

Air Pollution as an Effect of Vehicular pollution in the city of Siliguri & its effect on Health

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Abstract: Pollution means the major change of to the earth's environment with hazardous or non hazardous materials that can contaminate Air, water and entire environment and can cause permanent damage to human health, other animals, Plants, living & nonliving entity, quality of life and to the eco system. There exists several forms of pollution like i) Air Pollution, ii) Water Pollution iii) Noise Pollution, iv) Other Hazardous Pollution including Radioactive pollution, Thermal pollution, Soil contamination etc. The Air and water pollution are said to be responsible mostly in interfering with human health and the eco system. Air Pollution level in the city of Siliguri and its extended parts are alarming. In Siliguri nearly, 60% of the Air pollution is the contribution of automobile sector according to the WBPCB. As per the West Bengal Pollution Control Board the automobiles contribute significantly large amount of Particulate matters to the total Air pollution in Siliguri. The size of PM may vary from but mostly 1.1 micron in size of particulate matters is in the air of siliguri. Other than these, road encroachments by illegal occupier of roads, pavement dwellers, unregulated traffic, hawkers, illegal encroachers, salesman on road also play a vital role of traffic congestion in Siliguri city. The role of the local and state Government is not adequate or we can say there is lacking in proper automobile traffic management by these authorities. As a result of high automobile emission the main part of the City of Siliguri has become heat Island as compare to other nearby places of 4-5 km away. The residents of the city are mostly suffering or are susceptible to the respiratory diseases like heart diseases, COPD, Lung Cancer, Inflammatory Lung disease, nervous diseases, eye problem, Hypertension etc. Several measures could be taken as it has been sighted in the recommendation to reduce air pollution in Siliguri city but the state and local Govt. are not seen to be very much serious about the issue.

Key words: Automobiles, Vehicular Traffic, Respiratory Diseases, Asthma, Bronchitis, Breathing Problem, RPM, Road Encroachm

Objective of the Study:

The objectives of the study are as follows:

1. To identify the different pollutants responsible in different degree in the process of polluting environment of Siliguri city and the trend of Air pollution level in Siliguri.
2. To evaluate the condition of Siliguri city in terms of Air pollution level and its impact on residents health as compare to other big cities of India.
3. To understand the relation between changing temperature and Air quality of Siliguri and huge concentration of vehicular (Diesel, Petrol) pollutants in Siliguri City.
4. To compare siliguri with other polluted cities in India.
5. To put forward Ideas and recommendations to reduce vehicular pollution by re-designing, taking new strategies, implementing strict Govt. Rules & regulations related to transport traffic, and many action policies by the governmental bodies Of the City.

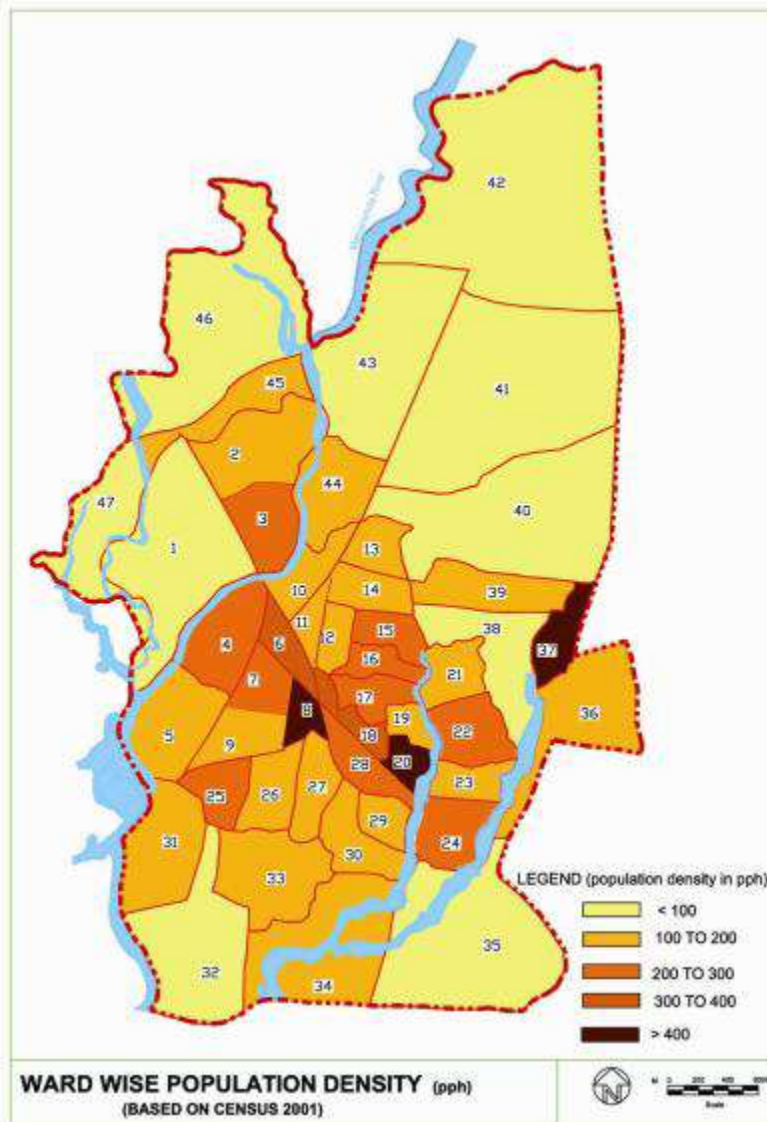
Introduction:

