



ASSESSMENT OF AIR QUALITY IN MEDINIPUR TOWN DURING PRE-LOCK DOWN, LOCK DOWN AND POST LOCKDOWN PERIOD: A COMPARATIVE STUDY

Environmental Study

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ABSTRACT

Air Quality is most important factor for human and sustainability of environment. Therefore, this study allows to show the quality of air in Medinipur town in between the time period pre lock down, lock down and post lock down period. In this study noticed that the graph of Air Quality Index is become satisfying position in lock down period. In pre lock down period the AQI value of Medinipur city are above of 100 but in the lock down period AQI value become 40-60 and after the lockdown period the AQI value is slowly increase due to changing amount of NO₂, PM₁₀ and SO₂ pollutant. Those changes playing significant role of positive impact of lock down. Here mainly showing a comparative status of air quality in pre lock down, lock down and post lock down period in Medinipur town.

KEYWORDS

Air Quality Index (AQI), Lockdown, PM₁₀, Environment sustainability

INTRODUCTION

Every year, billions of people are affected by the crucial problem of air pollution (Louati et al. 2018; Son and Louati 2016). The World Health Organization (WHO) estimates that pollution may be directly responsible for more than 25% worldwide fatalities (Amal et al. 2018). According to the global disease assessment, particulate matter (PM) 2.5 pollution caused 0.99 million premature deaths in 1990 and 0.78 million in 2016 (GBD MAPS Working Group 2018). In Asia, 35% of deaths were due to air pollution when highest pollution levels recorded (2015). Large cities, which have a lot of difficulty for balancing air quality and the environment, are particularly affected by pollution (Sharma et al., 2019). An index for daily reporting on air quality is the air quality index (AQI). It is an indicator of how quickly air pollution damages a person's health. The AQI was created to assist people better understand how their local air quality affects their health. For five major air pollutants (particle pollution/particulate matter (PM 2.5/PM₁₀, ground-level ozone), carbon monoxide, nitrogen dioxide, and sulphur dioxide), for which national air quality standards have been established to protect public health, the Environmental Protection Agency (EPA) calculates the AQI. India incorporates 640 districts, and under which, 27% districts exceeded the annual standard value of 40 µg/m³ in 1998, and 45% reached it in 2010 which create more severe problem (Guttikunda et al. 2019). As a result, Delhi continues to be ranked sixth out of the top 10 most polluted cities in the world, declared by the World Health Organization (WHO). According to the database of WHO Delhi is the extreme polluted city for PM₁₀, which is the very dangerous air pollutant content (Donkelaar et al. 2016; WHO 2018).

Midnapore, the city of tribal tradition, also spelled Medinipur, is located in south-central West Bengal of north eastern India. The town Midnapore extends over a territory of 18.65 square km, included in the municipality. For study purpose used three-year's 2019, 2020 and 2021 (till April) Air Quality Index (AQI) data of three major air pollutants (PM₁₀, NO₂, SO₂) which are collected from the West Bangle Pollution Control Board (WBPCB), during the pre-unlock and post- lockdown period of Covid19 in Midnapore. In the research have been noticed that air pollution is not only due to population growth, but also for other human activities. The quality of the ambient air depends on the presence of various air pollutants in the atmosphere such as particulate matter, sulphur oxides, carbon monoxide, trioxigen and nitrogen oxides which are standardized by the United States NAAQS (National Ambient Air Quality Standards) under the authority of clean air act, to human health protection and also environment protection with suitable edges. That study also helps to know how AQI become good in lockdown period also represent a comparative status pre-lockdown, unlock and post lockdown period in Medinipur town.

This comparative study tries to fulfil some important objective like to know present status of air quality in pre-lock down, unlock and post lock down period in Medinipur town. It also tries to measure trend of

air quality index changes in Medinipur town.

Description Of Study Area:

The administrative head quarter of Paschim Midnapore district of West Bengal is Midnapore Municipality. Geographically Midnapore municipality located in the central part of Paschim Midnapore district. It extends from 22° 23' 44.56" to 22° 26' 34.91" North Latitude and 87° 17' 18.57" to 87° 20' 30.12" East Longitude. This town situated by the banks of the Kangsabati River (differently known as Kasai and Cossye). The socioeconomic and demographic structure of Midnapore's urban growth has experienced substantial metamorphosis as a result of shifting historical, social, economic, political, and administrative causes at both the local and regional levels. The morphological, vocational, socioeconomic, cultural, and other behaviours of the urban system have been affected by this dynamism. Midnapore Municipality consists of 25 wards with an area of 18.36 sq. km. Midnapore Municipality has consistently high rate of population growth throughout its 152 years of existence. The growth of population growth is shown in the table. 50.47 % of total population of Midnapore Municipality is male, other 49.53 % is female. Here the density of population is 9212 persons/ sq. km.



Fig1: Study Area

MATERIALS AND METHODS

Analysis purpose collect the daily air quality data of Medinipur town

from 2019 to 2021, collected from the West Bengal Pollution Control Board (<http://emis.wbpcb.gov.in/airquality/citizenreport.do>). After that depends on highest and lowest value of their AQI value per month, calculating the monthly average of AQI value per month which helps to compared between pre-lockdown, lockdown and post lock down period.

