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STUDY OF AIR QUALITY & ITS EFFECT

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ABSTRACT

Air quality is important parameter of environment that can effect to life of human and other living thing. Effect of air quality can be Positive or negative. Positive effect is results of pure air quality and it means Air is free from any harmful impurities or agents. Negative effect results from poor air quality and harmful for environment including human. Purpose to conduct this study is know the status of Air in different region of India, Causes of Poor Air quality & effective measure to control to pollution and ensure suitable Air quality. In this study, Indoor & outdoor air quality has been also covered to know its impacts and basically focus to poor air quality on based of Air Quality Index (AQI).

Keyword: Air Quality, Health effect of Air Quality, Preventive measure, PM_{10}, $PM_{2.5}$, Pollutants, Air quality index (AQI)

OBJECTIVE:

- To know the benefit of good Air quality
- To know impacts of Air quality
- Identification of Air quality status
- Risk minimization method
- Saving Living & human health
- Ensuring compliance as per respective country regulation

1. INTRODUCTION

Suitable Air Quality is very important to keep Safe environment including Human. Human breathe air and remove Carbon mono-oxide. During breathing two processes occur inhalation & exhalation. Air enters in lungs during breathing, oxygen move from lungs to blood and carbon mono oxide and other waste gases move from blood to lungs and exhaled. Poor air quality always effect to human. They enter in body through inhalation and effect to respirator system and other organ. Exposure of Poor Air quality through inhalation and effect may be Acute or Chronic effect. Acute means person exposed within very short time from Poor Air quality and chronic effect means person has exposed in long time. Indoor environment reflects outdoor air quality. Fossil fuels used in plant & vehicles results outdoor pollution during combustion. This releases carbon monoxide (CO), sulfur dioxide (SO2), particulate matter (PM), nitrogen oxides (NOx), Sulphur Oxide (SOx), hydrocarbons and other pollutants. Air Quality Index (AQI) is categorise in different country from different way. In United State AQI runs from 0-500, India AQI runs from 0-500. Higher the AQI value then pollution level will be high and this will major concern of heath. On based of AQI value air quality is to be decide.

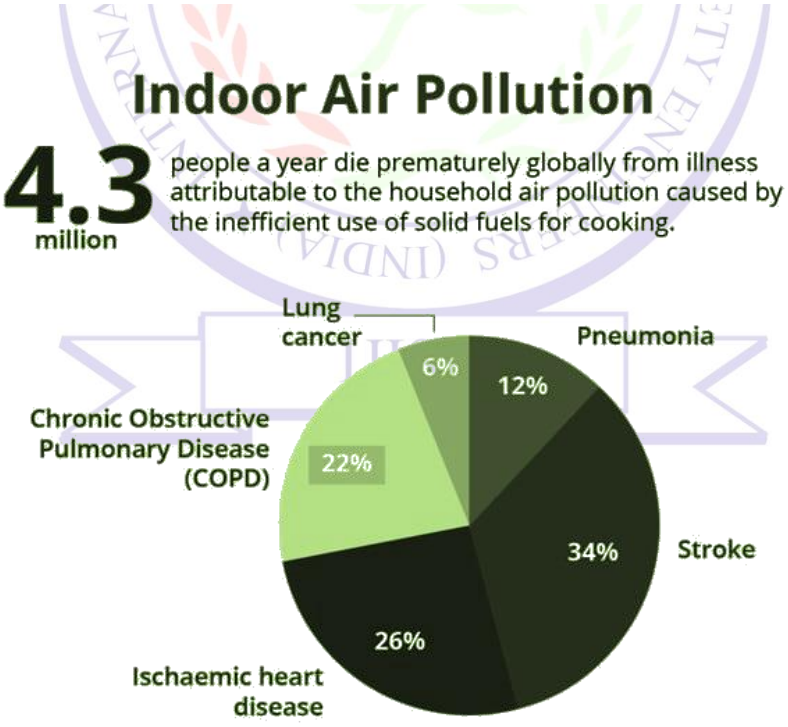


Fig. 1, indoor Air pollution consequence, Sources 2012 data WHO

2. AQI range & Category

There are six categories of AQI, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe. In AQI, Eight pollutants PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, O_3, NH_3, and Pb has been considered basically for which short term upto average 24-hourly period as per National Ambient Air Quality Standards (NAAQS)

Table 1, AQI Range & Category

AQI	Air quality Type	Associated Health Impacts
0–50	Good	No any health impacts
51–100	Satisfactory	Minor breathing discomfort to unhealthy people in few cases
101–200	Moderately polluted	Breathing discomfort to respiratory illness people, discomfort heart disease people, children and older adults.
201–300	Poor	Breathing discomfort due to prolonged exposure, discomfort to heart disease person
301–400	Very Poor	Respiratory illness due to long term exposure, Breathing difficulties to heart diseases person
401-500	Severe	Respiratory illness, Serious health impacts

Sources: CPCB's

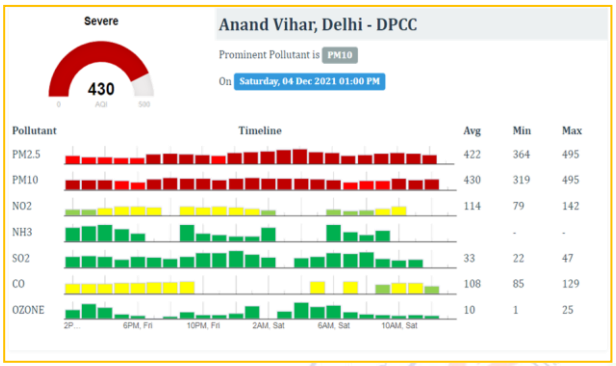
Table 2, AQI Category, Pollutants and Health Breakpoints

