



CODEN [USA]: IAJPBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.4011582>Available online at: <http://www.iajps.com>

Research Article

**AWARENESS ABOUT INDOOR AIR POLLUTION IN
GENERAL POPULATION OF RAWALPINDI/ISLAMABAD**Dr Areeba Saleem¹, Dr Amna Amir², Dr Anique Ahmad Jamil³^{1,2} Islamabad Medical and Dental College, Islamabad³ Yusra Medical and Dental College, Islamabad**Article Received:** July 2020 **Accepted:** August 2020 **Published:** September 2020**Abstract:**

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.

Objective: *To assess awareness about different sources of indoor air pollution and its effects on health in urban population of Rawalpindi/Islamabad*

Material and Methods: *It was a cross sectional survey. The study population was general population of Rawalpindi/Islamabad. It was carried out on 300 study subjects who were 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 will also be analyzed.*

Results: *Out of 115 male participants, 84 were aware whereas out of 108 female participants, 96 were aware about indoor air pollution. 96.0% people were of the view that there is association between indoor air pollution and respiratory diseases whereas 4.0% disagreed. Majority considered building construction dust (84.8%) as the most important source of indoor air pollution causing diseases.*

Key words: *Indoor, pollution, awareness.*

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Please cite this article in press Areeba Saleem et al, *Awareness About Indoor Air Pollution In General Population Of Rawalpindi/Islamabad.*, Indo Am. J. P. Sci, 2020; 07(09).

INTRODUCTION:

Indoor air pollution (IAP), in general, is a major concern for both developed and developing countries. However, the gravity of the situation is far greater for the latter, particularly due to high reliance on solid fuels whose use are a major source of IAP in developing countries.¹ Population exposure to various air pollutants is likely to be higher in the indoor micro-environment than outdoors due to the amount of time people spend indoors. Consequently, indoor air quality has drawn considerable attention in recent years.² Biomass refers to any plant or animal-based material burned by humans, mainly for cooking, lighting and heating in homes. Biomass burns incompletely, thus releasing, in addition to carbon dioxide, a multitude of complex chemicals including suspended particulate matter (SPM), carbon monoxide, formaldehyde, nitrogen dioxide, ozone and polycyclic aromatic hydrocarbons (PAH), among others. They are mostly burned in open fires or in three-stone stoves, leading to release of high levels of noxious chemicals. Exposure to these substances leads to increased risk of a variety of diseases including pneumonia, chronic respiratory diseases and lung cancer. National estimates for health burden of IAP have vital importance for a developing country like Pakistan where the majority of the population use biomass fuel as the main source of energy.¹

Women and their small children are at increased risk due to the amount of time spent close to the stove in the kitchen. Acute respiratory infections (ARIs) occur frequently in early childhood, and account for many primary care visits and hospital admissions. As young children spend most of their time in the home, the indoor environment has the potential to play an important role in their susceptibility to illnesses caused by respiratory infections. Specific aspects of the indoor living environment such as

household dampness and mold, and residential crowding have been shown to increase the risk of ARIs and hospital admission with ARIs in children. Exposures to indoor air pollutants produced by heating or cooking or from cigarette smoking have also been associated with an increased risk of ARI in early childhood.

Indoor air pollution is responsible for more than 1.6 million annual deaths and 2.7% of global burden of diseases (WHO 2006b). Indoor air pollution, from solid fuel use, is the tenth largest threat to public health (WHO 2007a). Hence, exposure to indoor air pollution from the combustion of biofuels is a significant public health hazard predominately affecting the poor in both rural and urban communities in developing countries.³ It is evident that there is very little published literature available regarding indoor air pollution in Pakistan.

MATERIAL AND METHODS:

This Cross-sectional study was held in the General Population of Rawalpindi/Islamabad. The sampling technique is Non-Probability convenient sampling. A total of 300 subjects were selected. The inclusion criteria were Adults males and females (above the age of 18 years). 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. 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. A score of 25 out of 100 was considered minimum for adequate awareness. The influence of age, gender, educational status and socio-economic status on the level of awareness will also be analyzed. Structured Questionnaire was used for data collection.

RESULTS:**Gender**

	Frequency	Percent (%)	Valid Percent	Cumulative Percent (%)
Valid male	115	51.6	51.6	51.6
female	108	48.4	48.4	100.0
Total	223	100.0	100.0	

To assess the impact of awareness about indoor air pollution in general population of Rawalpindi/Islamabad, gender-wise distribution was carried out in which male participation was 51.6% and female was 48.4%.

