

# Adverse Impact of Air Pollutants on Human health: A Case Study of Aurangabad City

Vijaykumar B. Pawar<sup>#1</sup>, Kshama Khobragade<sup>\*2</sup>

<sup>#1</sup>Research Scholar,

<sup>\*2</sup>Reader and Head, Department of Environmental Science,  
S. B. E. S College of Science, Aurangabad. 431 001, India

## Abstract

Exposure to air pollution is an inescapable part of our urban life. In this study, the interaction patterns of air pollutants, SO<sub>2</sub>, NO<sub>x</sub>, SPM and PM<sub>10</sub> are investigated based on measured database of the study area in Aurangabad. The paper mainly concentrates on the Impacts of Indoor and outdoor air pollutants especially on health, with result that Human Hygienic may be deteriorated, economic productivity may be declined. It has been concluded that intervention of the government has become indispensable to implement strong environmental policy and taking care of growing threats on air pollution in more institutionalized, regular and automatic basis is can not be avoided.

Keywords - Airborne pollutants, health impact, industrial air pollution, air quality assessment

## I. INTRODUCTION

Aurangabad is one of the fastest developing city in India. The location co-ordinates for Aurangabad are N 19° 53' 47" - E 75° 23' 54" and located 512 meters above sea level. The city is surrounded by hills on all sides.

Air pollution has adverse impact on human health as well as the health of other living entities and stress vegetation. Depending upon the life time of the pollutants, location of the sources and prevailing air currents, receptors, may be located at time intervals from near instantaneous to several decades<sup>1</sup> good air quality is essential for health of people and the environment, although the significant improvement have been made in many countries over the last 2-3 decades, air quality particularly in urban areas, remain a priority issue on most national environmental agendas<sup>2</sup> particulates and gaseous emission of pollutants from industries and auto-exhaust is responsible for rising discomfort, increasing airway diseases, decreasing productivity and deterioration of artistic and cultural patrimony in urban centers<sup>3</sup> The presence of air pollutants over the prescribed limit in the lower atmosphere is not only injurious to humans but also to animals, foliage, fruits, vegetables and microbial life and may even damage property<sup>4</sup> urban air pollution is a major focus of public health concern and regulatory activity<sup>5</sup>

The purpose of this study is to

- a) Quantify air quality,
- b) Observe health effects.

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## II. MATERIALS AND METHODS

The study is carried out

- 1) To study concentration of few air pollutants
- 2) To estimate the adverse health effects due to air pollution.
- 3) To study relation of air pollutants with that of various diseases occurred in different age groups of both genders.
- 4) To quantify the cases of premature death and morbidity associated with air pollution through the survey questionnaire collected in Aurangabad.

Annual temperature in Aurangabad ranges from 9° to 40° C. Average annual rainfall is 725 mm. Various Industries like Chemicals, Pharmaceuticals Drug, Distilleries, oil refineries, fertilizer plants, Pulp and Paper etc. are situated in this area. This study covers pollutants viz. SO<sub>2</sub>, NO<sub>x</sub>, SPM and PM<sub>10</sub> and these are investigated based on the measured database of Maharashtra Pollution Control Board (MPCB).

### Cross-sectional survey

A survey questionnaire relating to air pollution, health effects, local economical status and other factors and suggestions for improvement of the environmental status, was circulated for public perception and to gain a better understanding of public opinion. The survey was based on a mix of written responses to the questionnaire as well as personal interviews. The survey was conducted in 13 locations during June to December 2016. Hundred respondents, both adults and children living in Aurangabad and the surrounding area were surveyed.

### Indoor Air Pollution: Growing burden of Disease

Bio-fuels is an issue that requires to be addressed through health policy. Some of the highest concentrations of pollutants occur due to the use of bio-fuels for cooking in rural indoor environment.

They emerge from burning of bio-fuels like Wood, Agriculture crop residues and dung cake which are used by mass children below five years are mostly affected due to pollutants released during the burning of bio-fuels for cooking

**Out door Air Pollution**

Automobile industries, drug and distilleries are main sources of out door air pollution and their emission break out various air borne diseases like bronchitis, asthma, pneumonia and even lung cancer and skin diseases.

