

ANALYSIS OF AIR POLLUTION IN NORTHERN MUMBAI

By

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Introduction

Air pollution occurs when harmful or excessive quantities of substances are introduced into Earth's atmosphere. Its sources include gases such as ammonia, carbon monoxide, sulphur dioxide, nitrous oxides, methane and chlorofluorocarbons, particulates both organic and inorganic and biological molecules. It may cause diseases, allergies and even death to humans; it may also cause harm to other living organisms such as animals and food crops and may damage the natural or built environment. Both human activity and natural processes can generate air pollution. The levels of air pollution in Mumbai are high and rising. Since Mumbai is a metropolitan city with a lot of opportunities, many people from around the country travel from their homes to Mumbai causing population explosion. This causes a substantial increase in the number of motor vehicles on the roads of the city. The emissions from these vehicles cause an added damage to the already damaged air quality in the city. Industrialization and luxurious living also cause air pollution. The present paper evaluates the quality of air in the Northern wards of Mumbai.

Review of Literature

(A. K. Chinnaswamy et.al, 1995) According to the study new buildings are provided with huge balconies which leads to insolation and heating in the house, thus, the houses are meant to have centralized air conditioning which harms the environment **(Government of India, 2015)** Report of the steering committee on air pollution and health related issues, the Global Burden of Disease 2010 (GBD) ranked air pollution as a leading cause of death and disability in India. Traditional stoves, biomass combustion produces a range of toxic products resulting from incomplete combustion, including PM_{2.5} that is roughly equal to burning about 400 cigarettes an hour during cooking. Given that this occurs at the times and places where people are breathing, a large percentage of the population (particularly women and children who tend to be in the kitchen most) are exposed to this source of pollution.

Research Objectives

1. To analyse levels of air pollution in Northern Mumbai
2. To understand the causes of air pollution in Northern Mumbai

3. To suggest applicable measures to minimize the impact in Northern Mumbai

Research Methodology

Coverage

The area of study chosen is the city of Greater Mumbai and the unit of analysis is the Municipal Wards of the city. Its latitudinal extension is between 72.800N to 73.20N and longitudinal extension is between 18.90E to 19.300N. It is surrounded by Arabian Sea in the west, Thane district in the North and East and Raigad District in the South.

The area covered for the present study is Northern Mumbai and the unit of analysis is wards. Northern Mumbai consists of five wards viz. P/N, P/S, R/S, R/C and R/N.

