

Assessment of odour awareness of indoor pollution among rural and urban homemakers of Ludhiana city

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ABSTRACT : There seem to be substantial individual differences in the role that odours play in people's lives. Whereas some individuals are always spontaneously commenting on any odour in the room, others only notice these features after they have been pointed out to them. This characteristic is most likely related to individual differences. Being capable of quickly assessing people's odour awareness may prove useful in predicting their reactions to environmental odours in various indoor settings where annoyance or adverse health effects may be an issue. Keeping the concern and significance of indoor pollution in mind a study was planned with the objective to assess the indoor pollution subjectively from rural and urban houses". A modified 'Odour Awareness Scale' (OAS) was used. Study revealed that according to 'Odour Awareness Scale' people have different abilities to get attracted to differentiate and get repelled by indoor odours. Maximum awareness was for the positive/pleasant odours (Mean score = 3.73) which meant noticing the pleasant odour of fresh leaves and flowers both indoors and outdoors, smell of cooking food from own kitchen and neighborhood's; and getting aware of pleasant odour in air. The awareness was high for rural respondents (Mean score = 3.81) as compared to urban (Mean score = 3.64). Unpleasant odour awareness was next in the order (Mean score = 3.70); and it was higher amongst urban respondents (Mean score = 3.75) in comparison to rural counterparts (Mean score = 3.64). Negative odours included general unpleasant smell prevailing in the environment, smell of used, soiled clothes and smell of burnt food or smoked milk.

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According to International Encyclopedia of Social Sciences, environment is the aggregate of all external conditions affecting the life and development of an organism. Dictionary of Social Sciences defines environment as all the external sources of factory to which a person or aggregate of persons are actually or potentially responsive (Dubey and Samal, 1998).

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 pollution can be both indoor and outdoor but generally people think that pollution is only outdoor or affecting the indoor environment due to the different outdoor sources. Although we spend about 80 to 90 per cent time indoors yet we consider very little about the indoor pollution and causes of the same. As we walk through

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our homes, the air turbulence created by the movement of human beings stirs up a combination of dust and debris that can be very irritating to the lungs (Godish, 2010). According to the Environment Protection Agency (EPA), at least a dozen organic pollutants occur in concentrations two to five times higher in the home than the outdoors, with concentration of volatile organic compounds being ten times higher inside the buildings (Colbeck *et al.*, 2007).

Therefore, a study was planned with the aim 'to make subjective assessment of indoor pollution in the houses of rural and urban families of Ludhiana district'.

EXPERIMENTAL METHODOLOGY

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.

EXPERIMENTAL FINDINGS AND DISCUSSION

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

Odour awareness scale (OAS) :

For subjective assessment of the indoor pollution modified 'Odour Awareness Scale' (OAS) was used. Self-reported positive and negative OAS (32 Questions)

was used. In order to question odour perception on the basis of frequency, first 20 questions were used as a scale. In factor analysis 4 sub-fields were determined: Odour attention (10, 11, 12, 13), Odour recognition-differentiation (7, 8, 9, 18), pleasant odour awareness (1, 2, 3, 14) and unpleasant odour awareness (15, 16, 19, 20). In order to determine the pleasantness and unpleasantness of various items used indoors, the 32 statements of OAS were allocated positive and negative factors. In all statements number 1, 2, 6, 7, 9, 14, 17, 23, 27, 28, 29, and 33a were given 'P' factor and rest of the statements were given 'N' factor. Scoring was done on 5 point scale as explained in annexure. Scale was modified to determine the odours in various areas of the house on a 5 point quantum scale. The data collected were coded and tabulated. For analyzing the data, simple averages, percentages, mean scores, t-test were used.

Demographic features of the respondents :

Co-relates of demographic features of respondents is direct, with their extent of knowledge and age. So, demographic features studied in the present investigation included; age, education etc.

