VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

A COMPARITIVE STUDY ON PREVALENCE OF ACUTE RESPIRATORY INFECTION, DUE TO INDOOR AIR POLLUTION – AN INVISIBLE KILLER.

Community Medicine

KEYWORDS: Biomass Fuel, Acute Respiratory Infection, Indoor Air Pollution, Kitchen.

S. Rajini — Associate Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

G. Jayalakshmi — The Dean, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

ABSTRACT

Background Worldwide, more than three billion people depend on solid fuels, including biomass (wood, dung and crop residues) and coal, for cooking and heating. Exposure to indoor air pollution from solid fuels has been linked to many different diseases, including acute and chronic respiratory diseases, tuberculosis, asthma, cardiovascular disease and perinatal health outcomes. **Aims & objective**: To find out the prevalence of acute respiratory infections in houses with separate kitchen and in houses with kitchen in same living room. **Methodology:** A community based cross-sectional study was conducted during May to June 2015 among 300 households in the field work area of SLIMS, Puducherry. The information was collected from all households, who were present during the time of data collection. Data was collected by using a pre-designed and pre-tested questionnaire by interview method. The data was analysed using suitable statistical methods. **Results:** 300 houses were surveyed and the prevalence of ARI was 45.52% in houses with separate kitchen when compared to 54.4% in houses without separate kitchen. It was also reported that the prevalence of ARI among under five children was 10.18% in houses with separate kitchen and 11.47% in houses without separate kitchen. It was also observed that houses using fuel wood for cooking showed more prevalence (69.9% of ARI) when compared to less prevalence in houses using LPG & Electricity (27.7%). Thus the correlation between increased indoor air pollution and the increased prevalence of ARI is established.

INTRODUCTION:

Environmental factors play an important role in determining the health of children, who are among the most vulnerable of the world's population. This document focuses on the relationship between exposure(s) to environmental factors at a specific stage of fetal/child development and health outcomes through the life span, rather than on a single environmental hazard and related disease or outcome. Exposure to environmental hazards underlies ill-health in children in all regions of the world, but particularly in those who are impoverished and malnourished, and those who face a confluence of both traditional and emerging environmental exposures. Greater awareness in recent years about the special vulnerability of children has led to an increased number of new research programmes, international agreements, and international alliances that specifically address and promote healthy environments for children.(1)

Globally, reliance on solid fuels has emerged as one of the ten most important threats to public health. In 2000, indoor air pollution was responsible for more than 1.5 million deaths and 2.7% of the global burden of disease. In high-mortality developing countries, it accounted for 3.7% of the burden of disease, making it the most important risk factor after malnutrition, the HIV/AIDS epidemic and lack of safe water and adequate sanitation. Indoor air pollution disproportionately affects women and children who spend the most time near the domestic hearth. (2)

Acute respiratory infections (ARI) are the leading cause of the global burden of disease,(3, 4) accounting for more than 6% of worldwide disease and mortality, mostly in less-developed countries. Between 1997 and 1999, acute lower respiratory infections (ALRI) caused 3·5–4·0 million deaths worldwide1–3—more than that caused by any other infectious disease. Exposure to indoor air pollution, especially to particulate matter, from combustion of biofuels (wood, charcoal, agricultural residues, and dung), has been associated with respiratory disease in less-developed countries.4–9 More than 2 billion people use biomass as their main source of domestic energy; hence international development and public-health organisations have sought to implement preventive measures to reduce this exposure. The exposure-response relation between indoor air pollution from biomass combustion and ARI is important for assessment of the benefits and effectiveness of preventive measures such as design and dissemination of improved stoves and fuels. (5) Only few comparative studies have been done on this indoor air pollution, hence the study has planned in this direction.

METHODOLOGY:

A house to house community based cross-sectional study was conducted in the field practice area of Department of Community Medicine, SLIMS, Pondicherry. 300 households are randomly selected from the 4 villages covered by the rural health training centre. The information was collected from all households, who were present during the time of data collection. Houses locked and not willing to participate were excluded from the study. Data was collected during May to June 2015 by using a pre-designed and pre-tested questionnaire by interview method, with prior consent of the participants. Demographic profile of the participants, environmental data, history of exposure to pollutants/allergens, smoking, history of respiratory infections were collected. The data collected was analysed using suitable statistical methods.