The City of Siliguri like many other big cities in India, is suffering from enormous Air pollution due to excessive high growth of Air pollutant as a result of Vehicular air pollution or fossil fuel burning from rapid growth of motorized transport. As per the Siliguri Municipal Corporation and West Bengal pollution Control Board's report Siliguri's poor Air quality is attributed to, (1). Very less surface area of the roads comparing to the human and vehicular population, (2). Ever growing high density of population uses the same road space as of 1960s, (3). Ever growing number of vehicular population including the old high pollutant emitting vehicles still in service and it is with the new additions of vehicles, (4). Speed breakers and slow moving vehicles create jams & congestions in the Siliguri city. (5). Other than these, Road encroachment by illegal parking, migration of people from adjoining districts & states, by illegal shops or Hawkers makes the slow moving traffic. This essentially raises the Air pollution level. Since 1990 the number of Vehicles are growing rapidly in Siliguri . From 2004 to 2014 the growth rate of two wheelers was more than 76 % in India, which was highest in the world after defeating China and in case of Siliguri the growth of two wheelers is much higher than any other cities of North Bengal. The amount of diesel run commercial and personal four wheelers, Good Carriers three wheelers has grown almost 25% in this time. According the Reports of WHO Cities like Siliguri are much more vulnerable to several respiratory diseases including COPD, Cancer, Ischemic Heart Disease etc as compare to big metros because, of small congested size of the cities , heavy density of growing populations, rapid growth of vehicular traffic etc.

The Area of the Study:

Our study area is based on the area under the jurisdiction of Siliguri Municipal Corporation (SMC). The Area is based on 47 wards of the city and little area under city suburbs. From east (Ashighar More) to west up to Matigarah it is approx 8.5 km wide and from North Shalugarah to south Fulbari it is approx 10 km long. The core area of the City is 41.90 km² with a population of 705,579 (2011 census) and

1057,438 in siliguri metropolitan area. The density of population is 12000/km². This shows a huge growth of population has taken place with ever increasing vehicular traffic and congestion since 1950s.



Ward wise population density of Siliguri

Vehicular Growth & Pollution level in Siliguri:

Siliguri city is one of the most important junctions in India, as it is called the gateway to Northeast, transit point to the neighbouring countries of India, and surrounded by state like Bihar & different districts of North Bengal. That is why Thousands of Diesel run four wheelers, including Buses, trucks, dumpers, different Commercial passenger vehicles and private vehicles rushes into the city goes out of it every day. The two wheeler growth or revolution in numbers of two wheel vehicles has outnumbered Siliguri from a very stable walk able city and put to a city vulnerable or prone to road accident. According to the WBSTC, NBSTC, and Siliguri Mini Bus Syndicate association and City auto syndicate association, an estimated 2 lakhs two wheelers run in the congested city like siliguri where, around 4000 diesel run city autos, around 1000 buses (including govt, private local & long distance and school buses) and thousands of other diesel run private passenger vehicles run in this city. The available road space situation in Siliguri and total number of vehicular population exhibits negative

co-relation in siliguri. This results in road congestion leading to higher level of vehicular polluting emission. There is several types of fuel emission from the vehicles like, every time the vehicle starts for running, when it is running or when it get into traffic congestions etc.

