AIR QUALITY INDEX AT ABIDS, HYDERABAD

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***Abstract*: Rapid Industrialization & Urbanization coupled with increase in vehicular traffic in urban areas has become threat to air quality. An Air Quality Index is an interpretive technique, which transforms complex data on measured atmospheric pollutant concentrations into a single number or set of numbers in order to make the data more reasonable. When two or more pollutants are present in the air in significant amounts, the cumulative effect is observed using Air Quality Index. AQI gives clear picture of Air Quality. The parameters used for Air Quality Index are SO_2, NOx & SPM. In the present study Air Quality Index was calculated at Abids Site to evaluate the status of air pollution continuously and to assess its impact on human health.**

***Keywords*: Air Quality Index, SO_2, NOx, RSPM, TSPM & Abids.**

I. INTRODUCTION

Rapid Industialization & Urbanization coupled with increase in vehicular traffic in urban areas has become threat to air quality. As transportation systems i.e., number of two wheelers and four wheelers are increasing in the cities of India, therefore air pollution has become a growing problem in cities. In developing countries the air quality crisis in cities often attributes in large measures [40-80%] to vehicular emission. Despite the improved performance of technology is presently insufficient to counteract the growth of vehicles and associated pollution problems. Thus, it is necessary to evaluate the status of urban air pollution continuously and to assess its impact on human health so that proper initiative measures can be implemented.

Shyamala(2016) studied Air Pollutants and its effect on Plants in Hyderabad City.. Shyamala & Johnson (2015) investigated on Plants as Air Pollutant Absorbers – Modified APTI Abids, Hyderabad Telangana. Shyamala & Johnson (2015) worked on Modified Air Pollution Tolerance Index of selected plants in Nacharam Industrial area – Telangana.

II. MATERIALS & METHODS

Air Quality Index [AQI] : The Air Quality Index [AQI] is an indicator of air quality, based on the air pollutants that have adverse effects on human health and the environment. An Air Quality standard predicts the maximum permissible limits for a particular pollutant to be present in the air so as not to cause any severe health & other damages. The Air Quality Index [AQI] indicated the gross level of pollution with reference to standard limits of individual pollutant. The Air Quality Index is divided into six categories according to Environmental Protection Agency. The Air Quality Index value is between 0-50 indicates Good Category, Moderate Category –AQI value is 51-100, Unhealthy for Sensitive groups- AQI value is 101-150, Unhealthy Category - AQI value is 151-200, Very Unhealthy Category - AQI Value is 201- 300 and Hazardous Category- if AQI value is 301-500. According Rao & Rao, 1999 Air Quality Index is based on SO_2, NOx, & SPM. AQI gives clear picture of Air Quality. The Parameters used for calculating the Air Quality Index [AQI] were SO_2, NOx, RSPM & TSPM. In this method, the ratios of three important air pollutants to their Ambient Air Quality Standards are first obtained and is multiplied by 1/3 then their average is calculated by 100.

AQI = 1/3 {[SO_2] S SO_2 + [NOx]/ SNOx + SPM/ S SPM] X 100
S = Standard Value of SO_2 or NOx or [RSPM/TSPM]

III. RESULTS & DISCUSSION :

The present study was carried out commercial, at **Abids,** Nampally Mandal of Hyderabad District during the year August 2009-2011 July .The **Abids** commercial area with few Residential pockets i.e., Chapel Road, Chiragali, Gunfoundry, Boggulakunta along with Schools like Little Flower School, St.Georges Grammar School, Rosary Convent School, All Saints School, Stanely Girls High School, Seventh Day Adventist High School , Sujatha High School, Slate School etc . This commercial area has rised its importance because of its close proximity to Nampally Railway station which is situated half kilometer from it. It is the National Highway the main road links Charminar on one side & Vanasthalipuram , L.B. Nagar, Nagarjuna Sagar road on the other via Koti. It links Panjagutta, Kukatpally & also Mehdipatnam, Langerhouse etc. Along with heavy vehicular traffic in the region shows varied concentrations of Particulates, Sulphurdioxide, and Nitrogendioxide .

Today the whole area Abids is one of the main shopping centre in the city & the main street is known as Abid Road. The state Government building GHMC is adjacent to GPO are located here. Major business shops like textiles, hotels,jewelry,foot wear,electronic goods are established. Hence Abids is an important commercial centre along with many schools and residential areas.

Air Quality Categorization based on Environmental Protection Agency [2009] :

According to U.S. Environmental Protection Agency [EPA] and others are working to make information about outdoor air quality as easy to understand as the weather forecast. A key tool in this effort is the Air Quality Index or AQI which is divided into six categories [Table No:1]. Environmental Protection Agency 2009[EPA]and local officials use the Air Quality Index [AQI] to provide you with simple information on local air quality, the health concerns for different levels of air pollution, and how you can project your health when pollutants reach unhealthy levels. So an attempt was made to assess the air quality data of Abids with Air Quality Index [AQI], which incorporates colour coding symbolization so that it is of much information to the general public, this concept can be very well applied in India so that general public becomes aware of the health concern for certain criteria pollutants.