Age :

The data indicates that majority of the respondents *i.e.* 38.33 per cent were in the age group of 35-45 years, followed by 31.66 per cent who were above 45 years of age, while only 30.00 per cent of the respondents were either upto 35 years or less. Majority of the respondents (35.00%) were middle aged as seen in rural sample and in urban households 41.66 per cent respondents belonged

Table 1 : Distribution of respondents according to their demographic features

Demographic features	Rural (n=60)		Urban (n=60)		Total (n=120)	
	No.	Percentage	No.	Percentage	No.	Percentage
AGE (in years)						
Upto 35	14	23.33	22	36.66	36	30.00
35-45	21	35.00	25	41.66	46	38.33
> 45	25	41.66	13	21.66	38	31.66
Mean		44.00		38.98		41.49
SD		9.86		8.05		9.31
t-value				0.62		
Education						
Upto intermediate	46	76.66	19	31.66	65	54.16
Graduation	8	13.33	28	46.66	36	30.00
Post graduation	6	10.00	13	21.66	19	15.83

to the age group of 35-45 years. The data showed that 30.00 per cent respondents were from the younger age group. It means they had less rigid way of thinking and could be molded easily. They can be imparted the intended educational technology effectively. Table 1 further shows that the average age of the selected respondents was 41.49 years. The average age of the rural respondents was 44 years and that of urban respondents, it was 38.98 years. This difference in the age of rural and urban respondents was found to be statistically non-significant.

Education :

Majority of the respondents *i.e.* 54.16 per cent had studied upto intermediate, followed by 30.00 per cent respondents who had done graduation while 15.83 per cent of the respondents were either post graduates or done something beyond graduation like post-graduation diploma or training. Education level of sampled population was higher in urban areas as maximum number of them (46.66%) was graduates as compared to only 13.33 per cent of their rural counterparts who had done their graduation. More than three fourth of the rural samples (76.66%) were only school pass outs. This scenario may be due to lack of educational facilities in villages and reluctance of people for sending their girls to nearby towns for higher studies.

Age of family members with sensitivity to indoor pollution :

Vulnerability refers to the inability to withstand the

effects of a hostile environment. It is worthwhile to mention here that if these people will spend more time indoors; they become the prime target of all bad elements of environment and the worst hitting element is what remains trapped indoors and if it is an indoor pollution; it becomes mandatory to know who will be worst effected inhabitants, so that strategies can be devised to safe guard them.

In the context of present study, profile of the children and elderly family members, who are more vulnerable habitants, was included. It can be seen from Table 2 that maximum number of rural (94.91%) and urban (90.90%) families had upto 2 young kids categorized in vulnerable group staying at home most of the time. However, average number of children who remained at home only, was at random one (average value=0.98). It can further be seen from the table that there were 92.31 per cent of rural families where elderly in the age group of 60-70 years were residing as compared to urban counterparts (75.00%) who were staying at home most of the time. However, average age of elderly in rural sample was 63 years in comparison to urban families where their average age was 66.20 years. There were more elderly members, having age above 80 years, in urban sample. This may be owing to the fact that better medical facilities and transportation efficiency enhanced their chances of living longer. However, it remains non-debatable fact that both children and elderly people are soft target of indoor pollutants. The findings reported by Rahman and Sarkar (2006) are also in line with the findings of the study

Table 2: Age of family members sensitive to indoor pollution

Age	Rural (n=60)		Urban (n=60)		Total (n=120)	
	No.	Percentage	No.	Percentage	No.	Percentage
Children						
Upto 2 years	56	94.91	50	90.90	106	92.98
2-3 years	1	1.69	3	5.45	4	3.50
3-4 years	2	3.39	2	3.64	4	3.50
Mean		0.75		1.24		0.98
SD		1.04		1.07		1.08
t-value				2.54*		
Elderly						
60-70	12	92.31	15	75.00	27	81.81
70-80	0	0.00	2	10.00	2	6.06
Above 80 years	1	7.69	3	15.00	4	12.12
Mean		63.00		66.20		64.94
SD		5.67		9.36		8.16
t-value				2.47*		

* indicate significance of value at P=0.05

undertaken.

It was further revealed that 92.98 per cent children were in the age group of upto 2 years or less than 2 years, followed by only 3.50 per cent children who were of 3-4 years. Most of the elderly (81.81%) were in the age group of 60-70 years, followed by only 12.12 per cent of the elderly who were either 80 years or more than this. Only 6.06 per cent elderly were in the age group of 70-80 years.

The difference between the family members (both children as well as elderly) of rural and urban areas towards indoor pollution sensitivity was found to be statistically significant at 5 per cent level of significance.