Methodology:

In our attempt to study vehicular pollution in Siliguri City we first gone through several information and data and other literature related to our topic from various sources like online sources, websites like RTOs of India and West Bengal, West Bengal pollution control Board, WBBSA, WBSTC, JNNURM, SMC etc. There after we gathered data after visiting different pollution prone areas and junctions in Siliguri and interviewed several govt bodies including Siliguri Metropolitan traffic police and Siliguri Municipal Corporation. Even we took help of data collected from various Government Reports and various latest news paper cuttings related to Siliguri's Air pollution. After the data collection, tabulation and analysis have been done and interpretation put forwarded regarding this matter.

Relevant photographs have been taken during the field survey.

Table: 1

Main Auto Mobile Pollutants Siliguri

Main Pollutants	Source & Their Effects on Human Health
Carbon Monoxide(CO)	Vehicular transport is the principle source of CO in the city of Siliguri. It is widely responsible for respiratory disease and other cardiovascular diseases.
Nitrogen Oxides(NO)	NO _x is a cause of surface ozone formed in the troposphere. Siliguri's Road transport contributes to about 50 percent of total NO emission. NO increases vulnerability to Infections and /or irritation of Lungs, eye, nose and throat.
VOC (volatile organic compounds)	It includes wide range of hydrocarbon, oxygenates and halogen-containing species. Its effects on human health include eye, nose & throat irritations, headaches, loss of co ordinations, nausea and damage to the central nervous system and causes various lung diseases.
Hydro Carbons(HC)	Different HC's have different Hazardous effects on human health and on plants. In Siliguri about 15% of total HCs come from vehicular pollutions.
Sulphur Dioxide(SO₂)	Automobile sector is the main source of SO ₂ . It effects lungs adversely and cause of Acid rain.
Lead	The source of Lead is automobile sector. Its effects includes Impairment of liver and kidney and brain damage in children resulting in lower I.Q., with high level of lead in the air causes hyperactivity and reduce ability to concentrate.
Ozone(o₃)	Source is automobile sector and it increases the chance of infections, impairment of respiratory system.
Particulate Matters(PM)	Particulate matter or fine particulate matters include dust, dust particles of different forms of chemicals on road and are most dangerous and hazardous to human respiratory mechanism. Can cause COPD to lungs, or many other auto immune diseases of lungs or respiratory system. This is in enormous amount in the Air of Siliguri. It makes AQI of Siliguri worst.

Source: Air Pollution: A Study on Siliguri by WBPCB

Main Reasons of Poor Air Quality Index as a result of Air pollution from automobile sector in Siliguri

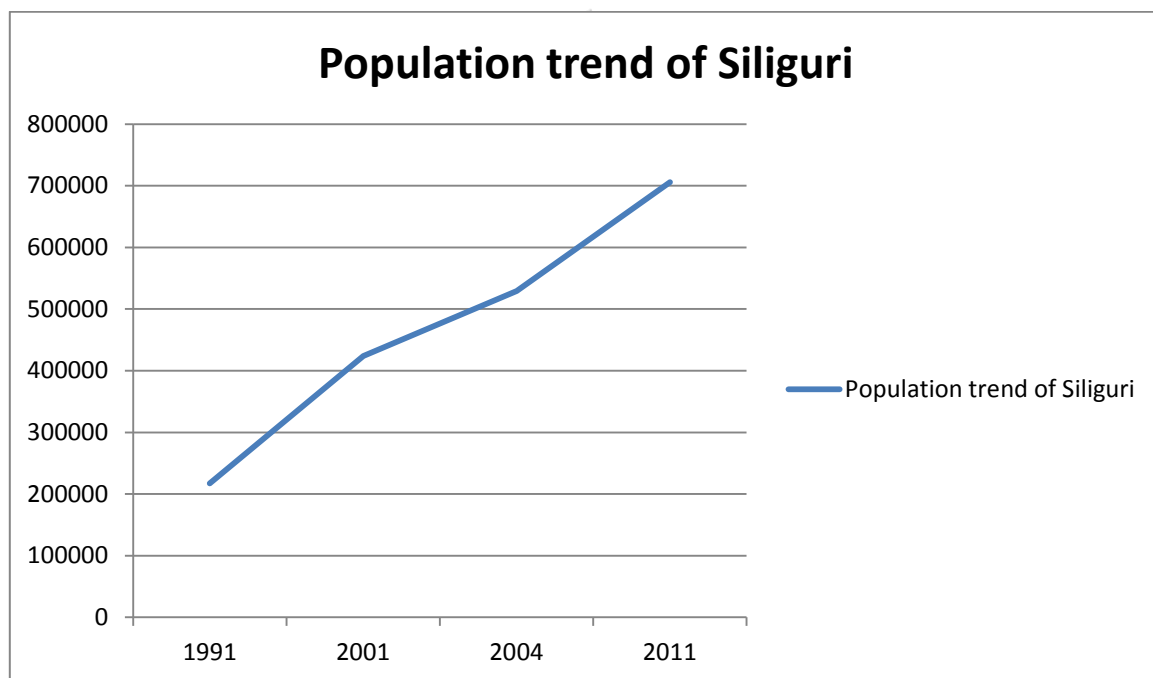
There are multiple reasons which are responsible for automobile pollution in Siliguri. Like,