Table No 1: TheAir Quality Index [AQI] divided into six categories of health concern rating by EPA[2009]

Air Quality Index (AQI) Values	Air Quality of Health Concern	Colors
0 to 50	Good	Green
51 to 100	Moderate	Yellow
s101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Varv Unhealthy	Purple
301 to 500	Hazardous	Maroon

Each category corresponds to a different level of health concern. The six levels of health concern and what they mean are :

- **“Good” :** The Air Quality value is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.
- **“Moderate”:** The Air Quality value is between 51 and 100 .Air quality is acceptable ; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **“Unhealthy for Sensitive groups” :** When Air Quality Index [AQI]values are between 101 and 150 , members of sensitive groups may experience health effects. This means they are likely to be affected vat lower levels than the general public. For example, people with lung disease are at greater risk. The general public is not be likely to be affected when AQI is in this range.
- **“Unhealthy” :** Everyone may begin to experience health effects when Air Quality Index[AQI] values are between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- **“ Very Unhealthy” :** Air Quality Index[AQI]values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- **“Hazardous” :** Air Quality Index[AQI] values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

The Air Quality Index focuses on the health effects experience within a few hours or days after breathing unhealthy air. The Air Quality Index [AQI] is calculated for four major pollutants: SO_2, NO_x, RSPM, &TSPM. For each of these pollutants, Environmental Protection Agency [EPA] has established National Air Quality Standards [2009].

It is important to know about the significant changes in the air Pollution levels in the present study Site Abids. The Effect of air pollution are as a result of the combination of various pollutants rather than a single pollutant. So it is difficult to be assessed on the basis of the contribution of individual pollutant, but the task can be achieved by applying certain indices which includes different types of pollutants in the ambient air. The Air Quality Index [AQI] indicated the gross level of pollution with reference to the standard limits of the individual pollutant.

In the Present investigation Air Quality Index [AQI] for SO_2 calculated value was varying from a minimum of 9.0 to a maximum of 11.0 during August 2009-July2011 at Site Abids which indicates **Good Category** and Air pollution poses little or no risk. The Good Category is represented by Green colour according to Environmental Protection Agency 2009 [EPA] . [Table No 2]

Table No 2: Air Quality Index [AQI] at Abids Hyderabad – based on SO_2 .

Months	AQI for SO_2	Levels of Health Concern
Aug -2009	10.4	Good
Sep-2009	10	Good
Oct -2009	10.4	Good
Nov- 2009	10.6	Good
Dec- 2009	11	Good
Jan-2010	10.6	Good
Feb- 2010	10.4	Good
Mar- 2010	9.8	Good
Apr -2010	10.8	Good
May- 2010	10.4	Good
Jun- 2010	10.0	Good
Jul- 2010	10.4	Good
Aug-2010	10.0	Good
Sep -2010	10.0	Good
Oct- 2010	10.2	Good
Nov -2010	10.0	Good
Dec -2010	10.6	Good
Jan -2011	9.8	Good
Feb -2011	10.2	Good
Mar -2011	10.4	Good
Apr -2011	9.0	Good
May- 2011	9.6	Good
Jun -2011	9.8	Good
Jul -2011	9.0	Good
Average	10.14	Good

AQI for NOx : The Air Quality Index[AQI] for NOx calculated value was varying from a minimum of 59.25 to a maximum of 83.25 during August 2009-July 2011 at Abids Site**.** It shows **Moderate Category** of Air pollution which is indicated by Yellow colour according to Environmental Protection Agency 2009. [Table No: 3]

Table No 3:Air Quality Index [AQI] at Abids Hyderabad – based on NOx

Months	AQI for NOx	Levels of Health Concern
Aug -2009	63.0	Moderate
Sep-2009	59.25	Moderate
Oct -2009	60.0	Moderate
Nov- 2009	63.75	Moderate
Dec- 2009	69.25	Moderate
Jan-2010	68.0	Moderate
Feb- 2010	66.25	Moderate
Mar- 2010	67.75	Moderate
Apr -2010	71.50	Moderate
May- 2010	69.25	Moderate
Jun- 2010	70.0	Moderate
Jul- 2010	69.25	Moderate
Aug-2010	78.25	Moderate
Sep -2010	71.50	Moderate
Oct- 2010	76.75	Moderate
Nov -2010	83.25	Moderate
Dec -2010	74.50	Moderate
Jan -2011	73.50	Moderate
Feb -2011	75.50	Moderate
Mar -2011	79.75	Moderate
Apr -2011	73.25	Moderate
May- 2011	76.25	Moderate
Jun -2011	67.25	Moderate
Jul -2011	73.75	Moderate
Average	70.86	Moderate

