

Awareness of indoor pollution in rural and urban houses of Ludhiana district

■ D. KAUR, M. SIDHU, S. BAL AND P. SANDHU

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■ **ABSTRACT :** Living in a technologically developing society, our lifestyle and attitude have become self-oriented which has added to the menace of household pollution. Environmental awareness is needed to change the mindset of modern society and needs to provide some alternatives which can help the women to save the environment, children, family and society. There is a need to make the public aware about environment, the serious health hazards of environmental pollution and their rights to live in a clean and healthy environment. Study conducted on the awareness of rural and urban homemakers revealed that majority of the rural and urban respondents were aware of different causes of indoor pollution though the awareness was more in urban homemakers. Among the awareness of environmental causes maximum awareness was found to be 'dust in abundance' with mean score 2.73, followed by high humidity inside (2.63). Major chemical based factors reported was awareness of 'leaking gas pipes or gas cylinder' with mean score 2.68. Majority of the selected respondents (55.83%) were aware of the indoor pollution due to choked pipes under the category of constructional faults and household articles. Damp and soiled bedding were placed at rank one with mean score 2.75. Other pollution creating causes categorized under 'miscellaneous causes' were: stagnated water, fungus and black mould, pet waste, animal dander, cockroaches, lizards, insects and spider's webs. Awareness of stagnated water was considered as one of the most polluting cause by 75.00 per cent respondents.

■ **KEY WORDS:** Chemical causes, Constructional causes, Environmental awareness

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See end of the paper for authors' affiliations

S. BAL

Department of Family Resource
Management, College of Home
Science, Punjab Agricultural
University, LUDHIANA (PUNJAB)
INDIA

Email : balsharanbir@pau.edu me

Environment is everything that surrounds or environs us. It affects our daily lives or activates in some way or the other. The degradation of environment with respect to water, air and soil is increasing day by day not only in the urban areas but also in the rural areas. There has been an increasing global concern over the impact of environment pollution

on public health. Many of the diseases that the mankind is facing are reported to occur due to prolonged exposure to polluted air, water and soil. A common man observe environmental pollution in the form of changing climate, ozone depletion, rising sea level, acid rain and polluted air in the cities, but he is little aware of the household pollution, as pollution of the outside environment (Songsore

and McGranahan, 1993).

Man is both creature and moulders of his environment which gives physical sustenance as well as provides opportunity for intellectual, moral, social and spiritual growth of human beings. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights and the right to life itself (Kumari, 2007).

The inside environment of houses often has a higher level of pollutants than the outdoor surroundings. Unfortunately, indoor pollution has not been given much importance. It was found that indoor pollutants form a substantial portion of the total exposure to various pollutants. The sources of such pollutants can be occupants, their activity, various appliances, building materials and infiltration of pollutants from outdoors. Indoor air contaminant materials are particulates, gases and vapors. These materials include bio-aerosols, particles, Volatile Organic Compounds (VOCs), organic and inorganic gases (Khare and Gupta, 2000). Studies of human exposure to air pollution indicate that the levels of many indoor pollutants can be 2-5 times higher than the levels of outdoor pollutants. Samet *et al.* (2000) reported that sometimes the level of indoor air pollutants is 100 times higher than the outdoor level. The high levels of allergens and irritants are of a great concern because we spend maximum time indoors and such indoor living conditions poses serious health threats to all the occupants of the building.

Environmental awareness is needed to change the mindset of modern society and needs to provide some alternatives which can help the women to save the environment, children, family and society. There is a need to make the public aware about environment, the serious health hazards of environmental pollution and their rights to live in a clean and healthy environment.

Environmental pollution can be minimized at nominal cost by creating awareness among the rural as well as urban residents. In this connection, woman being the key person of the family, can take initiative in showing concern about environmental pollution and can play vital and indispensable role in controlling pollution to some reasonable extent. Present study was, therefore, conducted with the objective to examine awareness of rural and urban homemakers regarding indoor pollution.