- (A) Very high emission from diesel run three and four wheels (both private & public passenger vehicles) .
- (B) Huge growth in the number of both two wheels and E. Rickshaw in Siliguri. The Two wheels emit lot of polluting matters in the air and E. Rickshaw and bikes create enormous jam and illegal encroachment in the city, and thereby increasing pollution level in Siliguri.

- (C) There exists adulteration of fuel in Siliguri. The using of (Kerosene, benzene and exhaust mobile) in the engine of three wheelers that is the autos in siliguri mostly uses, raises the pollution level in the air and makes it very dangerous to breath in it. It is also found in our study that vehicles are very poorly maintained and their engines emit lot of polluting matters in the air.
- (D) Improper or callous traffic management, erratic traffic behaviour, road encroachment, all these lead to congestion and thereby high emission of toxic pollutants in core city areas of Siliguri.
- (E) Improper construction of Siliguri Flyover, unscientific construction of speed breakers & road divider and Illegal & unscientific Car & two wheels parking in main roads(H.C road, Sevoke road, S.F Road, Bardhawan Road etc) makes the city of Siliguri a horrible place for traffic movement in orderly manner.

The Concentration of Pollutants at Various Important Areas in the City of Siliguri:

In our survey, 7 important areas have been selected to estimate the level of Air pollution level in the city of Siliguri. In that measure we found that HC road, Darjeeling more, Airview more, Church Road, Siliguri old Town station area, Bidhan Road, Sevoke road, Panitanki more, Asighar More, Khaprail More, Jhankar More, Tinbatti More, S.F. road and Siliguri junction area are recorded to have high concentration of SPM, SO₂, NO₂, RPM, CO₂ and CO in comparison to other important areas of the City of Siliguri. So these areas are quite heated also and can be considered to be the heat island in this area, as other places nearby to this place are 4 to 5 degree less hot as compared to these places.



Population of Siliguri in Thousands. Source : wikipedia

Rate of population growth in decades in SMCA 1991 to 2011 is 118%.

The condition of the city of Siliguri as compare to other cities in India:

According to the empirical studies & reports of The West Bengal Pollution Control Board (WBPCB) and Central pollution control board Siliguri is one of the most polluted Cities in India and 3rd most polluted city in West Bengal. Other most polluted cities are Delhi, Lucknow, Noida, Allahabad, Bangalore etc. The severity of SO₂ in the air of cities like Delhi has been reduced from before as diesel has been replaced by CNG in many places. Even NO₂ also reduced in many places like Faridabad, Ahmedabad, Bangaluru etc as new improved vehicles (BS 4 & 5) is introduced in many areas and banning old high pollution emitting diesel vehicles. In cities like Kolkata, Bangaluru, Hyderabad, Pune, Ahmedabad, the amount of RSPM has been declined as a result of using of cleaner fuel but the SPM (Suspended particulate matters) is not same and stable in cities, because of high traffic, bad road conditions, and increase in natural dust and reduction in rainfall.

According to the WBPCB & CPCB reports the AQI recorded in Siliguri on 13th February 2018 was much worse than any other polluted cities in India like faridabad, Kolkata, Delhi, Noida, Gaziabad etc.

Vehicular air pollution effects on health:

Several effects of vehicular pollution on human health particularly on respiratory mechanism and nervous system have been observed. Some of them are as follows,

Allergic Alveolitis: As a result of long term use of adulterated fuel in vehicles and huge emission from large number of petrol driven vehicles, the amount of SO₂ and NO₂ increases enormously in the Air, which is the cause of Allergic Alveolitis. This is a kind of auto immune lung disease.

Bronchial Asthma: High amount of NO_x, SO₂, Particulate Matter and surface ozone in the air are responsible for increase in morbidity and mortality from Bronchial Asthma as a result of air pollution due to automobile emission.