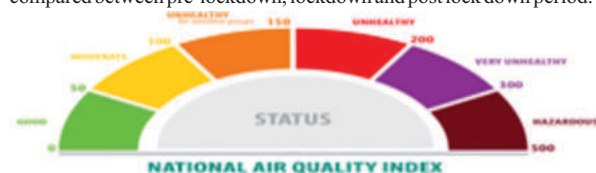


Fig 2: National Air Quality Index (Central Pollution Control Board)

RESULTS AND DISCUSSION

The monthly average AQI value of Medinipur town are divided into three category that are pre-lock down (NOV 2019, DEC 2019, JAN 2020, FEB 2020, MAR 2020), unlock (JUN 2020, JUL 2020, AUG 2020, SEP 2020, OCT 2020) and post-lock down (NOV 2020, DEC 2020, JAN 2021, FEB 2021, MAR 2021, APR 2021) period. After analysis noticed slight decline in the pre lockdown phase, but suddenly this line goes down in the lockdown phase, here AQI value stay nearby 60, this line is low enough until the unlock period (OCT 2020), but it starts to rise again in the post lockdown period after it is unlocked again when the daily livelihood started in normal manner.

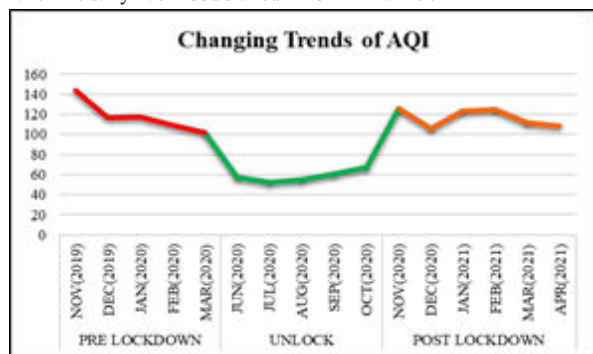


Fig 3: Changing trends of AQI

Here mainly graphically represent the AQI value of different month, where line of JUN, JUL, AUG, SEP and OCT are passed in between the AQI value of 40-60. But line of JAN, FEB, MAR, NOV and DEC are passed in between the AQI value of 100-140. Which indicate middle five months of 2020 of unlock period air quality of Medinipur town are good quality (AQI value 40-60).

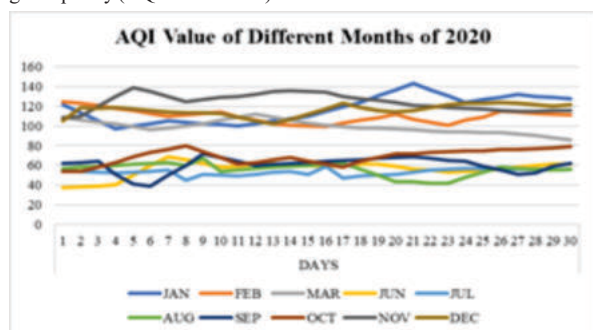


Fig 4: Monthly variation of AQI value (2020)

After analysis the data PM10 value of JAN, FEB and MAR are high than average value of PM10 of the year 2020. The value of PM10 of JUN, JUL, AUG, SEP and OCT are low than the average value of Pm10.

Table 1- Increase / Decrease Value of PM10 from Average Value of 2020

PM 10	JAN	FEB	MAR	JUN	JUL
Increase	34.84	22.66	12.52	0	0
Decrease	0	0	0	26.23	37.31
PM 10	AUG	SEP	OCT	NOV	DEC
Increase	0	0	0	47.32	34.47
Decrease	35.64	29.9	23.3	0	0

*Average Value of PM10 of 2020 is 90.67

(Source : West Bengal Pollution Control Board)

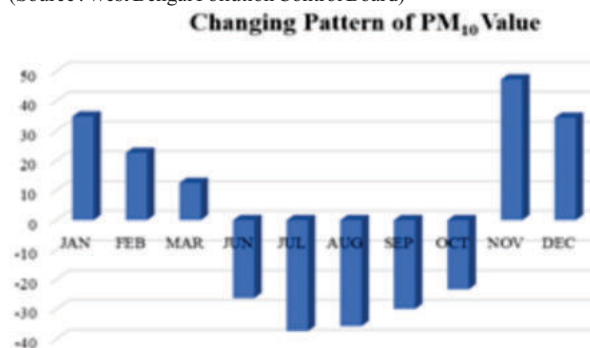


Fig 5: Changing Pattern of PM10 Value.

The significant reduction of PM10 was caused by restrictions on the use of public and private vehicles and other transportation, limitation on construction and industrial activities. So, in unlock period PM10 value become good and create a sustainable environment for human health in this town area, but when post lock down period came then PM10 value increase like pre lock down period.

CONCLUSION

This study represents a comparative image of air quality in Medinipur town during pre-lock down, lock down and unlock period. In the time of analysis lockdown period established a positive image of AQI in respect to pre lockdown and unlocked period. Due to very low amount of pollution and limited maintenance of daily livelihood, the value of NO2, SO2, PM10 were very low in the time of lockdown.

Extreme nitrogen dioxide concentrations can seriously harm respiratory system and make someone more susceptible to and suffering from respiratory symptoms and asthma. Chronic lung disease can be brought on by prolonged exposure to high nitrogen dioxide concentrations. The skin and mucous membranes of the eyes, nose, throat, and lungs are also irritated by sulphur dioxide. Particularly when engaging in vigorous physical activity, high SO2 concentrations can aggravate the respiratory system and induce inflammation. In this lock down period level of NO2 and SO2 decrease so, this negative impact is probably decrease in this lock down period.

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