RESULTS:

Among the surveyed population of 1138, the prevalence of acute respiratory infections was 38.87% in males and 61.12% in females. Most of the participants (22.57%) belonged to the age group of 16-25 years and almost equally (19%) of them have completed their middle and graduate level of education. 86% of females and 49% of males were unemployed or work for daily wages and 37% belong to class IV, according to BG Prasad"s classification (table1).

TABLE – 1 Demographic profile of the population surveyed:

AGE GROUP	MALE (%)	FEMALE (%)
<5 Yrs	5.6	6.87
5 - 15 yrs	20.66	15.34
16 - 25 yrs	17.51	22.57
26 - 35 yrs	15.23	20.28
36 - 45 yrs	16.63	16.22
46 - 55 yrs	13.66	11.64
56 – 65 yrs	6.47	3.70
>65 yrs	4.2	3.35
EDUCATION	**MALE (%)**	**FEMALE (%)**
Primary	17.86	19.75
Middle	21.89	19.04
High school	12.78	14.81
Higher secondary	12.08	10.58
College	26.97	19.04
Uneducated	8.40	16.75

OCCUPATION	MALE (%)	FEMALE (%)
Professional	2.62	0.52
Skilled	11.55	4.40
Semi-skilled	25.04	2.99
Coolie	17.51	5.64
Unemployed	49.21	85.97
CLASS – I	5800 and above	9.3
CLASS – II	2900 – 5799	24.66
CLASS – III	1750 – 2899	25
CLASS – IV	850 – 1749	36.6
CLASS – V	Less than 849	4.33

Results of the environmental data are shown in table2. Among the 300 surveyed houses, the prevalence of ARI was 46% in houses with separate kitchen when compared to 54.4% in houses without separate kitchen. The study also showed, 48% of the houses were using solid fuel for cooking and 41% of them gave history of ARI. It was also reported that the prevalence of ARI among under five children was 10.18% in houses with separate kitchen and 11.47% in houses without separate kitchen. It was observed that 64.42% of the surveyed houses were overcrowded, contributing to the increased prevalence of respiratory infections. It was also evidenced that houses using solid fuel for cooking showed more prevalence (69.9% of ARI) and least prevalence was seen in houses using LPG & Electricity (27.7%). Table3 shows the incidence of respiratory infection with exposure to different pollutants.

TABLE – 2: Environmental Profile of the houses:

TYPE OF HOUSE	WITH SEPERATE KITCHEN %(no)	WITHOUT SEPERATE KITCHEN%(no)
Thatched	7%(11)	71%(32)
Kutcha	21%(33)	23%(99)
Pucca	72%(116)	6%(9)
Total	53.33%(160)	46.66%(140)
No. of rooms	**% of houses(no)**	
< 2	14.66%(44)	
2 – 3	67%(201)	
> 3	18.33%(55)	

Fig: 1 Houses with overcrowding:

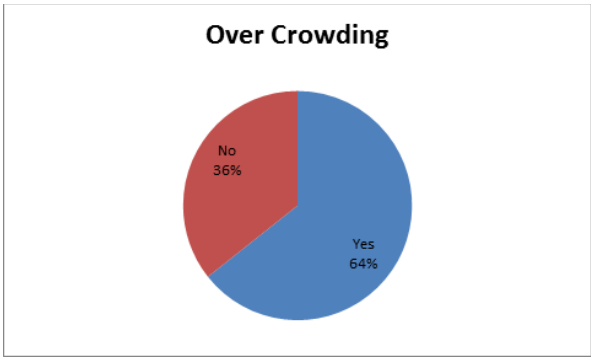


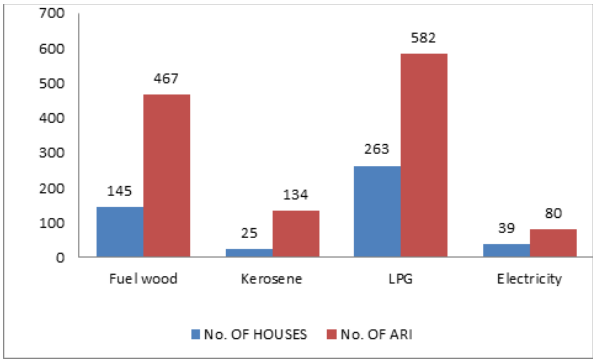
TABLE 3: ARI in different age groups of the population:

AGE GROUP	% OF EPIDODES OF ARI WITH KITCHEN		% OF EPISODES ARI WITHOUT KITCHEN	
	MALE (%)	FEMALE (%)	MALE (%)	FEMALE (%)
<5 YRS	5.06%	5.12%	4.43%	7.04%
6 – 15 YRS	7.68%	6.88%	8.23%	4.75%
16 – 25 YRS	2.85%	4.03%	4.27%	6.65%
26 – 35 YRS	00%	0.7%	0.2%	3.8%
36 – 45 YRS	0.3%	4.5%	0.07%	3.2%
46 – 55 YRS	0.1%	3.4%	0.8%	4.51%
56 – 65 YRS	0.7%	1.8%	1.5%	0.2%
>65 YRS	0.6%	0.8%	1.2%	3.2%

Table – 4: Incidence of Respiratory Infection with Exposure to Pollutants.