■ RESEARCH METHODS

The data for the present study was collected from 120 homemakers comprising of 60 rural and 60 urban respondents. The respondents were selected randomly. Rural data was collected from randomly selected villages *i.e.* Majara and Phullanwal of Ludhiana 1 block of Ludhiana district. Similarly urban homemakers were randomly selected from Jawahar Camp and Canal Avenue of Ludhiana, D zone of Ludhiana. An interview schedule was prepared which sought information about the awareness of homemakers regarding Indoor pollution. The information was collected by personal interview method with open ended and pre-tested interview schedule. The data collected were coded and tabulated. For analyzing the data, simple averages, percentages, mean scores, t-test were used.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Awareness regarding indoor pollution :

Indoor pollution being one of the biggest challenges in today's mode of living which has shrunk open spaces

Causes	Awareness (n=120)			Extent of awareness (3 point scale)			
	Rural	Urban	Total	Rural	Urban	t-value	Total
Dust in abundance	20 (33.33)	35 (58.33)	55(45.83)	2.63	2.83	1.67	2.73
High indoor humidity	21 (35.00)	31(51.67)	52(43.33)	2.61	2.64	0.28	2.63
Poor cross ventilation	13 (21.67)	38 (63.33)	51(42.50)	2.61	2.62	0.01	2.62
Smoking indoors (Cigarette/Cigar/ Beedi)	9 (15.00)	16 (70.00)	25(20.83)	2.36	2.86	2.14*	2.61
Pollution due to kitchen fuels	20 (33.33)	36 (60.00)	56(46.67)	2.31	2.60	1.96*	2.46
Garbage burning at home	12 (20.00)	41(68.33)	53(44.17)	2.32	2.56	1.72	2.46
Paddy burning in fields	35(58.33)	45 (75.00)	80(66.67)	2.32	2.51	1.84	2.42

*Multiple responses; # = 3 point Scale: Fully aware= 3, Somewhat aware=2, Little bit aware= 1; Figures in parentheses indicate percentages

and the dominant vertical habitats especially in urban areas. It has forced people to spend more and more time indoors. It becomes very important to study the awareness level of habitants both in urban and rural parts.

Awareness is knowledge or perception of a situation or fact. The knowledge that something exists or understanding of a situation at present time based on information or experience. After the scientific and industrial revolution in the recent past, there, has been immense impact of man on his environment. Man has failed to realise that any new factor upsets the balance of the ecosystem as a whole/the environment. The awareness level means that are likely to witness or discover a hazardous material at first instance.

In the present research, the awareness level of respondents was studied focusing on different parameters which included: environmental and chemical causes of indoor pollution as well as many miscellaneous causes and onset of indoor pollution due to constructional defects and household articles.

Environmental causes :

Environment is the sum total of what is around something or someone. It includes living things and natural forces. Immediate environment of any living organism includes both physical characteristics and climatic zone. However, for a habitant residing indoors for more time immediate environment significantly can affect health, alter comfort zone and cause psychological disturbances. Major such identified causes were related to air quality, which included Suspended Particulate Matter (SPM), water vapor, CO, CO₂ and other residual gases which are generally outcome of incomplete combustion.

Table 1 reveals data pertaining to the awareness of environmental causes. It can be seen from the table that

maximum number of respondents (66.67%) was aware of effect of paddy burning in fields causing indoor pollution in the residences. Urban habitants were more aware of this cause which one is considered as one of the important cause of indoor pollution as three fourth of respondents (75.00%) responded positively as compared to 58.33 per cent rural respondents. This may be due to high level of already existing air pollution in the cities resulting from vehicular traffic and combustion of cooking fuel indoors in small and congested houses. As level of environmental pollution in urban areas is already higher as compare to rural area so during burning of paddy straw after harvesting of paddy further increase its level. That is why urban people were more aware and conscious of effect of paddy burning in fields. Prasher (1998) had also reported that the smog due to the burning of paddy straw enveloped vast tracts of Punjab on October 15. For the residents of Ludhiana, it was a frightening experience. The sky was overcast since morning. It was in the afternoon that smog began descending. Within a short time, it thickened reducing visibility and causing irritation to the eyes and throat. In the evening, it was at its peak. Pollutants from industrial units and vehicular traffic accentuated the problem.