Gender * Is respondent adequately aware about indoor air pollution?**Cross tabulation****Count**

		Is respondent adequately aware about indoor air pollution?		Total
		yes	No	
Gender	male	84	31	115
	female	96	12	108
Total		180	43	223

Out of 115 male participants, 84 were aware whereas out of 108 female participants, 96 were aware about indoor air pollution and statistically it was significant (0.003, P significant).

What is your education? * Is respondent adequately aware about indoor air pollution? Cross tabulation**Count**

		Is respondent adequately aware about indoor air pollution?		Total
		yes	No	
What is your education?	illiterate	9	5	14
	under matric	11	5	16
	matric	21	11	32
	inter	50	10	60
	graduate	60	5	65
	post graduate	29	7	36
Total		180	43	223

The survey comprised of 6.3% illiterate, 7.2% under matric, 14.3% matric, 26.9% inter, 29.1% graduates and 16.1% post graduates. Educational status showed that higher education was associated with more awareness compared to lower education and this difference was statistically significant (0.013, P significant).

What is your monthly household income?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 10,000	26	11.7	12.1	12.1
	10,000-50,000	73	32.7	34.1	46.3
	51000-100000	53	23.8	24.8	71.0
	more than 100000	62	27.8	29.0	100.0
	Total	214	96.0	100.0	
Missing	System	9	4.0		
Total		223	100.0		

What is your monthly household income? ***Is respondent adequately aware about indoor air pollution? Cross tabulation****Count**

		Is respondent adequately aware about indoor air pollution?		Total
		yes	No	
What is your monthly household income?	less than 10,000	20	6	26
	10,000-50,000	55	18	73
	51000-100000	47	6	53
	more than 100000	54	8	62
Total		176	38	214

On socioeconomic analysis, 12.1% population represented lower class, 34.1% lower middle class, 24.8% upper middle class and 29.0% upper class. It was revealed that upper class population was most aware than others. But socioeconomic status had no impact (0.146, P not significant).

Do you know about indoor air pollution?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	204	91.5	91.5
	no	19	8.5	100.0
	Total	223	100.0	

91.5% people had knowledge of indoor air pollution.

Do you think indoor air pollution is detrimental to health?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	212	95.1	95.5
	no	10	4.5	100.0
	Total	222	99.6	100.0
Missing	System	1	.4	
	Total	223	100.0	

95.5% considered it detrimental to health.

Do you think there is association between indoor air pollution and respiratory diseases?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	214	96.0	96.0
	no	9	4.0	100.0
	Total	223	100.0	

96.0% people were of the view that there is association between indoor air pollution and respiratory diseases whereas 4.0% disagreed.

DISCUSSION:

The study conducted on awareness about indoor air pollution in general population of Islamabad/Rawalpindi showed that Overall, 80.7% of the total subjects were aware of indoor air pollution which was lower than 83.9% reported by Oke-Oyi in Kwara State¹ but more than 73% reported in Beijing, China.²²⁰ This shows most of the people in our society are aware about indoor air pollution and hazards associated with it but again that another 19.3% of the population is not aware of indoor air pollution and they think only the cause of air pollution is outdoor elements. Out of 115 male participants, 84 were aware whereas out of 108 female participants, 96 were aware about indoor air pollution and statistically it was significant which means females are more aware about indoor air pollution than males which was in contrast with the study conducted in Mendakwe village in Cameroon.²¹⁻²³ which showed males and females are equally aware about indoor air pollution.

People between 18-40 years of age are more aware about indoor air pollution as compared to other age groups which is in coherence with the study conducted Beijing, China.²⁴

Higher education is related with more awareness among people where 6.3% were illiterate and 29.1% were graduates which is in consistent with the study conducted in Mendakwe village in

Cameroon.³¹ Our study revealed that there is no association with socioeconomic status which is in contrast with the study conducted in West Bengal in 2014² which showed association in awareness and socioeconomic status. According to study conducted in South West Nigeria cough and asthma are main causes of indoor air pollution¹ and another study conducted in West Bengal showed eye symptoms are common due to indoor air pollution³ which is in coherence with our study showing most of the people consider cough and other respiratory problems as the cause of indoor air pollution. The overall knowledge regarding volatile organic compounds as a cause of IAP considered to be accurate in our study where as a study conducted in India⁴ showed that people are not much aware of these organic compounds causing IAP²⁴. In many studies it has been shown that stove is the main cause of IAP⁵ which is in contrast to our study which shows building construction material is the main cause of IAP.

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 better place to live and making it save for future generations. Using chimney stoves, avoid smoking, using less harmful construction material can help decrease

hazardous effects. As together we can make this place a better place.

CONCLUSION:

The level of awareness about different sources of indoor air pollution and its effect on health in general population of Rawalpindi/Islamabad is adequate.

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