Analysis Of Air Pollution In Indian Cities - A Literature Review

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ABSTRACT: Air pollution in India has increased rapidly due to population growth, increase in the numbers of vehicles, use of fuels, bad transportation systems, poor land use pattern, industrialization, and above all, ineffective environmental regulations. Sulphur Dioxide, Nitrogen Dioxide, Particulate Matter are some of the pollutants which are contributing to environmental pollution. Purpose of this paper is to review the literature relating to the analysis of ambient air quality of some Indian cities and compare the same with Indian National Ambient Air Quality Standards. Also discuss of the use of Air Quality Index (AQI), seasonal variation in concentration of air pollutants. Assessment of health impacts due to increase in the concentration of air pollutants in Indian cities.

I. INTRODUCTION

Air Pollution is one of the serious problems in the world especially in urban areas of developing countries due rapid growth of population, increase in number of vehicle and industrialization. Motor vehicle have been regarded as the primary cause of air pollution in the urban areas and account for 60 to 70% of the pollution found in the urban environment. SO$_2$, NO$_2$, SPM and RSPM are major air pollutants in India. The studies on air pollution in large cities of India showed that ambient air pollution concentrations are at such levels where serious health effects are possible. Continuous rise of population along with the lack of suitable measures for air pollution control means that there is a great potential that conditions may worsen in future in Indian cities. These all pollutants may pose harmful effect on human health such as cardiovascular and respiratory disease, Neurological impairments, increased risk of preterm birth and even mortality and morbidity. Various studies conducted in India at various locations suggests that pollution levels varies significantly in different areas with respect to its location, time, period of sampling and climatic conditions.

II. LITERATURE REVIEW

This paper reviews the Air Quality Analysis at following locations in India:

Gwalior: Gwalior is surrounded by industrial and commercial zones and rapid increase in urbanization results in increase gaseous pollutants SO$_2$, NO$_2$, SPM and RSPM. Concentration of SO$_2$ was monitored at 4 locations of Gwalior by using high volume air sampler (Envirotech APM 415 and 411). The average ambient air concentration of SO$_2$ was found below the permissible limits of NAAQS at all the sites. Comparatively somewhat higher concentration of SO$_2$ was observed during these months. A health survey was also carried out which showed the symptoms were developed such as sore throat, shortness of breath, skin irritation, wheezing, sneezing, chest tightness, nausea etc. An assessment for people (aged 10 to 60 years) was carried out to find health problems due to vehicular pollution between the months of November-2013 to May-2014 (winter). Average concentration of SO$_2$ at residential area Kampoo was found 11.800 µg/m$^3$ which is less as compared to other sites and also the health effects are minimum because this area is not so congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less. At commercial area Thatipur average concentration of SO$_2$ was found 13.300 µg/m$^3$ which is lower that of Railway Station and Gola Ka Mandir and higher than Kampoo may be due to the fact that this area is highly congested and traffic is less.
The average ambient air concentration of SO$_2$ was found below the permissible limits of NAAQS of CPCB at all the sites. Comparatively somewhat higher concentration of SO$_2$ was observed during November-2013 to May-2014.

In this study, an assessment of people (aged 10 to 60 years) suffering from health problems due to vehicular pollution between the months of November-2013 to May-2014 (winter) and showing these symptoms (sneezing, sore throat, shortness of breath, wheezing, chest tightness, skin irritation, nausea etc.) was developed. The people in Thatipur were mainly suffering from sneezing and skin irritation which may be due to the heavy emissions from Tempos. These vehicles are mainly run by diesel fuel and in most cases, are not frequently serviced. Wheezing is rare in all areas, but traders in Thatipur showed the highest complaints. Shortness of breath and skin irritation is mainly shown by the tempo drivers and other people in Thatipur. Since this is a commercial area of Gwalior. The percentage of people affected by sneezing, sore throat and shortness of breath was the highest in Railway Station and Gola ka Mandir. This may be due to the fact that Tempos, Buses, Trucks, Trains and privet cars are more common and they are not well maintained. Shortness of breath is very common in these areas. The health effects in Kampoo were found rear this may be due to the fact that this area is not so congested and the fleet of traffic is found less in this area. The people were mainly affected by skin irritation, this may be due to the fact that the spent most of their time with their vehicles which are not well maintained.

Table 1: Effects of the automobile emission on the people in the study area.