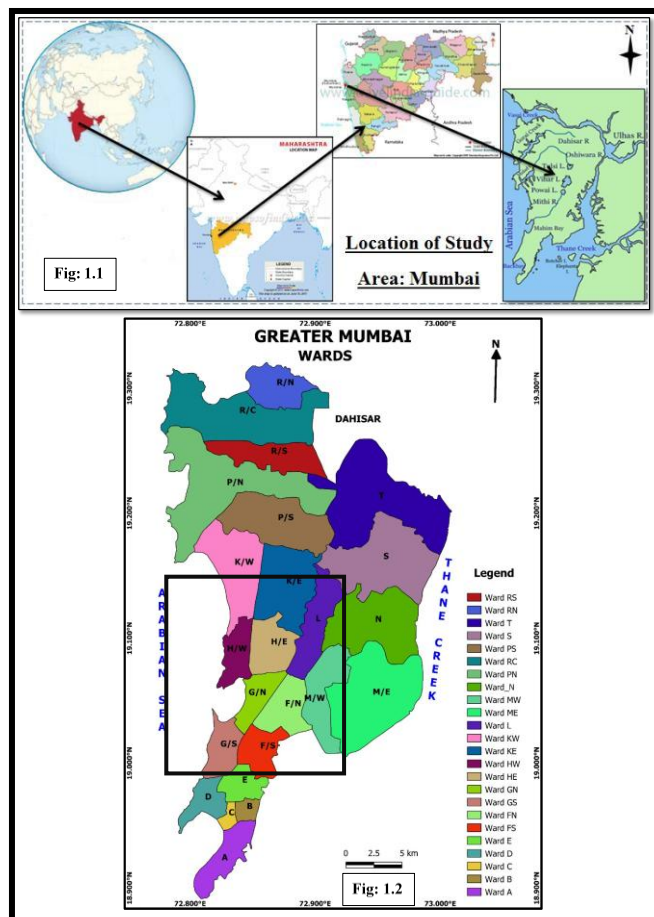


Table no. 01

Areas Covered Under Each Ward of Northern Mumbai

Sr. No.	Ward	Area Covered
1	P/N	Malad
2	P/S	Goregaon, part of Malad and Oshiwara
3	R/S	Kandivali
4	R/C	Sanjay Gandhi Rashtriya Udyan (National Park), Gorai, Kulvem Village (Devidas Lane) N.D.Zone to Link Road from Devidas lane to N.C. Phadke flyover the bridge and Daulat Nagar, Cemetery River to Nancy Colony wide Road, Chogale Nagar, Borivali(E).Khao Estate, Bor Industries wide D.P.Road, Railway subway Poisar Depot, Borsapada Rd. Mahavir Nagar RDP-4, Charkop up to Creek
5	R/N	Dahisar

Research Methodology

The methodology is divided into three phases so that it can be followed and represented systematically. The three phases are as follows:

Pre-field: Selection of area for each ward has been carried out and 10 locations have been selected randomly from each ward. To gain knowledge about the study, secondary data has been referred to undertake an extensive review of literature.

On field: The field work has been undertaken in the month of January 2020. The real time air pollution data has been collected with the help of air monitoring device which provides real time analysed air quality index of air. The device used here is the Airveda's Air Quality Monitor.

Post Field: The collected data has been stored, processed, analysed and represented using MS-Excel.

Results and Analysis

1.

