Street Peddlers and Poor Respiratory Health Outcomes in Lucknow, India

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ABSTRACT

Introduction: There are few studies which aim towards the awareness of using protective masks and respiratory problems among street peddlers in India. The focus of this study was to identify the major pollutants (i.e., PM 2.5, PM 10, etc.) present in the air which may be responsible for the adverse respiratory effect on the human population in street peddlers of Lucknow, India.

Material and Methods: Street Peddlers, who were not indulge in smoking in recent few days and have no knowledge of any diagnosed respiratory diseases, were asked to participate from roadside of different localities in Lucknow city, India. Volunteering Members (n=30) described having lower respiratory, upper respiratory, and other symptoms.

Result: The result of the study was estimated on the basis of a self-analysis form. Symptoms of upper (sour throat 36.3%) and lower respiratory tract (coughing 40%) and eye irritation (40%) was present in all the participants None of the participants used the N-95 respirator (PPE: masks) in this study. Some peddlers who is using PPE, are improper for the PM present in the air.

Conclusion: Results suggests awareness about respiratory problems and proper use of protective equipment like the N-95 type respirator mask among street Peddlers in Lucknow, India.

Keyword: Particulate Matter; Street Peddlers; Air-Pollution; Respiratory Symptoms, Pollution

INTRODUCTION

Air-pollution can be caused by many reasons, which makes it a ubiquitous problem in today's world. It is mainly caused by the increasing vehicles on the road, development of multiple industries and urbanization of cities. Therefore, these developmental actions are the reason for air pollution which ultimately causes an adverse effect on human health, vegetation and the climate of the region. SO_2 and NO_2 which are the main impurities in the air undergo chemical changes and form sulfates and nitrates compound, ultimately constituting aerosol. Combustion of fossil fuel and biomass increases the level of nitric oxides and nitrogen oxides in the air which ultimately became a cause to photochemical smog and acid rain. Nitrous oxide (N2O) mainly emitted from agronomic activities causes destruction of ozone in the stratosphere and is an important greenhouse gas causing global warming.[1] In the last 150 years, a drastic increase in the level of nitrogen dioxides can be seen in the atmosphere. Hewitt publicized that SO_2 is the primary component of Sulphur oxides (SOX) released during fossil fuel combustion[2], which reacts quickly with water vapor and result in acid rain. The Sulphur condenses on aerosol and dissociates it to form sulfate aerosol. This indicates that any health outcome attributed to SO_2 may be due to PM or any substance adsorbed on the PM. PM may carry materials with toxic or carcinogenic effects. Fine particulates penetrate deep into lungs causing pulmonary diseases.[3] Moreover, these particles also take part in different climatic activities like winter smog and acidification.[4] Therefore, the most studied pollutant in the air are these PMs, nitrogen dioxide and sulphur dioxide.[5]

It has been estimated by the WHO that 800000 deaths and 4.6 million lose life annually because of air pollution.[6] In India, large amounts of PM are regularly emitted by industries, thermal power plants, and vehicles causing great health risks. Upadhyay revealed that the impact of air pollutants is extremely significant in polluted urban regions of India.[7,8] Lucknow is one of the most populated cities in India. The geographical location of the city is 26.53°N latitude and 80.56°E longitude. It lies right in the middle of Indo-Gangetic plains on the banks of river Gomti. The area of the city covers 377.5 sq. km. The population of the city has increased to 2.7 million in 2011making the population density of the city is 7152 per sq. km. The Road Transport Office (RTO) of Lucknow has also registered 969,915 and increasing. The consumption of unleaded petrol and diesel was 90187 kL and 83,618 kL, respectively, during the years 2008–2009. Vehicles running day and night in the city has been marked as the main source of particulate pollutant. The studies conducted for air pollution in major cities in India, which include Lucknow have mostly reported a relationship between the PM and their association with other metal contents (i.e., PM10, PM2.5). National Ambient Air Quality Standards (NAAQS) of India conducted a study in 2007-09 where PM 2.5, selected metals and PAHs association with PM 10 were considered. The health risk was anticipated by

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relative mortality rate for each increase in the PM10 level of 10 µg/m3 and cancer risk was calculated for cancer-causing metals bound to PM10 and PM2.5.[9]

With an increase in the incidences of respiratory diseases over human population come into the light, constant evaluation of air quality index is imperative. This assessment of air quality can be very effective in understanding the atmospheric condition and composition with early detection of harmful PM.[10]