Odour awareness scale :

The odour awareness scale (OAS) is a questionnaire designed to assess individual differences in awareness of odours in the environment. The theory that odour awareness can be distinguished in awareness of negative (to be avoided) odours and positive (to be approached) odours was tested using confirmatory factor analysis (CFA) on the 34-item questionnaire. CFA (after deletion of 2 items) showed good fit of the 2-factor theory, resulting in a positive awareness subscale (11 items, Cronbach's $\alpha=0.77$) and a negative awareness subscale (21 items, Cronbach's $\alpha=0.80$).

Odour can sometimes be unnoticeable, or passed off without any reaction. Getting attentive on any type of odour is the first stage of odour awareness. Second stage of odour awareness may encompass odour recognition as well as differentiation. Differentiation of annoying as well as pleasant odour is the final stage of getting aware of odours in the surrounding environment. Smell of wet woods and other food, kerosene, LPG gas; of stale food, spoiled ingredients, fresh ones can be more peculiar to one person and may not get attention of other one. But frying, baking and cooking smells one cannot avoid noticing. Smell at the entrance of house, or when you open a room after few days; on entering a newly constructed building may even give a person very peculiar

odour. More strong odours when people give bad breath or sweat smell of perfume, aftershave etc. invariably gets immediate attention.

People living indoors are able to smell odours more easily as there is no escape of these odours in environment, more particularly if dwelling lacks proper ventilation and adequate openings in the outer wall. Smell of sour milk, burning fire, flowers, cigarette and smoking can be differentiated very easily as compared to smells from artificial fragrances. Table 3 revealed clearly that people have different abilities to get attracted to, notice, differentiate and get repelled by odours indoors. It can be clearly seen in the table that maximum awareness was for the positive/pleasant odours (with mean score = 3.73) like noticing the pleasant odour of fresh leaves and flowers both indoors and outdoors, smell of cooking food from own kitchen and neighborhood's; and getting aware of pleasant odour in air. The awareness level was high in case of rural respondents (with mean score = 3.81) as compared to urban counterparts (with mean score = 3.64).

Unpleasant odour awareness was next in the order (mean score = 3.70); higher amongst urban respondents (mean score = 3.75) in comparison to rural counterparts (mean score = 3.64). Negative odours included general unpleasant smell prevailing in the environment, smell of used or soiled clothes, and smell of burnt food or smoked milk. It was important to note here that respondents considered only that particular annoying and unpleasant odours, remains in their memories for long period especially if the smell lingers on.

Respondents were also able to recognize and differentiate odours successfully as revealed by the high score of 3.56; more prominently by rural respondents (mean score = 3.67) than urban ones (mean score = 3.46). Table 3 further portrays that odour recognition and differentiation covered an immediate reaction to new perfume, after shave, deodorant, person's bad/fresh breath or sweat; sniffing at clothes before putting them on is a very peculiar way of recognizing and

Table 3 : Assessment of indoor pollution by respondents on odour awareness scale

Assessment statements	Rural	Urban	t-value	Total
Pleasant odour awareness	3.81	3.64	1.33	3.73
Unpleasant odour awareness	3.64	3.75	0.86	3.70
Odour recognition differentiation	3.67	3.46	1.65	3.56
Odour attention	3.70	3.32	2.98**	3.51

** indicate significance of value at P=0.01

differentiating odour. Least scoring odour awareness level was 'being able to notice or get attentive to a particular odour' (with mean scores = 3.51 and 3.56, respectively) earned by rural and urban respondents. It was also observed that rural respondents ranked higher on both these levels with mean scores 3.67 and 3.70; compared to their urban counterparts with mean score 3.46 and 3.32, respectively. Getting attentive at any odour is more of a personal smartness/habit. For example if you are first one to smell leaking gas, or to know that milk has turned sour, first one to smell a fire and also whether it is coming from a barbecue or fireplace and if you can immediately conclude that which food item in your refrigerator has gone bad. Noticing the smells/odours can be tested by knowing if one can notice the smell of a house, a particular item lying in house, sniff at a book and get distracted by any odour in the environment; even if you are deeply engrossed in studies or some other serious mental work. The test also covers if you can revive the odours memory even after a long gap of time. It can be thus, concluded that being able to notice, recognize, differentiate and becoming aware of negative, annoying and unpleasant odours is the first step towards accepting the presence of pollution in the interior of your dwelling or work place. The subjective assessment of variety of odours which may emit from any soiled, spoiled, rotten or polluted stuff will help to devise a strategy to ward off the source effectively. Wrzesniewski *et al.* (1999) reported that difference in affective response extends across sensory domains through facial expression.