Ward P/N- Malad

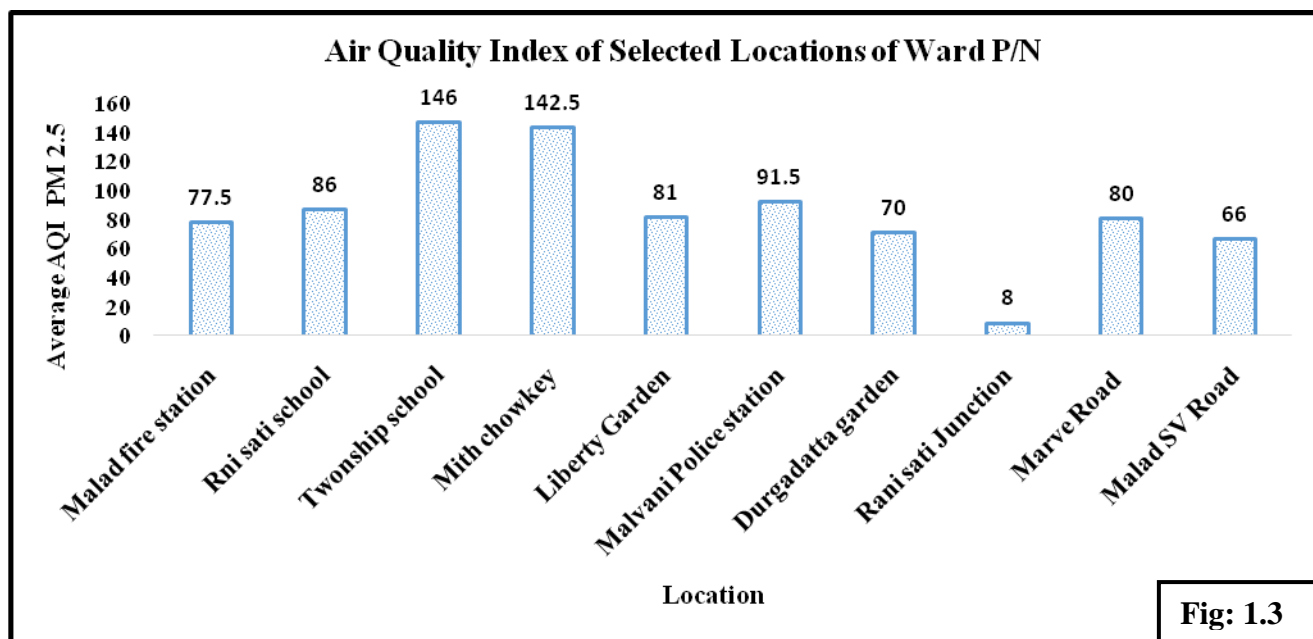


Figure 1.3 shows the Air Quality Index of selected locations in Ward P/N. It is observed from the graph that Township school and Mith Chowkey have the highest AQI level which is $146 \mu\text{g}/\text{m}^3$ and $142.5 \mu\text{g}/\text{m}^3$. This may be due to their location viz. junction. It leads to high traffic and greater vehicular emission. This makes their air quality very poor which may cause severe respiratory disorders. Rani Sati School, Malvani police station, Liberty Garden and Marve Road show moderate level of AQI ranging between $86 \mu\text{g}/\text{m}^3$ to $80 \mu\text{g}/\text{m}^3$. Malad fire station, Malad SV road and Durga Datta Garden also have moderately satisfactory air quality

index which is between $77.5 \mu\text{g}/\text{m}^3$ and $66 \mu\text{g}/\text{m}^3$. It may be due to narrow roads causing higher congestion. At Rani Sati junction the air quality is very good at $8 \mu\text{g}/\text{m}^3$ which may be due to larger width of the road avoiding congestion and vehicular emission in the area.

2.

Ward P/S- Goregaon

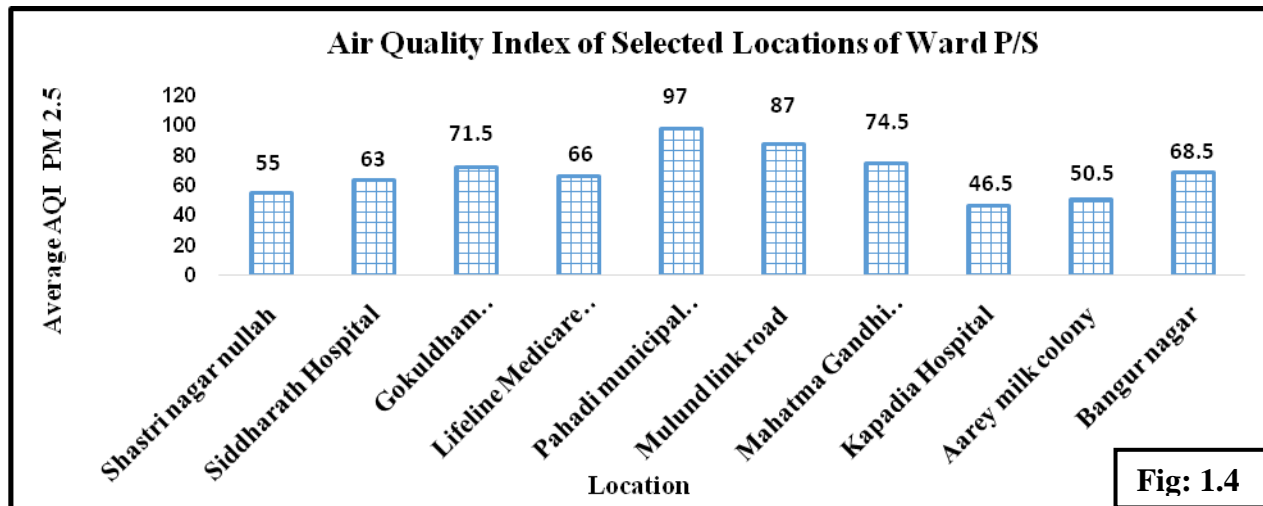


Fig: 1.4

The figure 1.4 shows Air Quality Index of selected locations of ward P/S in which it is observed that Pahadi Municipal School and Mulund Link Road have the highest AQI level which is $97 \mu\text{g}/\text{m}^3$ and $87 \mu\text{g}/\text{m}^3$ respectively. It may be due to the location of the areas viz. junction due to which there is high congestion on the road. In Shastri Nagar Nullah the AQI level is $55 \mu\text{g}/\text{m}^3$, In Aarey Milk Colony the AQI level is $50.5 \mu\text{g}/\text{m}^3$ which may be due to concentration of trees in the area. Kapadia Hospital shows lowest level of pollution which may be due to restricted movement of vehicles around the hospital.

3.