AQI for RSPM : The Air Quality Index [AQI] for RSPM calculated value was varying from a minimum of 143.33 to a maximum of 193.33 during August 2009-July 2011 at Site-Abids**.** It shows Category of **Unhealthy**. Red colour is represented for **Unhealthy** Category according to Environmental Protection Agency 2009 [EPA]. Members of sensitive groups may experience more serious health effects for **Unhealthy** Category.[Table No: 4]

Table No 4 :Air Quality Index [AQI] at Abids Hyderabad – based on RSPM

Months	AQI for RSPM	Levels of Health Concern
Aug -2009	151.67	Unhealthy
Sep-2009	151.67	Unhealthy
Oct -2009	160.0	Unhealthy
Nov- 2009	153.33	Unhealthy
Dec- 2009	171.67	Unhealthy
Jan-2010	166.67	Unhealthy
Feb- 2010	183.33	Unhealthy
Mar- 2010	181.67	Unhealthy
Apr -2010	165.0	Unhealthy
May- 2010	163.33	Unhealthy
Jun- 2010	168.33	Unhealthy
Jul- 2010	145.0	Unhealthy
Aug-2010	143.33	Unhealthy
Sep -2010	155.0	Unhealthy

Oct- 2010	153.33	Unhealthy
Nov -2010	143.33	Unhealthy
Dec -2010	163.33	Unhealthy
Jan -2011	190.0	Unhealthy
Feb -2011	188.33	Unhealthy
Mar -2011	193.33	Unhealthy
Apr -2011	173.33	Unhealthy
May- 2011	170.0	Unhealthy
Jun -2011	160.0	Unhealthy
Jul -2011	155.0	Unhealthy
Average	164.58	Unhealthy

AQI for TSPM **:** The Air Quality Index[AQI] for TSPM calculated value was varying from a minimum of 635.0 to a maximum of 777.5 during August 2009-July 2011 at Abids Site. It showed **Hazardous Category**. **Maroon** colour is represented for **Hazardous** Category according to Environmental Protection Agency [EPA] 2009. It triggered healthy warnings of Emergency conditions. [Table No 5]

Table No 5 : Air Quality Index [AQI] at Abids Hyderabad –based on TSPM

Months	AQI for TSPM	Levels of Health Concern
Aug -2009	690.0	Hazardous
Sep-2009	692.50	Hazardous
Oct -2009	717.5	Hazardous
Nov- 2009	660.0	Hazardous
Dec- 2009	735.0	Hazardous
Jan-2010	715.0	Hazardous
Feb- 2010	777.5	Hazardous
Mar- 2010	780.0	Hazardous
Apr -2010	742.5	Hazardous
May- 2010	715.0	Hazardous
Jun- 2010	720.0	Hazardous
Jul- 2010	655.0	Hazardous
Aug-2010	637.5	Hazardous
Sep -2010	687.5	Hazardous
Oct- 2010	670.0	Hazardous
Nov -2010	635.0	Hazardous
Dec -2010	697.5	Hazardous
Jan -2011	777.5	Hazardous
Feb -2011	767.5	Hazardous
Mar -2011	770.0	Hazardous
Apr -2011	722.5	Hazardous
May- 2011	735.0	Hazardous
Jun -2011	737.5	Hazardous
Jul -2011	670.0	Hazardous
Average	712.81	Hazardous

IV. CONCLUSION

Air Quality is important to protect the health of the citizens residing in a particular City. The Air Quality of Abids, Hyderabad City was found to be as follows.

Based on average of AQI value for **SO_2** was 10.14 & indicated **Good Category** at Site-Abids and Air Pollution posed little or no risk. While the average value for **NOx** was 70.86 indicated **Moderate Category** of Air Pollution and Average AQI value for **RSPM** was 164.58 indicated **Unhealthy Category**. Members of Sensitive Groups experience more serious health effects. Average AQI value for **TSPM** was 712.81 which indicated **Hazardous Category**.

V. RECOMMENDATIONS

1. It is noteworthy that **TSPM & RSPM** concentration was more at Site Abids This may be due to heavy traffic which flows from the Site-Abids. The number of 2wheelers & 4wheelers are 3711960 according to the data given by the Govt.of A.P [Joint Transport Commissioner, Hyd., 2011].

2. The commuters specially the school children in this region must cover their nose & mouth with a mask to protect their health. [Respiratory problems]

3. At **Site-Abids**, since schools, residential areas are in its surroundings **Traffic diversion during school hours, to prevent traffic jam;** Public Transport must be diverted 1 hour in Morning & 1 hour in Evening.

4. Encourage **Mass transport**.

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