Little less than half of the respondents were also aware of the reason that indoor pollution is also caused due to kitchen fuels (46.67%), abundance dust in their immediate environment (45.83%), garbage burning at home degrades air quality indoors (44.17%), high indoor humidity make air stale and unhealthy (43.33%) and poor cross ventilation does not allow exchange of fresh air inside the house (42.50%). Surprisingly least awareness was seen regarding the fact that the smoking of cigarette, cigar or *beedi* can cause indoor pollution as only 20.83 per cent respondents were found to be aware of this

Table 2: Awareness of respondents according to chemical causes resulting into indoor pollution

Causes	Awareness (n=120)			Extent of awareness (3 point scale)			
	Rural	Urban	Total	Rural	Urban	t-value	Total
Leaking gas pipes or cylinder	44 (73.33)	51 (85.00)	95 (79.17)	2.61	2.75	0.99	2.68
Hair spray	13 (21.67)	29 (48.33)	42 (35.00)	2.65	2.68	0.12	2.67
Artificial fragrance	21 (35.00)	45 (75.00)	66 (55.00)	2.62	2.71	1.06	2.67
Insecticide/pesticides	45 (75.00)	52 (86.67)	97 (80.83)	2.58	2.65	0.78	2.62
Room fresheners	12 (20.00)	35 (58.33)	47 (39.17)	2.37	2.68	1.97*	2.53
Cosmetics	10 (16.67)	26 (43.33)	36 (30.00)	2.36	2.65	1.91	2.51
Perfumes	16 (26.67)	29 (48.33)	45 (37.50)	2.38	2.48	0.84	2.43
Mosquito/insects repellents	20 (33.33)	45 (75.00)	65 (54.17)	2.02	2.36	1.23	2.19

*Multiple responses; #=3 point Scale: Fully aware= 3, Somewhat aware=2, Little bit aware= 1; Figures in parentheses indicate percentages

fact. Awareness of all these causes found to be higher with urban respondents as compared to their rural counterparts. These findings are in line with the findings reported by Evans *et al.* (2002) that more than 95 per cent of respondents were aware and identified household pests, pesticides, lead and tobacco smoke as the major sources of pollutants.

Extent of awareness, which was measured on a three point quantum scale projected slightly different picture of the environmental causes of indoor pollution as perceived by both urban and rural respondents in the present study. Highest score was earned by the cause 'dust in abundance' (mean score 2.73), followed by 'high indoor humidity' (mean score 2.63) and smoking indoors (mean score 2.61). As the Table 1 depicts that the scores given by urban respondents were higher as compared to rural respondents. Minimum extent of awareness perceived by respondents was for 'paddy burning in fields causes indoor pollution' (mean score 2.42) followed by little higher awareness for garbage burning at home and pollution is caused due to burning of kitchen fuels (mean score 2.46). The reason for the least score given to paddy

burning, as cause for the environmental pollution, may be that effect of paddy burning is temporarily and it is during the paddy harvesting period only.

The difference in the level of awareness, regarding indoor smoking and pollution due to kitchen as a cause for pollution inside the home among the rural and urban respondents, was found significant at 1 per cent level. As far as other environment causes are concerned the difference among the rural and urban respondents was found non-significant.

Chemical causes :

Household care and maintenance is essential. The products used for routine cleaning of the houses or for keeping the homes free from any insects like cockroaches, mosquitoes, house flies etc., are available in markets are of lot many types and brands. These products are chemical based and are poisonous or may have some harmful effects on human beings especially people with sensitivity. The people who are asthmatic might face a lot of health problems due to the excessive use of such chemical based things. Not only these

Table 3 : Awareness of respondents according to constructional faults and household articles resulting into indoor pollution