Ward R/C- Borivali

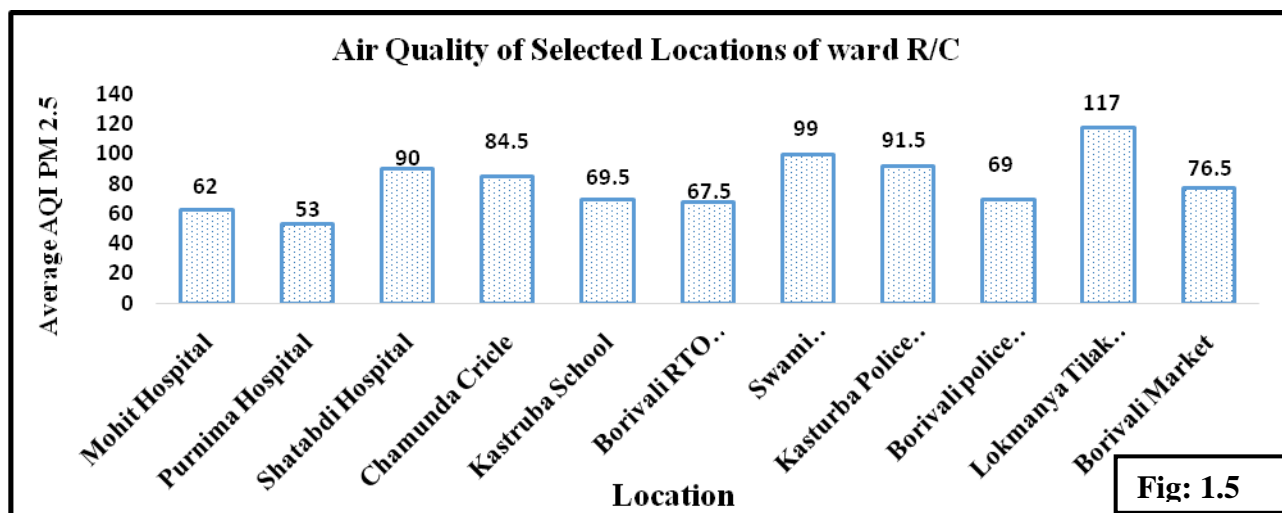


Fig: 1.5

Figure 1.5 represents Air Quality Index of selected locations of ward R/C. It is observed that Lokmanya Tilak Road has the highest AQI level of $117 \mu\text{g}/\text{m}^3$ which is due to traffic emission which leads to high air quality index in this area. Chamunda Circle, Borivali

market, Borivali RTO office, Kasturba School, Mohit Hospital and Borivali Police Station have the lowest AQI level which may be due to large width of the road and less traffic in these areas.

4.

