

Original Article

AWARENESS ABOUT INDOOR AIR POLLUTION IN GENERAL POPULATION OF RAWALPINDI AND ISLAMABAD

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Abstract

Background: Indoor air pollutants are increasingly being associated with respiratory illnesses leading to high degree of morbidity and mortality. There are not sufficient epidemiological studies from Pakistan which assess level of awareness of indoor air pollution resulting in respiratory diseases in population.

Methods: This cross sectional survey was carried out on general population of Rawalpindi/Islamabad. Sample size was 223 study subjects selected by non-probability convenient sampling. Knowledge of the study subjects was determined with regard to indoor air pollution, its effects on health and different sources of indoor air pollution with the help of a questionnaire. The influence of age, gender, educational status and socio economic status on the level of awareness was also analyzed.

Results: Out of total 223 participants, 115 were males and 108 females. Participants aware of indoor air pollution were 91.5% and adequate awareness about its sources was 80.7%. Those who knew indoor air pollution is detrimental to health were 95.1%. Awareness about building construction dust as source of indoor air pollution was maximum (84.8%). There was significant difference in awareness among participants with different monthly incomes and educational status and also between males and females.

Conclusion: This study concludes that general population of Rawalpindi/Islamabad has fairly good awareness about sources of indoor air pollution. Use of harmful material causing indoor air pollution should be limited or substituted with better ones where possible

Key words: Awareness, air pollution, population

Introduction

The World Health Organization defines air pollution as "any chemical, physical or biological agent that modifies the normal features of the atmosphere." The two types of air pollution, indoor and ambient, both contribute to a host of cardiac and respiratory illnesses.⁽¹⁾

Indoor air pollution refers to the pollutants found indoors. The main cause of indoor air pollution is inefficient fuel combustion from rudimentary technologies.⁽²⁾ Household air pollution is one of the major causes of disability-adjusted life years in Southeast Asia and the third leading cause of disability-adjusted life years worldwide. There are minimum sixty sources of domestic air pollution, and these differ from country to country. Major Contributions to domestic air pollution are provided by Indoor tobacco smoking, construction material used in structuring houses, fuel used for cookery, warming and illuminating, use of incense and various forms of mosquito repellents, use of insect killers, substances used for cleaning at home, and use of synthetic fragrances. Household air pollution has

an impact on all phases of life, affects multiple health systems and its effects are apparent right from pre-conception to advanced age.⁽³⁾

Universally, Indoor air pollution (IAP) is a threat for both industrialized and undeveloped countries. However, the severity of the condition is extremely greater for the latter, predominantly due to high dependence on solid fuels whose usage is a main source of IAP in developing countries mainly affecting the deprived in both rural and urban populations. Population exposure to innumerable air pollutants is expected to be greater in the indoor micro-environment than outdoors as much of time where people stay is indoors. Therefore, Indoor air quality has attracted sizeable attention in current years.⁽⁴⁾

About 2.7% of global burden of diseases is contributed by Indoor air pollution and 1.6 million deaths occur per annum due to the same reason. Indoor air pollution, from solid fuel use, is the tenth largest threat to public health causing over 4 million deaths per year.⁽⁵⁾

Biomass is any plant or animal based solid burned by people, mostly for cookery, illumination and heating in

homes. Biomass burns partly, thus liberating, other than carbon dioxide, a mass of complex compounds as well as suspended particulate matter (SPM), carbon monoxide, formaldehyde, NO₂, ozone and polycyclic aromatic hydrocarbons (PAH), amongst others. They are generally burned in exposed fires or in three-stone stoves which leads to discharge of high levels of toxic chemicals. Exposure to these substances leads to increased risk of a variety of diseases including pneumonia, chronic respiratory diseases and lung cancer. Pakistan being a developing country; bulk of people use biomass fuel as the chief source of energy adding to nationwide estimates for health burden of IAP. (6)

A third of the world's population are exposed to high levels of household air pollution, with women and children experiencing the greatest burden due to the amount of time spent close to the stove in the kitchen. . Acute respiratory infections (ARIs) are common in infancy and early childhood and reason for several primary care visits and hospital admissions. Young children spend their time indoors mostly therefore the enclosed environment of homes has the potential to play a vital part in their vulnerability to diseases caused by respiratory infections.(7)

The respiratory system is mainly affected but effects on the cardiovascular system, endocrine system, and nervous system cannot be ignored. Indoor air pollutants have also been associated with the development of many types of cancers. Detecting household air pollutants and their health consequences is important to prepare for various health-related issues but the real challenge is making changes to lessen the health effects of Indoor air pollution and planning new interventions to reduce the possibility of further exposure.(8)

It is evident that there is very little published literature available regarding indoor air pollution in Pakistan. This article is an attempt to understand peoples' knowledge about various sources of household air pollution and their effects on health for future strategies to deal with this growing threat globally.

