as others [7].

In China, exposure to ETS was estimated among those above 15 years to be 72.4% [8]. In some other investigation in South Korea, exposure to ETS among adults was reported to be 68% [9]. Agaku *et al*. estimated ETS among high school students to be 48% [10]. Research findings in the Indian context showed that many urban housewives (33.5%) were secondhand smokers [11].

The adverse effects of smoking are not exclusive to smokers and affect the surrounding non-smokers too, and there is a limited body of research conducted on this issue in Iran

The present Study aimed to investigate the extent to which Hormozgan province residents were exposed to ETS.

Materials and Methods

This descriptive-analytical research was designed as a cross-sectional study. The target research general population aged 18 years and over, Hormozgan residents in 2014-2015. A sample of 3,962 individuals randomly was selected so as to be representative of the research population. The sampling method multistage cluster classification selection, then randomly selected subjects in each cluster, followed to this aim. The whole population in this province could be divided in either urban or rural residents. Following a Probability Proportional to Size (PPS) the required sample size was determined. Therefore, from among the 3,962 research subjects, 1,866 subjects were assigned to the urban stratum and 2,096 were assigned to the rural stratum. In the second phase, according to the counties within the province, the urban stratum was further divided into 12 regions and the rural stratum was divided into 12 regions. Each stratum, either urban or rural was made sure to consist of an adequate number of subjects. To select the subjects in each cluster the researchers first referred to urban and rural health care centers that covered almost all the province's population (Figure1).

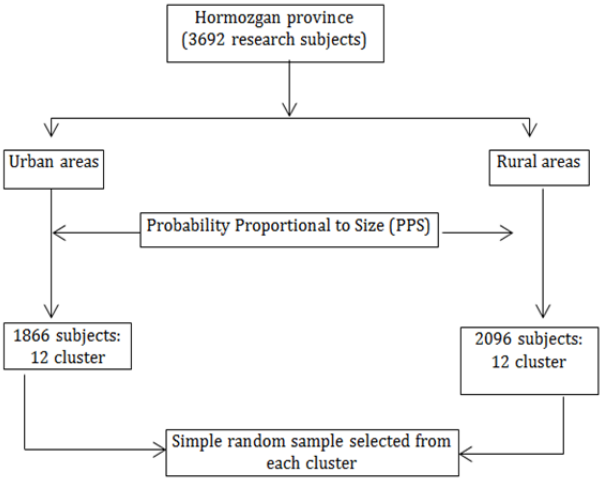

Figure1) Flowchart for sample selection

The clusters were selected based on a list of existing households and the researchers were provided with an address, to begin with. Then the researchers visited the site, the clusters, and households and made a list of all households commonly living together. Then one subject was selected randomly and was interviewed. The same procedure went on for the next household. In case the selected subject was not present, a second visit was made later on and if the subject could not be met again, a visit was made to the next household so as the required sample size was met.

The inclusion criteria were: Being over 18 years old, able to communicate, consent to participate, resided in Hormozgan and permanent residency Hormozgan. Exclusion criteria were unwilling to cooperate، incomplete responses to the questionnaire or was unable to answer the question because of a language barrier.

The data collection instrument was a questionnaire developed by the researchers. It was comprised of two sections the first of which contained demographic information such as age, sex, marital status, education and place of residence. The second section dealt with exposure to tobacco smoke and the site of exposure. To validate the questionnaire, a

panel of specialists was referred to. The required adaptations were made to the questionnaire according to the specialist's recommendations. The reliability of the questionnaire, the test-retest method was followed in a pilot test, which took a period of 3 weeks. The questionnaire was provided to participants similar to the real research participants in two periods and at a time interval of ten days and then, Cronbach alpha was estimated as the correlation coefficient of internal consistency. It was estimated at 89 and thus the reliability of the test was confirmed.