**Vehicular emission:**

Vehicular Emission has been identified as the greatest environmental danger in a number of cities in developing countries Particulate matter emitted by vehicles pose a hazard to the human beings, animals and also to longevity of the property

**Burning of agricultural Waste**

Burning of agricultural harvest waste causes problems related with air pollution like

- 1) Smoke nuisance
- 2) Effects on human hygiene
- 3) Threat to wild life
- 4) Damage to historical monuments

**Industrial emission**

The pollutants which are emitted by selective industries like sugar factories, distilleries, Cement factories, paints, pulp and paper industries have damaging effects on human health, Forest, Cattle and Bio-diversity.

**III. RESULT AND DISCUSSION**

**A. Morbidity data – findings**

Morbidity data were collected from major hospitals of Aurangabad, which consists of bronchial asthma, respiratory disorders, eye conjunctivitis, scabies and other skin infections.

**B. Asthma cases**

Seasonwise hospital admissions for treatment of asthma are shown in Figure 5 from April 2016 to December 2017 in the study area are shown in Table No.(1) Generally, both adult male (am) and adult female (af) were affected by asthma. Females are more affected. Though both male and female children (mc and fc) were affected, hospital admissions with respect to female children are higher.

In May 2016, the maximum value of PM<sub>10</sub> pollutant was 219 µg/m<sup>3</sup> and that of SO<sub>2</sub> was 26 µg/m<sup>3</sup> according to the air quality data. Comparison of air quality data with morbidity data reveals that hospital admissions for treatment of asthma were as high as am 55; af 62; mc 40; fc 50. It was further observed that the total number of cases recorded for treatment of various diseases for new cases were 2998, old cases 1554, as against the total population of the Aurangabad city.

**Table 1 Hospital admissions for treatment of asthma cases – season-wise maximum**

Year	Season	Adult Male (am)	Adult Female (af)	Male Child (mc)	Female Child (fc)	Month with high rate of Admission
2016	Summer	122	201	162	134	June
	Monsoon	133	354	177	156	Aug.
	Winter	139	365	186	163	Feb.
2017	Summer	314	296	175	326	May
	Monsoon	301	294	183	324	Aug
	Winter	299	279	191	321	Nov.

(Source: As per five Major Hospital Records in Aurangabad city for year 2016 and 2017)

**C. Respiratory problem cases**

Season wise distribution of hospital admissions for treatment of respiratory problems is given in Table 2. Generally, both adult male and female were affected by respiratory problems. Females are more affected and were considerably in higher numbers for treatment. As far the children, both male and female children were affected in winter 2017<sup>6</sup>, The maximum value of PM<sub>10</sub> pollutant was 276 µg/m<sup>3</sup>, NO<sub>x</sub> 81 µg/m<sup>3</sup>, SO<sub>2</sub> 130 µg/m<sup>3</sup> According to the air quality data it was further observed that the air quality data it was further observed that the total number of cases recorded for treatment of various diseases for new cases were 3280, old cases 1868, as against the total population of the area

**D. Eye and skin problem cases**

In November 2016, both adults and children were affected with eye problems while in Feb. 2017, female and male children were more affected with skin problems.

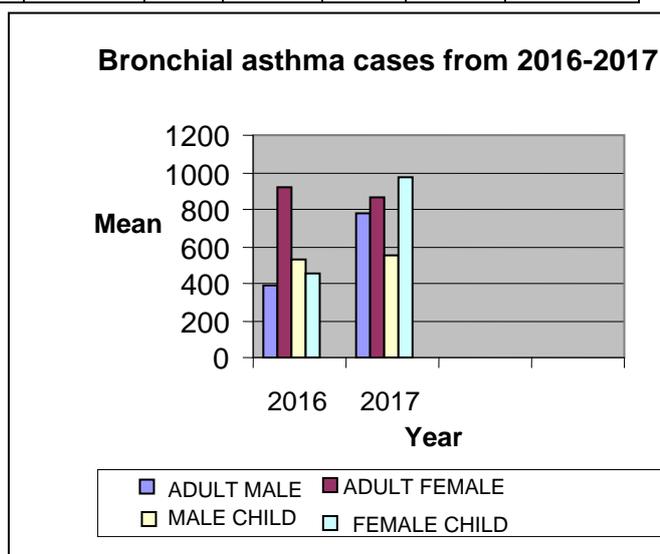
**E. Mortality data – findings**

Data regarding death were collected from the Town Aurangabad., based on birth and death records from 2016 to June 2017. Table 3 shows the year and gender-wise death cases that occurred in Aurangabad households under various age groups. It can be noticed that the total number of deaths recorded have been consistently on an increase each year. It is also generally observed that the number of death cases that occurred among males is higher than females. A comparison of the number of death cases with that of the age groups indicated that the number of death cases in 40–59 age group of both male and female category are high, followed by the age group 70. It is seen that ten male and six female death cases occurred particularly in May 2016.