Initiations by Government of India

The legislature of India has incorporated laws, approaches, and projects in the nation. Under the 1974 Water Prevention and Control of Pollution act, the legislature had built up Pollution Control Boards in the Central and at the State levels for the usage of affirmed standards to bring contamination leveled out. The Air Prevention and Control of Pollution act was passed in 1981 and The Environment Protection Act (EPA) was passed in 1986 as an Umbrella Act to close the gaps in the Water and Air Act. With these new plans, the nation had the option to widen the extent of the Central Pollution Control Board (CPCB) of India.[11] India's first National Ambient Air Quality Standards (NAAQS) was discharged on November 11, 1982, which included sulfur dioxide (SO_2), nitrogen dioxide gas (NO_2), Suspended PM (SPM), lead (Pb) and carbon monoxide (CO) for touchy air characteristics regions of the nation. The primary modification of the guidelines went ahead April, eleventh 1994 by including Respirable PM (PM10, estimate under 10µm) and second on October fourteenth, 1998 when NH_3 was added to the current rundown. Investigation of air quality gives data to the ecological arranging of the area.[12] Moreover, we can likewise utilize the air quality database for the recognizable proof of the territories where the common assets and human wellbeing could be in danger. Some momentary examinations as for PM10, SPM, SO_2, NOx, and metals have been finished by various analysts in the Lucknow city. Be that as it may, only a couple of concentrates on indoor air contamination were accounted for from families consuming bio-powers for cooking in the city and encompassing towns.

Hazardous health impact on street peddlers

Road sellers, who invest the vast majority of their energy outside are the ones who are most defenceless against air contamination. They have a high danger of getting exposed to the poor air quality and the particulate issue present with other destructive mixes. Street peddlers, who are commonly between the age of 18-34 years and 35-44-year-olds, are considered the more defenceless group of individuals given their residual long periods of working and childbearing age. The objective of this investigation is to comprehend the relationship between respiratory problems and the pollutants (i.e. PM10 and PM2.5). The correct utilization of respiratory covers with respect to sorts of veils and how to wear gears can be a way in decreasing respiratory hazard in Street sellers and the rest of the population. The gear distinguished in this analysis is N-95, which is appropriate for the PM present in the streets of Lucknow city, India.[13]

The focus of this study was to identify the major pollutants (i.e., PM 2.5, PM 10, etc.) present in the air which may be responsible for the adverse effect on street peddlers of Lucknow, India.

MATERIAL AND METHODS

In this investigation, we assessed unfavourable respiratory wellbeing results among road peddlers, utilizing a self-report poll.[14] Road sellers were chosen from roadsides at selected destinations in Lucknow city, India. Members (n = 30) announced having lower respiratory, upper respiratory, and different side effects. The analysis was directed after the endorsement with verbal consent without taking any composed documentation to keep information of the participants anonymous for investigation. There were 30 road peddlers from the roadside at chosen locales in Lucknow. The consideration condition was:

1. Proficient or potentially imparted verbally in Hindi or English language for an explanation as required;
2. Undiagnosed respiratory problems (i.e., asthma, tuberculosis and bronchitis) and
3. Not recently smoking.

The street peddlers were given data about the investigation. The poll was created from the contemporary-checked on writing including nine inquiries regarding statistic data, respiratory and usage of any kind of respiratory defensive gear.[15,16]

The members who detailed different types of respiratory problems and the members who knew or utilized appropriate respiratory defensive gears in each chosen area were figured. In this investigation, we recognized the connection between the utilization of appropriate respiratory gear while working and adverse health problems. The prevalence percentage was determined as rates of the number of street peddlers who revealed problems by the number of members who never used respiratory covers at all.

We stablished a relationship between the health outcomes and the street pedlars getting exposed to pollutants (i.e. PM10 and PM2.5) among different study sites in the Lucknow city (Lalbagh, Lucknow – CPCB, Nishant Ganj, Lucknow – UPPCB and Central School, Lucknow – CPCB). Whenever these sites were visited, the demographic air quality data was recorded from Uttar Pradesh pollution control board.[17]

RESULTS

The participating percentage of males was 66.6% and 33.3% for females. Participants of age between 24-35 (66.6%) was the most. The most common educational qualification was primary school (40.0%) and working experience being 1 to five years (40.0%). This data is summarized in Table 1.

The results suggested that most of the symptoms were common in the participating street peddlers. The specific symptoms reported by street peddlers was headache (26.6%), eye irritation (40.0%), cough (40.0%), nasal congestion (33.3%), fatigue (20.0%) and dizziness (20.0%). The self-reported results after careful observation suggests that none of the street peddlers ever used the N-95 respiratory masks.