Ward R/S- Kandivali

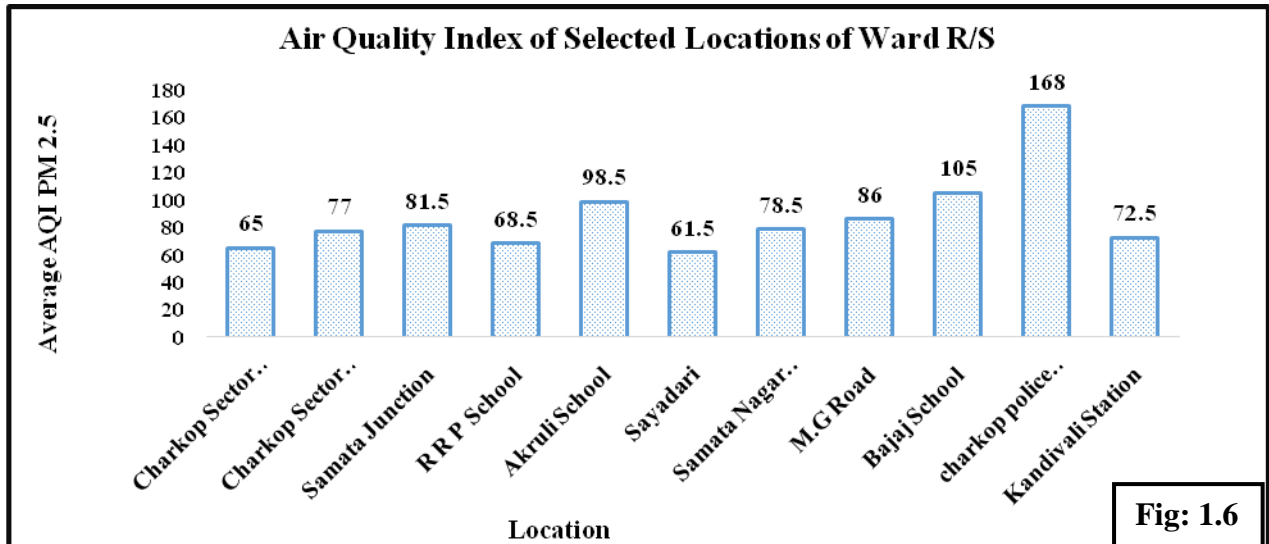


Fig: 1.6

In figure 1.6 Air Quality Index of selected locations of ward R/S is shown. It is observed from the graph that Charkop Police Station and Bajaj School have the highest AQI level which is $168 \mu\text{g}/\text{m}^3$ and $105 \mu\text{g}/\text{m}^3$ which may be due to narrow roads causing congestion and high vehicular emission. Charkop Sector number 1 school, RRP School and Sahyadri colony have the lowest AQI level which is $68.5 \mu\text{g}/\text{m}^3$ to $61.5 \mu\text{g}/\text{m}^3$ which is due to the residential nature of the areas allowing only private vehicles to pass through the roads.

5.

Ward R/N- Dahisar

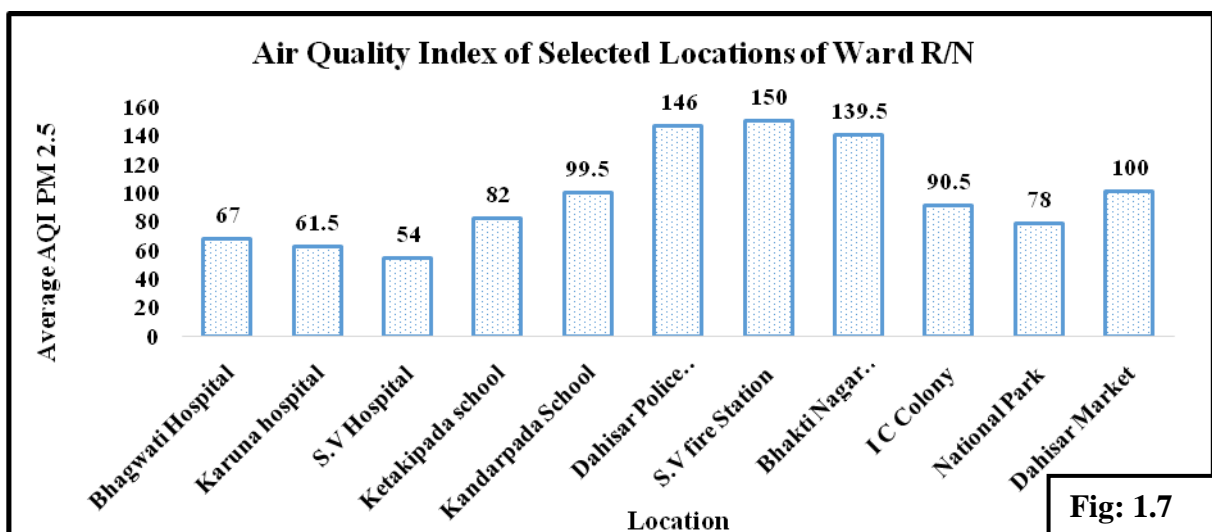


Fig: 1.7

Figure 1.7 represents Air Quality Index of selected locations of ward R/N and it is observed that S.V fire station, Bhakti Nagar, G.S road and Dahisar Police Station have the highest AQI levels at $151\mu\text{g}/\text{m}^3$, $39.5\mu\text{g}/\text{m}^3$ and $146\mu\text{g}/\text{m}^3$ respectively driven by high traffic and ehicular emission. At Bhagwati Hospital, Karuna Hospital and SV Hospital, the Air Quality Index is $67\mu\text{g}/\text{m}^3$, $61.5\mu\text{g}/\text{m}^3$ and $54\mu\text{g}/\text{m}^3$ respectively which it may be due to large width of the road and trees along the roads.