Once the required permissions were gained from the deputy of research at Hormozgan University of medical sciences, all ethical issues were followed and the participants gave written consent to take part in the Study. They were ensured of the confidentiality of the data they provided. For the literate subjects, the questionnaire was to be filled out as a self-report. For the illiterate, however, it was conducted as an interview. In the case of children, their parents were interviewed on the subject of ETS.

To investigate ETS and how it related to age, place of residence, education and city of residence, Chi-squared test and binary regression were used. The collected data were analyzed via SPSS 19.0.

Findings

The mean age of the subjects was 45.7±14/6 years, ranging from 1 to 96 years. 47.1% of the subjects were urban residents while 52.9% resided in rural areas.

To compare ETS between men and women, the chi-squared test was used which indicated that

The latter group was significantly more exposed to tobacco smoke than the former (p<0.001).

No statistically significant divergence was found between ETS in rural and urban regions (p=0.34).

A statistically significant correlation was found between ETS and age (p<0.001).

Statistically significant correlation was found between ETS and education level (p<0.02; Table 1).

A statistically significant divergence was found between ETS and different counties (p<0.001).

The highest degrees of ETS were observed, respectively in Bashagard, Jask and Sirik. The lowest degree was that of Bandar Khamir, Lengeh and Hajiabad (Table 2; Figure2).

A statistically significant correlation between the place of exposure and participant's sex was observed (Table 3; p<0.001). The most prevalent places of ETS were found to be respectively home, public places and workplace. This sequence of prevalence showed to be similar in men and women, but at a different rate. Women showed to be more exposed to tobacco smoke than men at home while men tended to be more exposed to smoke in public places or workplace (Table 3).

Table 1) Frequently distribution of demographic Characteristics and ETS (n=3962, the numbers in parenthesis represent percent)

variable	Exposure		p-value
	Yes	No	
Gender			
Male	342(34.8)	1216(40.8)	<0.001
Female	642(65.2)	1762(59.2)	
Place of residence			
urban	485 (49.3)	1416 (47.5)	0.34
rural	499 (50.7)	1562 (52.5)	
Age			
30≤	116 (11.9)	331 (11.1)	<0.001
31-45	501 (51.4)	1366 (45.7)	
46=59	214 (21.9)	682 (22.8)	
60≤	144 (14.8)	608 (20.4)	
Education			
Uneducated	221 (27.8)	734 (28.4)	0.02
Elementary school	253 (31.7)	770 (29.8)	
Junior high school	145 (18.2)	414 (16.0)	
Diploma	133 (16.7)	430 (16.6)	
academic	45 (5.6)	238 (9.2)	

Table 2) Frequently distribution of ETS and subjects' county of residence

County	Exposure	Total (Sample size)
Bandar Abbas	307 (21.7)	1418
Minab	190 (30.5)	623
Roudan	102 (24.9)	410
Jask	50 (56.2)	89
Bandar Lengeh	52 (15.3)	339
Bastak	50 (21.3)	235
Qeshm	47 (20.0)	235
Parsian	48 (39.0)	123
Hajiabad	41 (18.8)	218
Sirik	29 (47.5)	61
Bashagard	48 (69.6)	69
Khamir	20 (14.1)	142

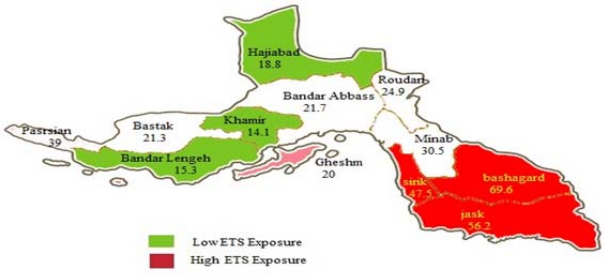

Figure2) Geographical Situation of EST in Hormozgan province

Table 3) Place of exposure and subjects' sex

Variable	Home	Work	Public Place
Male	161 (52.6)	67 (21.9)	78 (25.5)
Female	439 (78.8)	11 (2)	107 (19.2)
Total	600 (69.5)	78 (9.0)	185 (21.5)

p<0.001

Age, education and gender were predictors of the dependent variable (Exposure to environmental smoking).