Methodology

This Cross sectional survey was carried out in four months duration from February 2017 till May 2017. The study population was general population of Rawalpindi/Islamabad. Total sample size was 223 which were selected with non-Probability convenient sampling technique. Adult's males and females (above the age of 18 years) were included. Data collection tool was a structured questionnaire which was tested with the help of pilot study. Knowledge of the study subjects was determined with regard to indoor air pollution, its effects on health and different sources of indoor air pollution. Sources of indoor air pollution were divided into four categories; particulate matter, volatile organic compounds, Indoor radiation, biological material and assessed by total score obtained by them. At least score of 25 out of 100 was required for adequate awareness.

The influence of age, gender, educational status and socio economic status on the level of awareness was also analyzed. Approval from institutional review board was taken and informed written consent was obtained from all study participants.

Results

In the study to assess the awareness about indoor air pollution in general population of Rawalpindi/Islamabad, 115 males (51.6%) and 108 females (48.4%) out of total 223 participated. The mean age of participants was 36.08+2SD years. Age of 65.9% participants was below 40 while 34.1% were 40 or above. Educational status of 27.8% of the participants was primary, 26.9% secondary and 45.3% tertiary. Participants belonging to lower middle class and below were 46.6%, upper middle class 24.7% and upper class were 28.7%.

Participants aware of indoor air pollution were 91.5% and adequate awareness about its sources was 80.7%. Those who knew indoor air pollution is detrimental to health were 95.1% and there is association between indoor air pollution and respiratory diseases 96%. Maximum participants (73.1%) thought cough was the main effect of indoor air pollution. Awareness about building construction dust as source of indoor air pollution was maximum (84.8%) (Table: 1)

Table 1: Sources and knowledge about effects of indoor air pollution

Variables	Frequency N (%)	Variables	Frequency N (%)	Variables	Frequency N (%)
Sources of indoor air pollution		Cooking vapors		House dust	
Chullah (stove)		No	185 (83.0%)	No	58 (26.0%)
No	94 (40.8%)	Yes	38 (17.0%)	Yes	165 (74.0%)
Yes	132 (59.2%)	Wood polish		Knowledge about effects of indoor air pollution	
Construction dust		No	161 (72.2%)	Knowledge about AP*	
No	34 (15.2%)	Yes	62 (27.8%)	No	19 (8.5%)
Yes	189 (84.8%)	Pesticides		Yes	204 (91.5%)
Mosquito coil		No	81 (36.3%)	AP* risk of health**	
No	96 (43.0%)	Yes	142 (63.7%)	No	11 (4.9%)
Yes	127 (57.0%)	Air freshner		Yes	212 (95.1%)
Mosquito repellent vaporizer		No	164 (73.5%)	Association b/w AP* & RTI**	
No	130 (58.3%)	Yes	59 (26.5%)	No	9 (4.0%)
Yes	93 (41.7%)	Television		Yes	214 (96.0%)
Incenses		No	198 (88.8%)	Cough	
No	172 (77.1%)	Yes	25 (11.2%)	No	60 (26.9%)
Yes	51 (22.9%)	Radon		Yes	163 (73.1%)
Oil paint		No	184 (82.5%)	Catarrh	
No	117 (52.5%)	Yes	39 (17.5%)	No	143 (64.1%)
Yes	106 (47.5%)	Dust mites		Yes	80 (35.9%)
Toilet cleaner		No	65 (29.1%)	Eye irritation	
No	140 (62.8%)	Yes	158 (70.9%)	No	104 (46.6%)
Yes	83 (37.2%)	Cob webs		Yes	119 (53.4%)
Floor cleaner		No	138 (61.9%)	Headache	
No	155 (69.5%)	Yes	85 (38.1%)	No	150 (67.3%)
Yes	68 (30.5%)	Pigeon feathers		Yes	73 (32.7%)
Tobacco smoke		No	123 (55.2%)	Asthma	
No	49 (22.0%)	Yes	100 (44.8%)	No	102 (45.7%)

*Air pollution, **Respiratory tract infection

When bivariate analyses was done, it was found out that there was no significant difference between different age groups in their awareness about sources of indoor air pollution ($p=0.9$) There was significant difference among participants with different monthly incomes and educational status and also between males and females (Table: 2).