Causes	Awareness (n=120)			Extent of awareness (3 point scale)			
	Rural	Urban	Total	Rural	Urban	t-value	Total
Damp and soiled bedding	18 (30.00)	28 (46.67)	46 (38.33)	2.71	2.79	0.75	2.75
Dust beneath carpet	12 (20.00)	35 (58.33)	47 (39.17)	2.35	2.60	2.06*	2.48
Wall dampness	12 (20.00)	40 (66.67)	52 (43.33)	2.41	2.46	0.49	2.44
Roof leakage	13 (21.67)	28 (46.67)	41 (34.17)	2.29	2.56	1.99*	2.43
Clogged drain pipes	25 (41.67)	42 (70.00)	67 (55.83)	2.25	2.57	2.11*	2.41
Damp carpets	10 (16.67)	25 (41.67)	35 (29.17)	2.65	2.16	2.43*	2.41
Dusting of rugs/carpet/ bedding/sofa	15 (25.00)	28 (46.67)	43 (35.83)	2.32	2.43	1.11	2.37
Cooking fumes	14 (23.33)	36 (60.00)	50 (41.67)	2.32	2.38	0.42	2.35
Leaking pipes	15 (25.00)	27 (45.00)	42 (35.00)	2.19	2.36	1.19	2.28
Uncovered dustbins	23 (38.33)	40 (66.67)	63 (52.50)	2.02	2.16	0.97	2.09
Worn off mattresses	13 (21.67)	31 (51.67)	44 (36.67)	2.16	2.02	1.13	2.09

*Multiple responses; # =3 point Scale: Fully aware= 3, Somewhat aware=2, Little bit aware= 1; Figures in parentheses indicate percentages

Table 4: Awareness of respondents according to miscellaneous causes resulting into indoor pollution

Causes	Awareness (n=120)			Extent of awareness (3 point scale)			
	Rural	Urban	Total	Rural	Urban	t-value	Total
Stagnated water	42 (70.00)	48 (80.00)	90 (75.00)	2.70	2.74	0.31	2.72
Fungus, black mould	15 (25.00)	26 (43.33)	41 (34.17)	2.63	2.65	0.14	2.64
Pet waste	38 (63.33)	46 (76.67)	84 (70.00)	2.39	2.50	1.19	2.45
Animal dander	34 (56.67)	38 (63.33)	72 (60.00)	2.32	2.43	0.92	2.37
Cockroaches, lizards, insects	22 (36.67)	34 (56.67)	56 (46.67)	2.10	2.39	1.17	2.25
Spider's webs	28 (46.67)	36 (60.00)	64 (53.33)	1.84	2.02	1.98*	1.93

*Multiple responses; # =3 point Scale: Fully aware= 3, Somewhat aware=2, Little bit aware= 1; Figures in parentheses indicate percentages

products, there are many products which are an integral part of the dressing table such as hair spray, perfumes, different cosmetic products. These dressing table cosmetic products are also chemical based causing indoor pollution. So information was also gathered to know the awareness regarding these commonly used chemical based products. It can be seen from the Table 2 that maximum number of respondents (80.83%) was aware of harmful effect of insect repellents used indoor by the respondents. Urban habitants were more aware (86.67%) of this fact as compared to their rural counterparts (75.00%).

Table 2 further shows that little less than half of the respondents were also aware of the reason that indoor pollution is also caused due to leakage of gas pipes or cylinder (79.17%), artificial fragrance in their immediate environment (55.00%), mosquito/insects repellent (54.17%), room fresheners (39.17%), perfumes (37.50%), hair spray 35 per cent and the minimum awareness was about the cosmetics used by the family members *i.e.* 30 per cent. Awareness of all these causes found to be higher with urban respondents as compared to their rural counterparts. These findings are in line with the findings of Graham (2009) who also reported similar findings.

To measure extent of awareness a three point quantum scale was used. It projected slightly different picture of the chemical causes of indoor pollution as perceived by both urban and rural respondent under present study. Highest score was earned by the cause *i.e.* leaking of gas pipes or cylinder (mean score 2.68), followed by 'hair spray' and 'artificial fragrance' with mean score 2.67 each, 'insecticides and pesticides' as cause for indoor pollution' (mean score 2.62), 'room fresheners' (mean score 2.53), 'cosmetics' (mean score 2.51), 'perfumes' (mean score 2.43). Table also reveals that the mean scores given by urban respondents were higher as compared to the rural respondents. Minimum extent of awareness perceived by respondents was for 'mosquito/insects repellent' that was 2.19.

The difference in the awareness level of rural and urban homemakers was found to be statistically significant for room fresheners as a chemical cause for creating indoor pollution. The difference for other listed chemical causes was found to be statistically non-significant.