Chronic Bronchitis Due to maximum concentration of dust and SPM in the Air from exhaust emission of automobiles Chronic Inflammatory lung disease or inflammation of bronchus causes breathlessness, chest pain and cough.

Chronic Obstructive Pulmonary Disease (COPD): Maximum inhalation of SO₂, SPM and RPM for prolonged time causes COPD(Chronic Obstructive Pulmonary Dysfunction).

Lung Cancer: Lung cancer is a result of long exposure to toxic SPM, PM 2.5. In India the amount of lung cancer is highest as comparing with other countries..

Pulmonary Edema: Pulmonary Edema, Emphysema and ageing of respiratory mechanism is a result of structural changes of lungs due to prolonged exposure to NO₂ and surface ozone.

In our survey in Siliguri , we have found that the residents who have been staying here for longer time are susceptible to many types of health issues like COPD, Bronchial Asthma, Lung Cancer , Hypertension, Eye problem, reduction of fertility different types of heart & Neurological diseases which are mainly due to poor Air Quality Index of the City of Siliguri.

Table: 2

Air Pollutant	Minimum	Average	Maximum
O ₃	7	64	152
SO ₂	2	8	14
NO ₂ (mg/m ³)	18	47	120
CO	1	20	107
NH ₃	1	12	22
P.M. 2.5(mg/m ³)	99	252	390
P.M. 10(mg/m ³)	71	152	314

As per the WBPCB's Air monitoring station (Babu para, Siliguri) report the above poor AQI report of Siliguri was responsible of breathing discomfort, burning eyes, headache, for many people in Siliguri during the month of February 2018. As per the AQI reports the PM 2.5 is the ultra thin toxic particulate matter which is very harmful to human being as it can penetrate to the deepest crevices of Lungs and cause severe damage to the lung and can trigger many auto immune diseases.

Table: 3

AQI	Impact on Human Health	Effects
0-50	Minimum Impact	Good
51-100	Minor breathing discomfort to sensitive people	Satisfactory
101-200	Breathing discomfort with Lungs, asthma, heart diseases.	Moderate
201-300	Breathing discomfort to most people.	Poor
301-400	Respiratory illness to prolonged exposure	Very Poor
401-500	Affects healthy people and seriously impacts those with existing respiratory diseases.	Severe

Table: 4

CITY	Air Quality Index
New Dehli	258.6
Ghaziabad	297.3
Faridabad	290.3
Siliguri City	343.6

Source: WBPCB 13 feb. 2018

According to the reports of WBPCB & CPCB the average value of AQI of Siliguri was 344 during 8th to 13th February 2018, which was enough to create respiratory illnesses for lakhs of people residing at Siliguri.

Recommendation of Policies for reduction of vehicular pollution in Siliguri City:

There should be proper adaptive strategy for resistance to Air pollution in the City of Siliguri.

Firstly, as per the Prevention & Control of pollution Act 1981 the SMC(Siliguri Municipal Corporation) should banned all diesel commercial & private vehicles which are older than 15 years or more.

Secondly, all city autos and diesel run commercial passenger buses should converted to either LPG or CNG.

Thirdly, there should be checks and bans by the regulatory authority on the use of adulterated fuel (both petrol & diesel).

Fourthly, all two & three wheeler vehicles having two stroke engines should be banned by the motor vehicles department in operating in the Siliguri city area. Each & every vehicle should be checked whether they posses pollution certificate time to time or not.

Fifthly, the amount of JNNURM buses should be increased to operate in the city of Siliguri as they emit less pollution and are BSIV standard. Number of E. Rickshaw should be minimum in the City and should be registered by the SMC and should not be allowed in the main roads of Siliguri in busy hours (from 9 am to 9pm)

New modernized City traffic planning should be introduced so that Siliguri's Vehicular traffic should be managed properly so that jams and congestions can be avoided and in that way Air pollution can be reduced.

Plantation of trees should be as much as possible throughout the city of Siliguri in order to reduce carbon emission in the city's air. In this matter many private NGO can take vital role with SMC.

People of Siliguri should be trained properly by the Govt, SMC and other Non Govt. Organisations, about the traffic rules & regulations and the benefits can be acquired by abiding them. Lastly govt should take actions against any kind of road encroachment issues and should properly rehabilitate those people who are deprived of their jobs on roads.

Conclusion:

If we look just 30 years back the city of Siliguri was much cleaner and greener. But it has become one of the most polluted cities in India now. The above sighted points should be implemented at least, in order to make the Siliguri City less polluted and a place for normal living and breathing.

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