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Thatipur</th>
<th>Railway Station</th>
<th>Gola Ka Mandir</th>
<th>Kampoo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sneezing</td>
<td>18</td>
<td>29</td>
<td>34</td>
<td>6</td>
<td>87(21.7%)</td>
</tr>
<tr>
<td>Sore Throat</td>
<td>14</td>
<td>29</td>
<td>26</td>
<td>8</td>
<td>77(19.2%)</td>
</tr>
<tr>
<td>Shortness of Breath</td>
<td>16</td>
<td>23</td>
<td>18</td>
<td>5</td>
<td>62(15.5%)</td>
</tr>
<tr>
<td>Wheezing</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>11(2.7%)</td>
</tr>
<tr>
<td>Chest Tightness</td>
<td>13</td>
<td>16</td>
<td>21</td>
<td>7</td>
<td>57(14.2%)</td>
</tr>
<tr>
<td>Skin irritation</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>10</td>
<td>54(13.5%)</td>
</tr>
<tr>
<td>Nausea</td>
<td>12</td>
<td>17</td>
<td>19</td>
<td>4</td>
<td>52(13.0%)</td>
</tr>
</tbody>
</table>

Cuttack. Pradeepa K. Bhuyan, Pradyusa Samantray and Swoyam P Rout (2010) discussed the use of Air Quality Index (AQI) describing air pollution in Choudwar area. AQI is computed for ten air quality sampling stations in the Choudwar area within the radius 10 kms from the core zone. This study identifies the potential sources of air pollution. The data obtained from monitoring of ambient air at ten locations within the study area are used to calculate the AQI for each season during the study period. Throughout the study period SPM was found to be minimum of 102.2 mg/m$^3$ at Narapada, monsoon, 2007 and maximum of 360 mg/m$^3$ at Kapeleswar Near IMFA, Post-monsoon, 2007 and also at Ghantikhal, Premonsoon, 2008.

Table 2: Parameters (Pollutants) in mg/m$^3$ Monsoon, 2007.

<table>
<thead>
<tr>
<th>Location</th>
<th>SPM</th>
<th>RSPM</th>
<th>NO$_2$</th>
<th>SO$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrahat</td>
<td>169.5</td>
<td>120.2</td>
<td>74.4</td>
<td>74.4</td>
</tr>
<tr>
<td>Neruguda Railway station</td>
<td>182.5</td>
<td>125</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Narapada</td>
<td>138.2</td>
<td>102.2</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Kapeleswar Near IMFA</td>
<td>168</td>
<td>130.2</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Khuntani</td>
<td>179</td>
<td>118</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Ghantikhal</td>
<td>190</td>
<td>125</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Near Arati Steel</td>
<td>149</td>
<td>125</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Daulatabad</td>
<td>148</td>
<td>115</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Kayalapada</td>
<td>152</td>
<td>120</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>Gurudihatta</td>
<td>135</td>
<td>125</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>
The highest value of SPM is due to coke/coal dust and frequent transport of raw materials through heavy vehicles in the industrial belt located in rural area. SPM was found to be less at Kapeleswarnear IMFA on account of proper management of coke/coal dust through frequent sprinkling of water at Coal Handling plant and its peripheral area. NO\textsubscript{2} found to be minimum of 12.8 mg/m\textsuperscript{3} at Narapada, Pre-monsoon, 2007 and Pre-monsoon, 2008 and maximum of 38.3 mg/m\textsuperscript{3} at Ghantikhal. Post-monsoon, 2008 which are within limits. SO\textsubscript{2} found to be minimum of 0.8 μg/m\textsuperscript{3} at Agrahat, Pre-monsoon, 2007 and maximum of 8.4 mg/m\textsuperscript{3} at Kapeleswar Near IMFA. Post-monsoon, 2007 and Post-monsoon 2008. The SO\textsubscript{2} content in ambient air is slightly higher owing to combustion of high sulphur content coal/coke used in thermal power plant and ferroalloys plant and the emission of fumes. The data for three seasons revealed that concentration of pollutants except SPM, for entire monitoring stations do not exceed the permissible limits but in the locations around Arati Steel, the concentration of SPM is very high at most of the times.