Pollution due to constructional faults and house hazard activities :

Table 3 reveals data pertaining to the constructional

faults and household hazard activities causing pollution in homes. It can be seen from the table that maximum number of respondents (55.83%) were aware of the fact that clogged drain pipes were the important cause of indoor pollution in their residences. Urban habitants (70.00%) were having more awareness depicting clogged drain pipes as one of the reason of indoor pollution where as only 41.67 per cent rural respondents replied positive.

Little less than half of the respondents were also aware of the reason that indoor pollution is caused due to uncovered dustbins (52.50%) followed by other causes of indoor pollution such as wall dampness (43.33%), cooking fumes degrading the indoor air quality (41.67%), dust beneath carpet or rugs (39.17%), damp and soiled bedding (38.33%), worn off mattresses (36.67%), dusting of rugs/carpet/bedding/sofa (35.83%), leaking pipes (35.00%), roof leakage (34.17%) and the minimum awareness was revealed for the damp carpets *i.e.* 29.17 per cent as a cause for pollution inside the homes. Findings are corroborated with the findings reported by Edelstein *et al.* (2008) that respiratory diseases were three times higher in rural respondents as compare to their counterparts. Rural women were aware of the negative effect of smoke on the health of their family members especially children and on their own.

Extent of awareness, which was measured on a three point quantum scale projected quite different picture of the constructional faults and household articles as the causes of indoor pollution as perceived by both urban and rural respondent in the present research study. Highest score was earned by the cause 'damp soiled bedding' (mean score 2.75), followed by 'dust beneath carpet' (mean score 2.48), wall dampness (mean score 2.44), roof leakage (mean score 2.43), 'clogged drain pipes' (mean score 2.41), 'damp carpets' (mean score 2.41), 'dusting of rugs/carpet/bedding/sofa' (mean score 2.370), 'cooking fumes' (mean score 2.35), 'leaking pipes' (mean score 2.28) and minimum extent was reported for both 'uncovered dustbins' as well as 'worn off mattresses' with mean score 2.09 each.

The difference in the awareness of rural and urban homemakers was found to be statistically significant, for the reasons; dust under carpet, roof leakage, choked drain pipes and damp carpets among the mentioned constructional faults and household articles resulting into indoor pollution. The difference in the awareness level among rural and urban homemakers, for other mentioned causes, was found to be non-significant.

Miscellaneous causes :

There were many more causes which could not be covered under above mentioned causes that could be causing pollution inside the houses. These were categorized under miscellaneous causes. The causes were stagnation of water near the house, pet droppings, insects, webs etc. From the Table 4 it can be observed that awareness of stagnate water as cause of pollution, was maximum (75.00 %), followed by pet waste or droppings (70.00 %) and animal dander as another important cause for indoor pollution (60.00 %). Minimum awareness (34.17 %) was for fungus or black mould as the cause of pollution by the selected respondents.

Three point scale was used to measure the extent of awareness of the selected respondents about the miscellaneous cause for indoor pollution. Highest mean score *i.e.* 2.72 was for stagnated water near the place of living, followed by fungus and mould (mean score 2.64) and pet waste with mean score 2.45. The other causes such as animal dander, cockroaches/lizards/insects and spider web were given 2.37, 2.25 and 1.93 mean scores, respectively. Similar ranks were given by the rural and urban respondents with the slight difference in the mean scores.

As Table 4 shows that 80.00 per cent urban and 70.00 per cent rural respondents were also aware of the fact that stagnant water causes pollution which resulted into malaria, dengue, and other water borne diseases. Least awareness was observed to be for pollution arising from fungus or black moulds. The difference in the awareness of rural and urban homemakers was found to be statistically significant, for spider's webs as miscellaneous causes resulting into indoor pollution. The difference in the awareness level among rural and urban homemakers, for other mentioned causes, was found to be non-significant.

Conclusion :

It can be concluded that the rural and urban homemakers were aware of different environmental, chemical, constructional faults and household articles and

miscellaneous causes resulting into indoor pollution. But the awareness level was higher among the urban homemakers as compare to rural homemakers. So door to door as well as campaigning through social net work and also through mass media has to be undertaken by government and non-government organization to have control on the environmental pollution with special focus on the indoor pollution.

Authors' affiliations:

D. KAUR, M. SIDHU AND P. SANDHU, Department of Family Resource Management, College of Home Science, Punjab Agricultural University, LUDHIANA (PUNJAB) INDIA

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