It is further observed that the percentage of deaths due to heart attacks is considerably high, compared with other causes for death as shown in Table No. 3. The air pollutant PM<sub>10</sub> is of prime concern, as it triggers increase in cases with breathing problems, asthma and heart attacks.<sup>2</sup>

**Table 2 Hospital admissions for treatment of respiratory cases – season wise maximum**

Year	Season	Adult Male	Adult Female	Male Child	Female Child	Month with High rate of Admission
2016	Summer	53	74	NA	NA	NA
	Monsoon	302	710	37	93	July to Sept.
	Winter	39	136	488	360	Very high during all months
2017	Summer	318	469	187	255	During All Months
	Monsoon	414	138	325	474	Very high during all months
	Winter	45	262	35	241	Nov. to Feb.



**Fig. 1 Bronchial asthma cases from 2016 to 2017.**

**Table 3 Death cases that occurred in Aurangabad households from 2016 to 2017**

Year	Gender	Death cases in numbers							Total
		Age Group							
		0-9	10-19	20-39	40-59	60-69	>70		
2016	Male	1	0	8	20	14	19	62	
	Female	2	3	3	3	4	12	27	
2017	Male	1	1	4	20	12	14	52	
	Female	0	1	4	8	4	18	35	

(Source: As per Major Hospital Records in Aurangabad city of year 2016-2017)

NA - Not Available

(Source: As per major five hospital records in Aurangabad city of year 2016-2017)

**Eye and skin problem cases**

In November 2016, both adults and children were affected with eye problems while in Feb. 2017, female and male children were more affected with skin problems.

**F. Mortality data – findings**

Data regarding death were collected from the Town Aurangabad., based on birth and death records from 2016 to June 2017. Table 3 shows the year and gender-wise death cases that occurred in Aurangabad households under various age groups. It can be noticed that the total number of deaths recorded have been consistently on an increase each year. It is also generally observed that the number of death cases that occurred among males is higher than females. A comparison of the number of death cases with that of the age groups indicated that the number of death cases in 40–59 age group of both male and female category are high, followed by the age group 70. It is seen that ten male and six female death cases occurred particularly in May 2016.

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**Cross-sectional survey**

Among the villages that intersect Aurangabad. The inhabitants of Cidco, Chikalthana and Waluj-Pandharpur areas were severely affected by asthma, respiratory problems were noticed at the rate of 8 to 10 persons in every studied area. Similarly, 4 to 8 persons were affected by the same problem in Chikalthana, In the remaining areas, an average of 2 to 3 persons were affected while conducting the survey in December 2016, the responds informed that 2 to 3 cases of premature deaths had occurred in Cidco, Chikalthana, Waluj-Pandharpur and Shendra. The survey result indicates that in the said villages, the urban poor people spent at the rate of Rs. 150 to 200 per month per head towards cost of illness, while others spent at Rs 250 to 300.

**IV. CONCLUSIONS**

This is a study about higher air pollutant concentrations, which give rise to significant adverse health effects, and it is an issue of serious public health threat to inhabitants of the study area. However, increasing levels of pollutants, due to industrial activities and alarming increase in the number of vehicles may become a problem in the future, with greater health impact. A comparison of the survey results of morbidity and mortality cases indicates that the impact of SPM and PM<sub>10</sub> levels gives rise to increased hospitalization for respiratory problems like asthma and gradual increase in

mortality cases. Cases of premature death due to heart attack are on the increase in males under the age group 40–59 compared to all other causes for mortality. The study Concludes that the seriousness of the air pollution problem in Aurangabad. May aggravate further, if not brought under control in this scenario, the city development and environmental enforcement authorities have to adopt future strategies to combat the menace of air pollution.

### **Suggestions**

#### **A. Indoor air pollution control strategies**

- 1) Improving the ventilation in the cooking area so as to reduce particulate matter concentration
- 2) Increasing access to clean fuels such as biogas, solar stoves, liquid petroleum gas etc.

#### **B. Outdoor air pollution control strategies**

- 1) Manufacturer of such Vehicles which do not pollute the atmosphere beyond permissible limits
- 2) Serious actions and laws over burning Agriculture waste

- 3) Sources of Industrial pollution must be taken into account in setting Air Quality standards
- 4) Producers and consumers should be aware about the air pollutants and their hazardous impacts

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