### Table 3: Parameters (Pollutants) in mg/m\textsuperscript{3} Monsoon, 2008

<table>
<thead>
<tr>
<th>Location</th>
<th>Pre Monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
<th>Pre Monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
<th>Pre Monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
<th>Pre Monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrahat</td>
<td>163.2</td>
<td>124.4</td>
<td>173</td>
<td>71.2</td>
<td>61.2</td>
<td>74.4</td>
<td>18</td>
<td>22.4</td>
<td>24</td>
<td>1.8</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nergundi Railway station</td>
<td>181.1</td>
<td>135.4</td>
<td>182</td>
<td>74.6</td>
<td>51</td>
<td>82</td>
<td>25.4</td>
<td>20</td>
<td>28.2</td>
<td>2</td>
<td>1.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Narapada</td>
<td>136.7</td>
<td>118</td>
<td>142</td>
<td>52.9</td>
<td>40</td>
<td>68.2</td>
<td>12.8</td>
<td>18</td>
<td>16.4</td>
<td>1.6</td>
<td>1.8</td>
<td>2</td>
</tr>
<tr>
<td>Kapeleswar Near IMFA</td>
<td>164.4</td>
<td>138.4</td>
<td>192</td>
<td>65.8</td>
<td>32.4</td>
<td>86.8</td>
<td>16</td>
<td>18.2</td>
<td>19.4</td>
<td>8</td>
<td>8.2</td>
<td>8.4</td>
</tr>
<tr>
<td>Khuntuni</td>
<td>170</td>
<td>358</td>
<td>133</td>
<td>78</td>
<td>117.2</td>
<td>63</td>
<td>32.4</td>
<td>28.1</td>
<td>30.3</td>
<td>4.1</td>
<td>4.2</td>
<td>4</td>
</tr>
<tr>
<td>Ghantikhal</td>
<td>360</td>
<td>241</td>
<td>328</td>
<td>126</td>
<td>115</td>
<td>110</td>
<td>28.2</td>
<td>27.5</td>
<td>38.3</td>
<td>4.1</td>
<td>4.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Near Arati Steel</td>
<td>160</td>
<td>291</td>
<td>142</td>
<td>71</td>
<td>116</td>
<td>72</td>
<td>35.3</td>
<td>27.5</td>
<td>30.1</td>
<td>4.2</td>
<td>4.1</td>
<td>4</td>
</tr>
<tr>
<td>Daulatabad</td>
<td>152</td>
<td>122</td>
<td>190</td>
<td>62.4</td>
<td>48</td>
<td>72.2</td>
<td>21.2</td>
<td>20.4</td>
<td>21.2</td>
<td>2</td>
<td>1.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Kayalapada</td>
<td>148</td>
<td>116</td>
<td>165</td>
<td>78</td>
<td>28.2</td>
<td>78</td>
<td>16.4</td>
<td>18.6</td>
<td>18.8</td>
<td>1.8</td>
<td>2.2</td>
<td>2</td>
</tr>
<tr>
<td>Gurudijhatia</td>
<td>140</td>
<td>125.2</td>
<td>160</td>
<td>32.2</td>
<td>24.2</td>
<td>82.3</td>
<td>18.4</td>
<td>17.6</td>
<td>16.4</td>
<td>2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

### Bangalore

Kamath and Lokeshappa (2014) investigated air pollutant concentrations at Residential, Industrial & Sensitive Areas of Bangalore. SO\textsubscript{2}, NO\textsubscript{X} and RSPM were collected over six sites in Bangalore. The sampling stations are located at Victoria Hospital, Graphite Industrial Area, Amco Apartments, Peenya Industrial Area, Yeshwanthapur Residential Area and K.H.B Industrial Area. Meteorological parameters like Temperature, Relative humidity, Wind speed, Wind direction & Rain fall data were also recorded during the sampling period. Monthly and seasonal variation of these pollutants have been analysed and noted. It has been observed that the concentrations of the pollutants are high in summer in comparison to the Pre-monsoon and post-monsoon seasons. In the present study, it was noticed that the RSPM levels at all selected sites exceed the prescribed limits. Apart from this the SO\textsubscript{2} and NO\textsubscript{2} levels in industrial areas remain under prescribed limits. In this study, air quality data of different Areas of Bangalore were collected and also to assessed the air quality and finally following conclusions have been drawn. At all areas SO\textsubscript{2} and NO\textsubscript{2} concentration in the ambient air was found to be within the permissible limit except at Victoria Hospital for NO\textsubscript{2}, RSPM concentration exceeding 4.5 times than acceptable limit was observed in the ambient air at Yeshwanthpur during 2014 (RSPM - 274μg/m\textsuperscript{3}). Air quality at Victoria is very sensitive is found to be much deteriorated in terms of NO\textsubscript{2}, SPM and RSPM concentrations.