Parameters	N = 30	Percentage (%)
Sex		
Male	20	66.6
Female	10	33.3
Age (years)		
18-24	4	13.3
24-35	20	66.6
>35	6	20
Education		
No School	10	33.3
Primary School	12	40.0
Secondary School	5	16.6
High School	3	10.0
Higher Education	-	-
Work Experience (years)		
<1	-	-
1-5	12	40.0
6-10	10	33.3
>10	8	26.6
Work Shift Duration (hours)		
<3	-	-
3-5	12	40.0
6-8	18	60.0
>8	-	-

Table-1: Demographic profile of the participant

Parameters	N = 30	Percentage (%)
Lower respiratory symptoms		
Cough	12	40.0
Wheeze	6	20.0
Chest stiffness	10	33.3
Breath Shortness	8	26.6
Upper respiratory symptoms		
Cold	10	33.3
Sore Throat	11	36.6
Nasal Congestion	10	33.3
Other symptoms		
Headache	8	26.6
Fever	11	36.6
Eye irritation	12	40.0
Dizziness	6	20.0
Fatigue	6	20.0
Personal Protective Equipment		
Surgical mask	5	16.6
Anti-dust mask	0	0.0
Carbon / charcoal mask	0	0.0
N-95 type respirator	0	0.0

Table-2: Health outcome of participants

This data is summarized in Table 2.

The study showed that some street peddlers used personal protective equipment against the pollutants in air. But respiratory gear used were improper according to the percentage of harmful exposure they are bearing (i.e., surgical or anti-dust). Moreover, no participant used the appropriate N-95 mask for their protection.

DISCUSSION

This pilot study observed respiratory problems among street peddlers in Lucknow, India, working in the vulnerable situations under the direct exposure of PM10 and PM2.5. According to the central pollution control board, Lucknow city was at the second most polluted city in Uttar Pradesh with AQI of 320. Lucknow city was declared the sixth most polluted city in India on November 16, 2018. Lucknow has a blend of air contamination like most urban cities in India. A tremendous amount of non-renewable energy source is devoured in vehicles, railroad motors, generator and industries. Consuming oil, diesel, CNG in vehicles, coal, LPG, lamp fuel, wood, and charcoal are the real reasons for air contamination in the city. Traffic clogs because of an enormous number of vehicles on limited paths and occupied convergences and re-suspension of residue from street offers ascend to an assortment of vaporous and particulate contamination. Industries at Lucknow with out-of-date contamination control instruments exposes territories situated in various sites in the city. Road development, dumping and lifting of waste from street side bins, combustion of waste like leaves, clothes, papers, tire, plastic material etc. are among numerous different sites in the city. Since the greater part of the territories is private, residential and industrial, but other contamination source also exist in the city.[18] The respiratory problems and different side effects among adult road sellers in Lucknow, India was identified with exposure to various contaminations (i.e. PM10 and PM2.5).

PM increases in diameter by water adsorption as it passes through the airway inside human. Once these PM reaches the alveoli, it contacts with water repellent surfaces and such particles then gets managed by the bodies defence mechanism. Studies prove that the body react differently with particles below 100 nm in diameter and a micrometric size non-toxic particle can be toxic in nanometric size.[19] There are cases in which PM breaks the epithelium in alveoli which result in ozone-initiated lung inflammation.[20] Individuals suffering from respiratory disorders are much more vulnerable to PM as it may cause life threating situation. Exposure to high level of sulphur dioxide[21], nitrogen oxide[22] may cause symptoms like throat roughness, preceding bronchoconstriction and dyspnoea, especially in asthmatic individuals. Long term exposure to nitrogen oxide may increase the chances of reduced lung functions[23] and can even lead to emphysema.[24] Exposure to ozone with other heavy metals may result into respiratory failures.[25,26] Hence long term exposure to PM, harmful compounds and heavy metals present in air can be the reason to increasing incidence of asthma, emphysema, and even lung cancer.[27,28]

The study observed one or the other symptoms and signs of upper and lower respiratory problems and eye irritation among all the study participants and proposes the utilization of appropriate respiratory defensive gear among street peddlers in Lucknow, India. The survey has also highlighted that only few members were utilizing respiratory defensive gear but was inappropriate explicitly for PM10 and PM2.5. The study limitation was that some variables were left to be included in this investigation, i.e., the work amount, cardiovascular and psychosocial/psychological wellness.

In addition, it can also be noted that individuals might not be concerned about his/her health problems and may be unwilling to share the information truthfully.

CONCLUSION

This growing threat is common among developing cities and a class of individuals who need to spend most of their time being exposed to such conditions in order to earn for their survival. Future research is required with statistical measures including constant air monitoring and the exact duration of hours every individual is getting exposed to describe pollutants. This will help in stablishing a statistical data about the exact number of hours beyond which any expose to such bad air may cause respiratory issues.

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