Age was the first variable that significantly affected the exposure to environmental smoking. The odds ratio of this variable was estimated at 1.36 which indicates that exposure to environmental smoking at a lower age is 1.36 times as high as the older. The second variable is gender. The odds ratio of exposure to environmental smoking among women to men was estimated at 1.27. Concerning education, the chance of exposure to environmental smoking among the less educated was 1.13 times as high as the more educated. (Table 4).

Table 4) Binary logistic regression to determine predictors for ETS

Variable	B	S.E.	Wald	df	Sig.	Exp (B)
Sex	0.240	0.085	7.942	1	0.005	1.271
Education	0.124	0.038	10.742	1	0.001	1.132
Age	0.308	0.072	18.403	1	0.000	1.361
Constant	-0.103	0.266	0.151	1	0.698	0.902

Discussion

The present Study aimed to investigate exposure to tobacco smoke in Hormozgan. The present findings revealed that women were significantly more exposed to tobacco smoke than men. More than half of the subjects in Al Zabadi's research in Palestine reported that either their spouse or a family member was a smoker. That exposed them inevitably to tobacco smoke [2]. The findings reported by Gilman *et al*. revealed that men smoked much more than women and this exposed women inadvertently to tobacco smoke produced by men [12]. A body of related literature reported similar findings [7, 11, 13, 14]. Unlike the present Study, Skorge *et al*. [13] and Kaneita *et al*. [14] observed that men were more exposed to tobacco smoke than women. This attests to the divergent exposure pattern in different parts of the world as a function of different cultural and social features.

In the present Study, which showed that women were more exposed than men to tobacco smoke, the underlying reason can be the particular conditions in Iran, especially the high prevalence of smoking among men, which, like it or not, exposes all family members including the spouse and children.

The present findings revealed that the highest degree of ETS occurred respectively at home, public places and the workplace which was consistent with the findings reported by Ahmed [11], Palipudi [5] and Al Zabadi *et al*. [2] that found the highest degree of ETS to occur at home. Some other investigations reported similar findings too [15, 16].

The present findings showed that people are more exposed to tobacco smoke at home. It seems that the prohibition of smoking in many countries at work or public places have been implemented. Similarly, certain rules need to be set to prohibit smoking at home. The research findings reported by Wipfli *et al*. indicated that if people chose to voluntarily stop smoking at home, it would significantly reduce nicotine concentration in the air [15]. Another investigation conducted by Hughes *et al*. in Seoul revealed that a lack of prohibitory rules on smoking at home was positively correlated with ETS [9]. Similar findings were reported by Maziak [17]. It appears that setting prohibitory rules on smoking at home can significantly reduce ETS. On the contrary, Emmons *et al*. [18] and Nebot *et al*. [19] found that the highest degree of ETS occurred at work or public places. This contrast can be due to the differing prohibitory rules on smoking at work, home or public places among different countries.

In the present Study, men showed to be significantly more exposed to tobacco smoke at work than women. This was consistent with the results reported by Skorge *et al*. [13] and Dongfeng *et al*. [16]. One reason for this consistency can be the high percentage of working men than women. Therefore, men are naturally more exposed to tobacco smoke than women at work.

Significant divergences were found among Hormozgan counties in terms of ETS. Bashagard, Jask and Sirik showed to have the highest degree of exposure while Bandar Khamir, Lengeh, and Hajiabad had the lowest degree of exposure. Those with the highest exposure were located nearby in the eastern part of the province. Some other research findings showed that geographic diversity can affect smoking [11]. Some other underlying reasons can be the different customs, cultures, social pattern and urban texture as Hormozgan is extensive in size and contains many divergent cultures. Similarly, some other research in South Korea revealed that since Koreans tended to respect the elderly more they tended to avoid visiting smokers. This finding was consistent with some other findings [2, 9, 11, 19, 20].