Further based on the average AQI of different Areas studied, it was concluded that sensitive area viz., Victoria Hospital has unhealthy air quality followed by Yeshwanthpura Residential Area unhealthy for sensitive group. Moderate air quality condition was detected at industrial area namely near Graphite India Ltd., and at AMCO Residential Area. AQI established for the month of April for Victoria Hospital (187.88) indicated the hazardous level of health concern. Even the Yewshwanthpura Area exhibited very unhealthy level of health concern (191.50). Thus the AQI values warn that there is an urgent need to take steps to mitigate the deterioration of air quality.

### Ahmedabad and Gandhinagar

Chintan Y. Pathak, Hiren C. Mandalia D. Roy and R. B. Jadeja (2014) studied the comparative analysis of ambient air quality of Ahmedabad and Gandhinagar in Gujarat. Both the cities have been studied on the basis of land use pattern and meteorological condition.
Ahmedabad - During monsoon (June 2012 to August 2012), the minimum concentration of pollutants were found due to increased vertical dispersion, washout by monsoon rains and suppressed wind erosion. During winter (November 2012 to February 2013) there was a maximum concentration range of all parameters. The minimum and maximum average concentration of SPM was recorded from 185 µg/m$^3$ to 362 µg/m$^3$. Maximum concentrations were recorded during January. During winter season mixing height was very less with respect to the other seasons. High concentration of Pollutants were observed on October due to festival. Minimum concentration of particulates and gases pollutants were found during summer season (April 2012 to June 2012).

Lesser concentration levels of pollutants were recorded due to maximum mixing height, high temperature, high wind erosion and moderate stability. As compared with NAAQS, annual average SO$_2$ and NO$_2$ concentrations were found well below the prescribed limits. RSPM levels were slightly increasing order at station Panjarapol Char Rasta while SPM showed increasing trend. The minimum and maximum average concentration of RSPM was recorded from 74 µg/m$^3$ to 135 µg/m$^3$. Monitoring station nearby city area were found maximum NO$_2$ concentration levels and monitoring station nearby industrial area were found maximum SO$_2$ concentration levels due to industrial influence.

<table>
<thead>
<tr>
<th>Name of sampling station</th>
<th>RSPM, µg/m$^3$</th>
<th>SPM,µg/m$^3$</th>
<th>NO$_2$,µg/m$^3$</th>
<th>SO$_2$,µg/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad Naroda Lake</td>
<td>135</td>
<td>362</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Narol Naroda Cross Road</td>
<td>84</td>
<td>214</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>Panjarapol Char Rasta</td>
<td>74</td>
<td>185</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Jagnath Mahadev Chowk</td>
<td>86</td>
<td>224</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Shahibaug Under Bridge</td>
<td>90</td>
<td>206</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>Ekta Circle, Behrampura</td>
<td>80</td>
<td>211</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Gandhinagar Inquiry Office, Sector-30</td>
<td>86</td>
<td>224</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>Shoping Centre, Sector-8</td>
<td>68</td>
<td>178</td>
<td>17</td>
<td>8</td>
</tr>
</tbody>
</table>

Gandhinagar - During monsoon, average concentration was at the minimum levels. The factors responsible same as Ahmedabad. The minimum particulates and gases concentration were found on winter season due to minimum mixing height. The minimum and maximum average values of SPM were ranging from 178 µg/m$^3$ – 224 µg/m$^3$. The maximum average concentration of RSPM was recorded to 86 µg/m$^3$, which is under the permissible limit. However maximum concentrations were observed in January. During summer (April to June 2012), the concentration of gaseous & SPM pollutants were at the minimum due to high temperature, mixing height, high wind erosion, moderator stability, almost dry atmosphere and less humidity. As compared with NAAQS, SO$_2$ and NO$_2$ concentration were found to be very low from the prescribed limits. Annual average concentration levels of RSPM and SPM were also found to be slightly increasing order.

