Section: Community Medicine

Original Research Article

KNOWLEDGE AND PERCEPTION OF PUBLIC HEALTH EFFECTS & USE OF PERSONAL PROTECTIVE INTERVENTIONS FOR HOUSEHOLD POLLUTION IN A SLUM CUM RESETTLEMENT COLONY OF DELHI – AN OBSERVATIONAL STUDY

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Received *: 17/07/2024*
Received in revised form *: 05/09/2024*
Accepted *: 20/09/2024*

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DOI: 10.70034/ijmedph.2024.3.196

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2024; 14 (3); 1097-1100

ABSTRACT

Background: Air pollution impacts human health, the environment, and even the global climate with health effects ranging from respiratory illnesses and cardiovascular problems to asthma and even premature death.

Materials and Methods: community based cross sectional study was conducted in slum area/resettlement colonies of Gokal Puri, New Delhi by systematic random sampling procedure. A predesigned, pretested, semi-structured questionnaire was used for the community survey.

Results: Construction and garbage related pollution are the most commonly reported sources of household pollution. A majority (61.72%) of respondents take precautions based on air quality advisories, such as staying indoors or using masks, reflecting a proactive approach to managing air pollution risks.

Conclusion: Health care system is increasingly strained and thus, additional burden due to rising air pollution needs to be prevented by making people aware about the methods of reducing air pollution..

Keywords: Public Health, Personal Protective Interventions, Pollution

INTRODUCTION

Over the last few decades, the threat of rising air pollution has increased manifolds. World Health Organization (WHO) has estimated that thirteen million deaths annually are attributable to preventable environmental causes.[1]

Air pollution impacts human health, the environment, and even the global climate. Health effects range from respiratory illnesses and cardiovascular problems to asthma and even premature death.[2]

Addressing air pollution has become a very crucial domain for safeguarding human health, preserving the environment, and ensuring a sustainable future for generations to come.

Various measures like regulatory measures, technological advancements to reduce emissions, promoting cleaner energy sources, and fostering public awareness can serve pivotal roles in reducing this rising menace.[3]

Lacunae in available studies: The literature available doesn't present sufficient data to determine the awareness levels amongst people regarding the household pollution and also the self-perceived public health effects of the same.

Novelty of the study: The current study not only aims to relate the awareness amongst people with various sociodemographic parameters, but will also explore the public health effects and preventive interventions of the household pollution per se.

Further the study will also uncover the self-perceived uneasiness/discomfort in the general population with change in ambient air quality.

Objectives: Primary Objective

1. To assess the knowledge of sources and public health effects of household pollution in a slum cum resettlement colony of Delhi.
2. To assess the use of Personal protective interventions related to household pollution in a slum cum resettlement colony of Delhi.

Secondary outcome

1. To determine the association of use of Personal protective interventions for pollution with socio demographic, occupational and other environmental factors.

MATERIAL AND METHODS

Study design: Community based cross sectional study

Study Site: The study was conducted in slum area/resettlement colonies of Gokal Puri, New Delhi

Study Population: The study was conducted on the residents (>18 years) of slum area/resettlement colonies of Gokalpuri, New Delhi

Exclusion Criteria

1. Those who were unable to understand and answer the questions.
2. Individuals residing at the current location for less than a year.

Inclusion Criteria

Individuals >18 years of age of either gender

Study instruments

- Patient interview schedule to collect socio demographic data
- Pre-designed and pre-tested questionnaire for community survey

Sample Size

A community survey done by Mor et al determined 75% level of awareness for air pollution among the study participants.(4) Thus, taking prevalence at 75%, at 95% confidence interval, with 5% absolute error, sample size calculated was 288.

Methodology

For selecting the households in the sampled areas, systematic random sampling procedure at the time of survey was used. At each selected household: One adult was selected above the age of 18 years using lottery method.

List of houses was procured from ASHA of the area beforehand.

Also, data was collected using a patient interview schedule and predesigned questionnaire. One month recall was used to fill the questionnaire. Standard definitions were used for assessing various parameters. People in the community were also provided health education for their protection from increasing hazards of air-pollution. Also, wherever required, people were counselled and referred to higher centers for further management.

Study Outcomes

1. Proportion of the population with knowledge of sources and public health effects of household pollution in a slum cum resettlement colony of Delhi
2. Proportion of people using Personal protective interventions related to household pollution in a slum cum resettlement colony of Delhi
3. Generation of baseline data for evidence for association of use of Personal protective interventions for pollution with socio demographic, occupational and other environmental factors.

Statistical Analysis: Descriptive statistics and inferential statistics were analyzed using Microsoft Excel. Categorical data has been expressed in frequency and proportions. Appropriate statistical tests have been used to demonstrate associations.

Ethical considerations: Written and informed consent was taken from all study subjects. Anonymity of the subjects has been ensured. Due permission was taken from Institutional Ethical Committee for conducting the study.

RESULTS

The table shows that "Garbage Odour" and "Construction Activities" are the most common sources of pollution, reported by 156 (10.80%) and 144 (9.97%) respondents, respectively. Other sources like "Industrial Emissions" and "Household Cooking/Heating" are less prevalent. [Table 1]

The table 2 indicates that 61.72% of respondents have taken precautions based on air quality information or advisories, such as staying indoors or using masks. In contrast, 38.28% have not taken any such precautions. Also, 24.59% of respondents reported smoking cigarettes or bidis in the house, while 75.41% do not.