Major Findings- Objective wise

1. There are 5 wards in Northern Mumbai which is taken in the study area. The sum is calculated for each ward as follows:

WARD	SUM OF AIR QUALITY INDEX PM 2.5
Malad	$467.5 \mu\text{g}/\text{m}^3$
Goregaon	$252.5 \mu\text{g}/\text{m}^3$
Borivali	$453 \mu\text{g}/\text{m}^3$
Dahisar	$629.5 \mu\text{g}/\text{m}^3$
Kandivali	$590 \mu\text{g}/\text{m}^3$

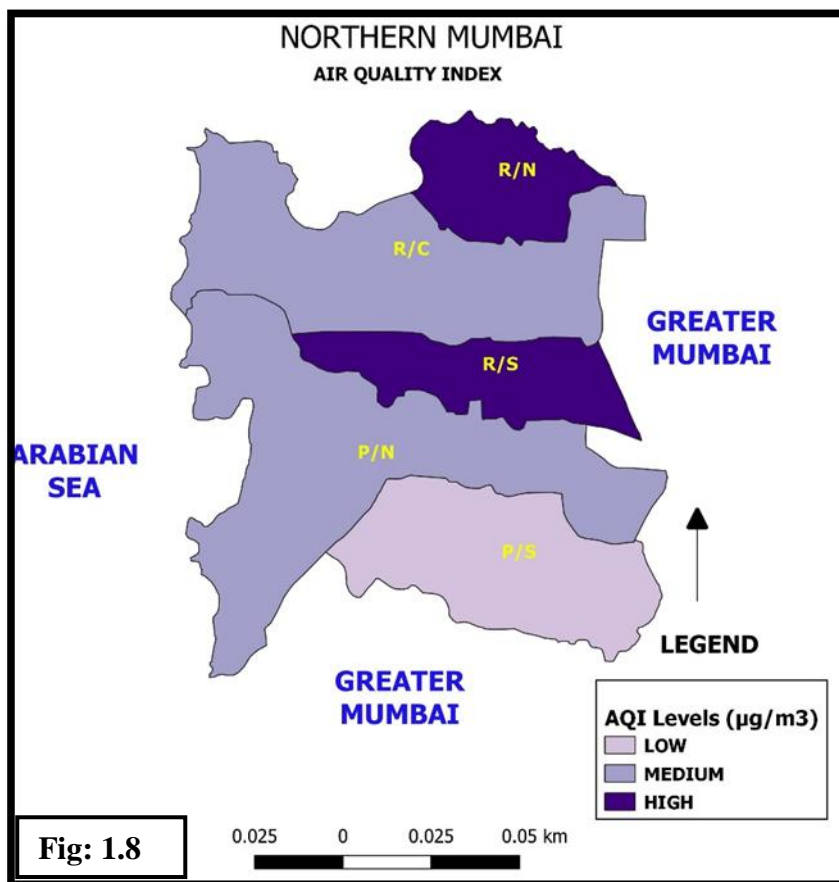


Fig: 1.8

It is observed that Dahisar is worst affected by air pollution in the study area and Goregaon is the least affected. However, this is only when compared, the levels are independently high and cross the ideal levels for a healthy environment.

2. The underlying causes of air pollution in the study area are as follows:
- a. Over population
 - b. Large number of vehicles
 - c. Narrow roads
 - d. Congestion
 - e. Ignorance

Conclusion

Air pollution is increasing day by day and leading to various problems which has made it important to study the levels of air pollution in Mumbai. Air pollution leads to environmental issues and causes harm to the health of human beings, livestock and vegetation. Transportation is also affected due to pollution in air. There are many diseases which are caused by air pollution. The study reveals that the levels of air pollution is high in the city. The higher the AQI, the higher the level of pollutants, the higher is the pollution and vice versa.

Recommendations

- People should be advised to switch over to public transport instead of using private vehicles. Carpooling could also be an apt measure.
- Instead of using petrol or diesel vehicles, people should use CNG gas run vehicles. Futuristic electric cars could be a good option.
- Vehicle should be serviced regularly so that there is less release of smoke emission
- Afforestation must be encouraged.
- People should wear mask while travelling as a precaution from pollutants.
- Government must undertake road widening wherever possible.

References

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