Feeling of odours from different areas of house :

Odours are organic or inorganic compounds and can

be both pleasant and unpleasant. Some odours can be health hazards and some are not. While most chemical contaminants originate from within the building may it be construction material, detergents, leathers. The basic materials used for the production of these things, some or other types of odours are generally machine produced. These odours do affect the indoor environmental quality. Information was gathered from the selected respondents regarding the feeling of odour from certain peculiar things which generally affect the working of the human beings who have very sensitive smelling sense. Data was collected about the feeling of odour from shoes/socks, stored winter or summer clothing, basement, bathrooms, soiled bedding etc. It can be observed from the Table 4 that the first rank was given by the respondents to 'odour from shoes or socks' with mean score 4.23. It was followed by 'stored winter clothing' (mean score 3.89), 'laundry area' (mean score 3.84), 'dirty bedding' (mean score 3.83), 'basement' (mean score 3.61), 'store or pantry odour' (mean score 3.60), 'stored summer clothing' (mean score 3.58), 'bathroom' (mean score 3.44) and the last rank was given to 'soiled stored clothes' with mean score 3.30. When the ranks given by rural and urban respondents were compared, it was found that rural respondents gave last rank to 'smell from laundry area' (mean score 3.70) and urban respondents placed 'soiled stored clothes' in the last with mean score 2.82.

Conclusion :

It can be concluded from the study that according to 'Odour Awareness Scale' people have different abilities to get attracted to differentiate and get repelled by indoor odours. Maximum awareness was for the positive/pleasant odours that means notify the pleasant odour of

Table 4: Distribution of respondents regarding the feeling of odour from different areas of house

Feeling of odour	Rural (n=60)		Urban (n=60)		Total (n=120)	
	Mean score	Rank	Mean score	Rank	Mean score	Rank
Shoes/socks	4.43	I	4.02	I	4.23	I
Stored winter clothing	3.90	III	3.88	III	3.89	II
Laundry area	3.70	IX	3.98	II	3.84	III
Dirty bedding	3.98	II	3.67	V	3.83	IV
Basement	3.73	VIII	3.48	VI	3.61	V
Store odour	3.80	IV	3.40	VII	3.60	VI
Stored summer clothing	3.78	V	3.38	VIII	3.58	VII
Bathroom	3.75	VII	3.72	IV	3.44	VIII
Soiled stored clothes	3.77	VI	2.82	IX	3.30	IX

fresh leaves and flowers both indoors and outdoors, smell of cooking food from own kitchen and neighborhood's; and getting aware of pleasant odour in air. The awareness was found to high among rural respondents as compared to urban. Unpleasant odour awareness was higher amongst urban respondents in comparison to rural counterparts. Negative odours included general unpleasant smell prevailing in the environment, smell of used, soiled clothes and smell of burnt food or smoked milk.

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REFERENCES

Colbeck, I., Zaheer, A. N., Shahida, H. and Sikander, S. (2007).

Indoor air quality at rural and urban sites in Pakistan. *J. Water Air Soil Pollu.*, **8**: 61-69.

Dubey, A. and Samal, B. (1998). Environmental awareness among women. *Indian Psychol. Rev.*, **50**: 50-56.

Godish, T. (2010). *Indoor environmental quality*. CRC Press. pp 376, NEW YORK, U.S.A.

Kumari, A.K. (2007). Evolution of environmental legislation in India. Institute of Chartered Financial Analysts of India, University, Hyderabad (A.P.) INDIA.

Rahman, A. and Sarkar, A. (2006). Health impact of indoor air pollution: A study of growing urban center Aligarh (India). *Epidemiology*, **17**: 97.

Wrzesniewski, A., McCauley, C. and Rozin, P. (1999). Odour and affect: Individual differences in the impact of odour on liking for places, things and people. *Chem. Senses*, **24**: 713-721.

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