The table presents that 6.77% of respondents reported that someone in their household has experienced health issues related to air pollution, while 93.23% have not. 39.44% of respondents believe that indoor air pollution exacerbates respiratory conditions or allergies in their household, while 60.56% do not perceive such an impact. Also, 8.25% of respondents have sought medical help for health issues they believe were worsened by indoor air pollution, whereas 91.75% have not. [Table 2]

The table highlights that the 18 to 44 age group shows the highest awareness of various pollution sources as compared to the other age groups. [Table 3]

The younger age groups are most likely to take precautions based on air quality information. This age group appears to be more engaged with air quality issues compared to other age groups. [Table 4]

Respondents with higher education levels are less likely to allow smoking. Specifically, those with graduation or post-graduation education show the lowest acceptance of smoking, while those with lower education levels, are more accepting. [Table 5]

Table 1: Distribution of respondents according to the knowledge regarding various sources of household air pollution

Source of pollution	Frequency (n=606)	Percentage
Construction activities	144	9.97
Garbage odour	156	10.80
Household cooking/heating	22	1.52
Industrial emissions	93	6.44
Other	2	0.14

Table 2: Knowledge and perception of public health effects & use of personal protective interventions for household pollution

Distribution of respondents according to precautions taken based on-air quality information or advisories (e.g., staying indoors, using masks)		
Precautions taken based on-air quality information or advisories	**Frequency (n=606)**	**Percentage**
Yes	374	61.72
No	232	38.28
Distribution of respondents according to smoking cigarettes/bidi in the House		
If anyone smoke cigarettes/bidi in the House?	Frequency (n=606)	Percentage
Yes	149	24.59
No	457	75.41
Distribution of respondents if anyone in the household experienced health issues related to air pollution.		
Anyone in the household experienced health issues related to air pollution	Frequency (n=606)	Percentage
Yes	41	6.77
No	565	93.23
Distribution of respondents according to who believe that indoor air pollution exacerbates respiratory conditions or allergies in household		
Indoor air pollution exacerbates respiratory conditions or allergies in household.	Frequency (n=606)	Percentage
Yes	239	39.44
No	367	60.56
Distribution of respondents who have sought medical help for health issues possibly worsened by indoor air pollution		
Ever sought medical help for health issues possibly worsened by indoor air pollution	Frequency (n=606)	Percentage
Yes	50	8.25
No	556	91.75

Table 3: Association of the age of the respondents and the knowledge regarding sources of household air pollution

Association of the age of the respondents and the knowledge regarding sources of household air pollution					
	2to17yrs	18 to 44 yrs	45to65 yrs	65+yrs	Total
Construction activities	0	27	12	2	41
Garbage odour	2	35	19	4	60
Industrial emission	2	111	48	15	176
Other	0	1	2	2	5
Vehicle emissions	0	152	89	22	263
Waste burning	0	35	19	7	61
Total	4	361	189	52	606

Table 4: Association of age of the respondents and the precautions taken on based on air quality information or advisories received

Age	Precautions taken on based on air quality information or advisories received		Total
	No	Yes	
2 to 17 yrs	1	3 (75%)	4
18 to 44 yrs	125	236 (65.45%)	361
45 to 65 yrs	82	107 (56.6%)	189
65+ yrs	24	28 (53.8%)	52
Total	232	374 (61.7%)	606

Table 5: Association of the education of the respondents and their attitude towards smoking

Education	Don't allow household smoking	Allows household smoking	Total
11^{th} to 12^{th}	88 (78.5%)	24	112
6^{th} to 10^{th}	137 (81.1%)	32	169
Graduation	115 (88.5%)	15	130
Illiterate	80 (87.9%)	11	91
Post-Graduation	29 (93.5%)	2	31
up to 5th	55 (75.3%)	18	73
Total	504 (83.2%)	102	606

DISCUSSION

In this study, it has been observed that garbage and construction-related pollution are the most commonly reported sources of household pollution. Similar observation has been made in the study "Environmental and Health Impacts of Air Pollution: A Review" by Manisalidis et al which reviewed various sources of air pollution, including construction activities and garbage, and their health impacts and provided context for understanding the common sources of household air pollution.[2]

A majority (61.72%) of respondents take precautions based on air quality advisories, such as staying indoors or using masks, reflecting a proactive approach to managing air pollution risks. Similar findings have been observed in study titled "Public Awareness and Behavioral Response to Air Quality Alerts" by Dowling et al where it explored how people respond to air quality advisories and the effectiveness of public health campaigns in encouraging precautionary measures.[5]

Only 6.77% of respondents report health issues related to air pollution, indicating that while some individuals are affected, the majority do not directly link air pollution to health problems. A study by Pandey et al on-Health Impacts of Air Pollution published in Lancet Public Health, 2021 also reviewed the health effects of air pollution, including respiratory conditions and allergies.[6]

Nearly 39.44% of respondents believe that indoor air pollution exacerbates respiratory conditions or allergies, highlighting a significant concern about indoor air quality's impact on health.

The 18 to 44 age group shows the highest awareness of various pollution sources and is most likely to take precautions based on air quality information. This age group appears to be more engaged with air quality issues compared to other age groups.

Higher education levels correlate with a lower likelihood of accepting smoking in the household. Those with higher education (graduation and post-graduation) are less tolerant of smoking compared to those with less formal education, indicating that educational attainment may influence attitudes toward smoking and possibly other health behaviors. Various studies have also observed how age influences awareness and response to environmental issues like air pollution.

Limitations of the study

The study was not able to observe the association between indoor air pollution and bronchial asthma and other respiratory morbidities and even a predictive model could be established for these. But the limited time and resources added to these limitations.

CONCLUSION

Household air pollution presents a significant health risk, with various factors contributing to elevated levels of indoor pollution. Efforts to mitigate household air pollution are crucial. This can involve adopting cleaner cooking technologies, improving ventilation, and reducing the use of products that release harmful chemicals into the air. Public awareness campaigns and policy measures can also play a significant role in addressing these issues.

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