A negative correlation was found between ETS and age. This was in line with investigations conducted by Yuan Sun [1] and Skorge *et al*. [13] who showed that the elderly were less exposed to tobacco smoke than the youth or adolescents. Some other research in the U.S. and Canada approved these findings too [13, 16, 21, 22]. On the contrary, Dongfeng *et al*. observed that elderly men were more exposed to tobacco smoke at home [16].

Moreover, the present findings revealed a significant correlation between ETS and education. The more educated showed to be less exposed to tobacco smoke. In Ahmadi *et al*.'s study, less educated women showed to be less exposed to tobacco smoke [11]. In some other investigation conducted by Gharaibeh *et al*. although highly educated and less educated women lacked the required knowledge of ETS, avoidance of ETS showed to be significantly higher among the former group [3]. Skorge indicated that the more educated elderly were less exposed to tobacco smoke than the less educated elderly [13]. A body of related literature confirmed this finding too [1, 2, 8, 23]. It can be inferred from the role of education

in ETS that systematic educational interventions and raising public awareness can significantly reduce people's exposure to ETS. These findings showed that education can significantly raise public awareness of ETS. All these findings attest to the fact that education has managed to significantly raise people's awareness of the adverse effects of tobacco smoke. The body of research in the U.S., Norway, and the Netherlands showed a decreasing rate of exposure to tobacco smoke at home as a result of public awareness-raising [24-26]. Some other investigations showed the contrary [2, 27-29]. In some other research, Shiva mentioned participant's awareness essential in adopting the right social behavior even more essential than education as not in all cases education necessarily leads to awareness [28]. Rohrbach *et al*. indicated that holding educational campaigns on the issue of ETS had no effect on reducing exposure. The underlying reason might be the type of educational messages which managed to raise people's awareness, but failed to change their behavior [27].

No statistically significant difference was observed in the present research between rural and urban resident's ETS. Similarly, Dongfeng *et al*. reported a similar trend of ETS among urban and rural female residents [16] which is consistent with the present Study. On the contrary, Petersen *et al*. observed a higher exposure to tobacco smoke in urban residents than the rural. The underlying reason was reported to be the addictive consumption of an herb known as Khat. Consuming this herb showed to be positively correlated with ETS [30]. Some other investigations observed a positive attitude towards smoking among urban residents [31, 32]. On the contrary, in some other investigation, more than half of the rural residents of eastern Ethiopia showed to accept smoking at home [33]. Yang observed a higher rate of ETS in rural residents than the urban [34]. These discrepancies in results can be partly due to cultural and social differences, social norms and demographic distribution in urban and rural areas.

Limitation of the study: Among the limitations of the present study was that the questionnaires were to be completed as self-reports which might reduce data objectivity to a certain extent. Moreover, there existed the threat of biased responses. Some other limitation was the lack of similar investigations in the Iranian context for the sake of comparison. Therefore, more qualitative and longitudinal research is suggested to delve into the factors involved in ETS. On the other hand, the large sample size in the present Study could be considered as a strength which made the sample well representative of the target population. The present study was, in fact, the first extensive research which worked on the whole population of the province. The findings can, therefore, provide key information on the factors involved in ETS (e.g. Sex, age, education, and geographical area) for both authorities and researchers. It is hoped that certain rules are established against smoking and are implemented quickly enough to control smoking and protect the public against exposure to environmental tobacco smoke.

Conclusion

Education can be an effective and essential strategy in promoting the family's health and protecting them against exposure to ETS. All the public need to be aware of the adverse effects of ETS. Adoption of the right policies can be effective in reducing exposure to ETS at home. Raising people's awareness of the hazards of smoking indoors, monitoring the prohibitory rules of smoking in public places, establishing anti-smoking campaigns and sending messages through mass media, especially to the youth and women are recommended to cut down on exposure to ETS.

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Conflicts of interests: The Authors state that there is no conflict of interests.

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