Table 2: Descriptive statistics with bivariate analysis

Variables	Total	No 43 (19.3%)	Yes 180 (80.7%)	p-value
Age (years)				
Up to 40	147 (65.9%)	28 (65.1%)	119 (66.1%)	0.9
Above 40	76 (34.1%)	15 (34.9%)	61 (33.9%)	
Sex				
Male	115 (51.6%)	31 (72.1%)	84 (46.7%)	0.003
Female	108 (48.4%)	12 (27.9%)	96 (53.3%)	
Education				
Primary	62 (27.8%)	21 (48.8%)	41 (22.8%)	0.002
Secondary	60 (26.9%)	10 (23.3%)	50 (27.8%)	
Tertiary	101 (45.3%)	12 (27.9%)	89 (49.4%)	
Monthly income				
Up to 50k	104 (46.6%)	29 (67.4%)	75 (41.7%)	0.01
51k to 100k	55 (24.7%)	6 (14.0%)	49 (27.2%)	
Above 100k	64 (28.7%)	8 (18.6%)	56 (31.1%)	

Figures 1 and 2 explain the awareness of the participants about volatile organic compounds and of gender-wise awareness about the indoor air pollution. Most were aware of tobacco smoke as a volatile organic compound, and women were more aware of indoor air pollution than the men.

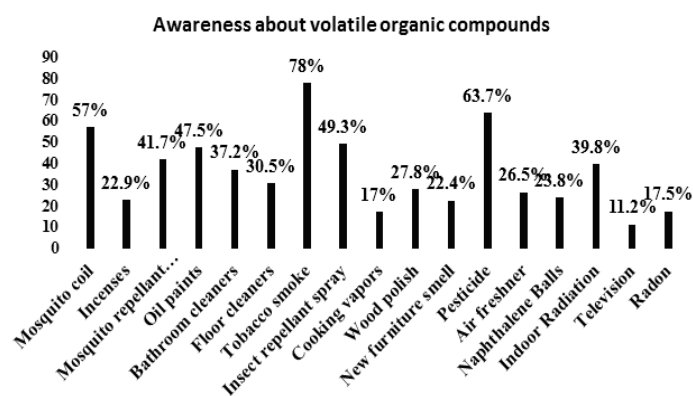


Figure 1: Awareness about volatile organic compounds

Gender wise Awareness about indoor air pollution

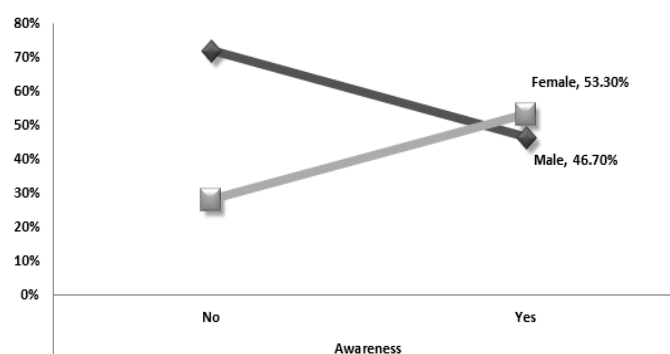


Figure 2: Gender wise Awareness about indoor air pollution

Discussion

The key finding of this study is that there is fairly good awareness among general population about indoor air pollution and studies conducted in china and Kwara State reveal almost the same level of awareness among population yet a small percentage of the population in the study is not aware of indoor air pollution and they think only the cause of air pollution is outdoor elements. In our study level of awareness among females is more as compared to males which is in contrast to study conducted in Cameroon which shows females are just as aware about indoor air pollution as males.(10) People up to 40 years of age are more aware about indoor air pollution as compared to those who are above 40 years which is in coherence with the study conducted in Beijing, China.9 Higher education is related with more awareness among people which is in consistent with the study conducted in Mendakwe village in Cameroon.(10) Our study revealed that there is a significant difference in awareness of people belonging to different socioeconomic class which is similar to the study conducted in West Bengal.11 According to study conducted in South West Nigeria cough and asthma are main effects of indoor air pollution9 and study conducted in West Bengal showed eye symptoms are common due to indoor air pollution(11) which is somewhat different from our study where a good number of participants consider cough, asthma and eye symptoms as main effects of indoor air pollution but maximum people are of the view that headache and cancers are the main effects.

A study conducted in India puts forward that cough, phlegm production, shortness of breath, wheezing, common cold, and throat congestion are prevalent in houses where there is a family history of smoking concluding that indoor air pollution has an association with respiratory function of children.(12)

The overall knowledge regarding volatile organic compounds as a cause of IAP considered to be adequate in our study where as a study conducted in India 13 showed that people are not much aware of

these organic compounds causing IAP.

In many studies it has been shown that stove is the main cause of IAP (14) whereas in our study building construction material is the main cause of IAP. Knowledge about cooking vapors, television and Radon as sources of indoor air pollution was least out of all.

In order to control IAP measures should be immediately taken which might save our world from hazardous effects of growing hazard. In developing countries like Pakistan there should be awareness camps and educational seminars regarding indoor air pollution to educate people and to make Pakistan a healthier place to live and making it save for next generations. Using Chimney stoves, avoidance of smoking, using less harmful construction material can help decrease hazardous effects as together we can make this place a better place.

Conclusion

This study concludes that general population of Rawalpindi/Islamabad has fairly good awareness about sources of indoor air pollution. Use of harmful material causing indoor air pollution should be limited or substituted with better ones where possible.

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