Bhopal. Sadhana Chaurasia, Pragya Dwivedi, Ravindra Singh and Anand Dev Gupta (2013) analysed ambient air quality of industrial, commercial and residential area of Bhopal (M.P.). The outcome of the study has been presented in the form of AQI. The study was carried out in February and March, 2012. Sampling time was 24 hrs. at three different locations with respect to SO$_2$, NOx, PM$_{10}$ and PM$_{2.5}$. PM$_{10}$ and PM$_{2.5}$ was always found beyond the permissible limit at all the sampling site. The relative AQI was found in severe air pollution range. Maximum value of PM$_{2.5}$ and PM$_{10}$ was found 80.90 µg/m$^3$ and 160.53 µg/m$^3$ respectively at Hamidia road on March and minimum value was observed 62.90 µg/m$^3$ and 108.20 µg/m$^3$ respectively at Govind Pura on February. All values of PM$_{2.5}$ and PM$_{10}$ at all selected stations were obtained beyond the permissible limit i.e. 60 µg/m$^3$ and 100 µg/m$^3$ respectively on both studied months. SO$_2$ and NOx values were found within limit (80 µg/m$^3$) at all selected stations in study period.

Air pollution index was also calculated for all the parameters of both months and value of PM$_{2.5}$ was found in red zone at all stations which indicate unhealthy air quality for health concern. Similarly API of PM$_{10}$ was found in yellow zone at all stations accept Hamidia road on March. Yellow zone indicate level of health concern moderate and API of Hamidia road was found orange zone which indicate unhealthy air quality for sensitive group. API of SO$_2$ and NOx was found in green zone indicating clean air quality and this zone is not harmful. Overall relative AQI indicates that severe air pollution in Bhopal city during study period.
Shillong. R. E. Lamare and S. S. Chaturvedi (2014) studied concentration of RSPM, NRSPM and TSPM at Dhankheti Junction varies from 81.24 µg/m³ to 261.43 µg/m³; 73.17 µg/m³ to 265.54 µg/m³ and 212.49 µg/m³ to 467.94 µg/m³, respectively. Overall RSPM and TSPM concentrations were found to exceed the permissible limit. Based on the results obtained, the concentrations of particulate matter in the ambient air at Dhankheti Junction was mainly by vehicles. However, their concentrations at NEHU campus were found comparatively lower and are within the limit.

**Respirable Suspended Particulate matter (RSPM)**

The concentration of RSPM at Dhankheti Junction varies from 81.24 µg/m³ to 261.43 µg/m³. Based on NAAQS, the permissible limit for RSPM for 24 hours is 100 µg/m³. The results revealed that 73.33% out of the total sampling period RSPM exceeded the permissible limit at Dhankheti Junction due to increase number vehicles. However, RSPM concentration at NEHU campus ranged from 13.34 µg/m³ to 95.02 µg/m³ and all are within the limit.

**Non-Respirable Suspended Particulate matter (NRSPM)**

At Dhankheti, the 24 hour concentration of NRSPM varies from 73.17 µg/m³ to 265.54 µg/m³ and at NEHU campus varies from 6.16 µg/m³ to 162.02 µg/m³. The re-suspension of coarse and fine soil dust from unpaved portion of the road and its dispersal by the action of wind leads to the rise of NRSPM concentration in the air.

**Total Suspended Particulate Matter (TSPM)**

The permissible limit for TSPM for 24 hours sampling at industrial, residential-rural and sensitive area was 500 µg/m³, 200µg/m³ and 100µg/m³, respectively. The TSPM concentration at Dhankheti and NEHU campus was observed between 212.49 µg/m³ to 467.94 µg/m³ and 67.51 µg/m³ to 226.24 µg/m³, respectively. Based on the prescribed standard limit, TSPM concentrations at Dhankheti exceed the given limit for 24 hour sampling period and at NEHU campus for little duration it crossed the limit due to elevated concentration of NRSPM in the ambient.

**III. CONCLUSION**

There is great need to control the air pollution as it is impacting the environment and human health seriously. The concentration of air pollutants like have to be controlled to save the environment. To control air pollution, proper rules and regulations should be implemented by the government, awareness among the people, control the growth of population, number of vehicles, industries and energy consumption. We need to take pollution issue seriously because ignorance is certainly not the proper way to go. The stakes are really high and world needs to wake up and start acting right now because environmental issues are constantly growing in number and size.

**REFERENCES**