	HOUSE WITH EXPOSURE	% OF EPISODES OF ARI IN EXPOSED HOUSE	HOUSE WITHOUT EXPOSURE	% OF EPISODES OF ARI IN NON-EXPOSED HOUSE
Pet animals	11%	75%	89%	25%
Gardening	29.33%	52.4%	70.66%	47.5%
Mosquito repellents	21%	54.8%	79%	45.2%
Exposure to dust	7%	54.16%	93%	45.93%
Cigarette smoking	8%	54.54%	92%	45.45%
Travelling	76.66%	58.06%	26.33%	41.93%

Fig: 2 Type of fuel used for cooking in the houses:



DISCUSSION:

There is remarkable increase in the episodes of respiratory illness in the houses with usage of Biomass-fuel, without separate kitchen. In developing country, association of kitchen in the same living room is high when compared to developed countries. According to our study, among 300 houses surveyed, 140 houses are having kitchen in the same living room. Environmental factors like indoor air pollution by usage of biomass fuel, improper ventilation, overcrowding, and exposure to other pollutants play an important role in determining the health of children, who are among the most vulnerable of the world's population. The most affected people are the one who spend indoors cooking with biomass fuel and the children who always tend to accompany/stay with their mothers, as shown in a similar study done by Smith(6) and chindo sulaiman(7).

Priority to the incidence of ARI among the family members in the previous year was given. Rough number of episodes of illness in the family is collected from the housewives. The present study shows out of 1138 population surveyed, 12.47% (71 no's) belong to under five category. Incidence of ARI among the housewives and above 60years was also considered, since they stay in home and they are exposed to more of indoor air pollution. Housewives had the highest incidence of ARI ie.,471 episodes, which was similar to the study done in Nepal(8). The present study indicates the number of ARI, is more with LPG users. This may be because the number of houses using solid fuel is less when compared to LPG users. This correlates the use of biomass fuels and the time spent near the smoke with the occurrence of respiratory infections. Other pollutants causing air pollution were also surveyed viz., pet animals, gardening, and usage of mosquito repellents, exposure to dust in and around the house, travelling and cigarette smoking (passive smoking).

CONCLUSION

To conclude, an effective strategy should be employed multiple

VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

interventions such as improvements in fuels, cooking technologies to reduce the usage of solid fuel, etc. Improvement in ventilation conditions, construction of separate kitchen with smoke vent is recommended. Our government had taken steps; in asking the affordable population to give up subsides for LPG cylinders in order to increase the usages of LPG stoves in rural areas, where we can improve the health condition of the actual needy population. Additional recommendations such as ensuring children are kept away from smoke and not smoking in close range of children is ensured.

REFERENCES:

1. World Health Organization (2011). Summary of Principles for Evaluating Health Risks in Children Associated with Exposure to Chemicals.
2. World Health Organization (2007). Indoor air pollution, National burden of disease estimates.
3. WHO. World health report. Geneva: WHO, 1999. 2
4. WHO. World health report 2000. Health systems: improving performance. Geneva: WHO, 2000.
5. Ezzati M, Mbinda BM, Kammen DM. Comparison of emissions and residential exposure from traditional and improved biofuel stoves in rural Kenya. Environ Sci Tech 2000; 34: 578–83.
6. Smith KR, Samet JM, Romieu I, Bruce N. Indoor air pollution in developing countries and acute lower respiratory infections in children. Thorax 2000; 55: 518–32.
7. Wood fuel consumption and mortality rates in Sub-Saharan Africa: Evidence from a dynamic panel study: chindo Sulaiman, A.S. Abdul Rahim, Chemosphere; 6 March 2017.
8. 8.Pandey MR, Neupane RP, Gautam A, Shrestha IB. Domestic smoke pollution and acute respiratory infections in a rural community of the hill region of Nepal. Environ Int 1989; 15: 337–40.