AQI Category, Pollutants and Health Breakpoints								
AQI Category (Range)	**$PM_{2.5}$ 24-hr**	**PM_{10} 24-hr**	**NO_2 24-hr**	**CO 8-hr (mg/m^3)**	**O_3 8-hr**	**SO_2 24-hr**	**Pb 24-hr**	**NH_3 24-hr**
Good 0-50	**0-30**	**0-50**	**0-40**	**0-1.0**	**0-50**	**0-40**	**0-0.5**	**0-200**
Satisfactory 51-100	**31-60**	**51-100**	**41-80**	**1.1-2.0**	**51-100**	**41-80**	**0.5 –1.0**	**201-400**
Moderately polluted 101-200	**61-90**	**101-250**	**81-180**	**2.1- 10**	**101-168**	**81-380**	**1.1-2.0**	**401-800**
Poor 201-300	**91-120**	**251-350**	**181-280**	**10-17**	**169-208**	**381-800**	**2.1-3.0**	**801-1200**
Very poor 301-400	**121-250**	**351-430**	**281-400**	**17-34**	**209-748**	**801-1600**	**3.1-3.5**	**1200-1800**
Severe 401-500	**250+**	**430 +**	**400+**	**34+**	**748+**	**1600+**	**3.5+**	**1800+**

Sources: CPCB's

3. Study of AQI

Data collected from different region of India from different sources for study to know Air quality status. Majority of city of India found AQI is poor. Few details given in Fig 2



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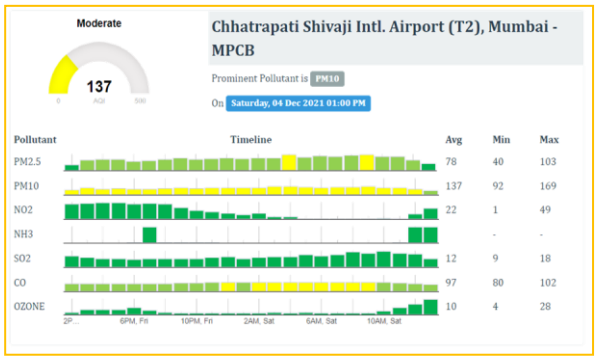

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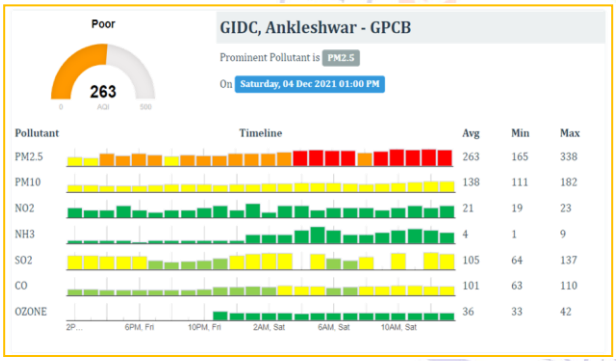

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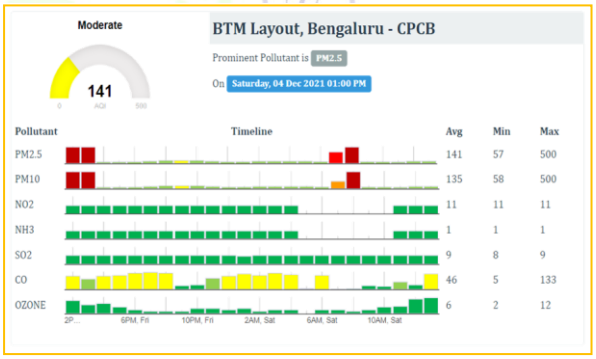

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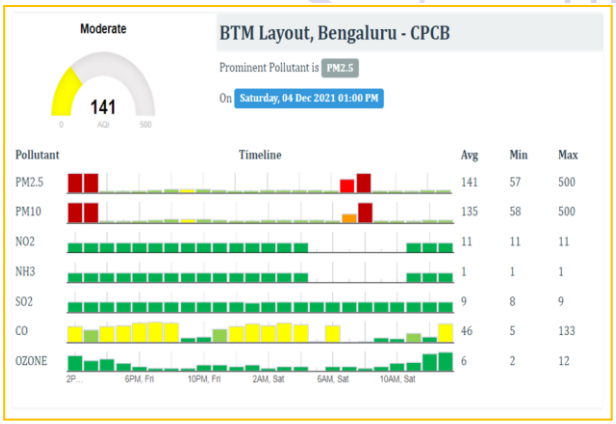

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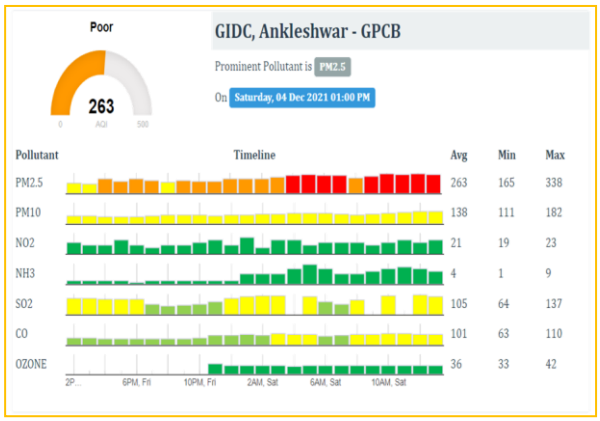

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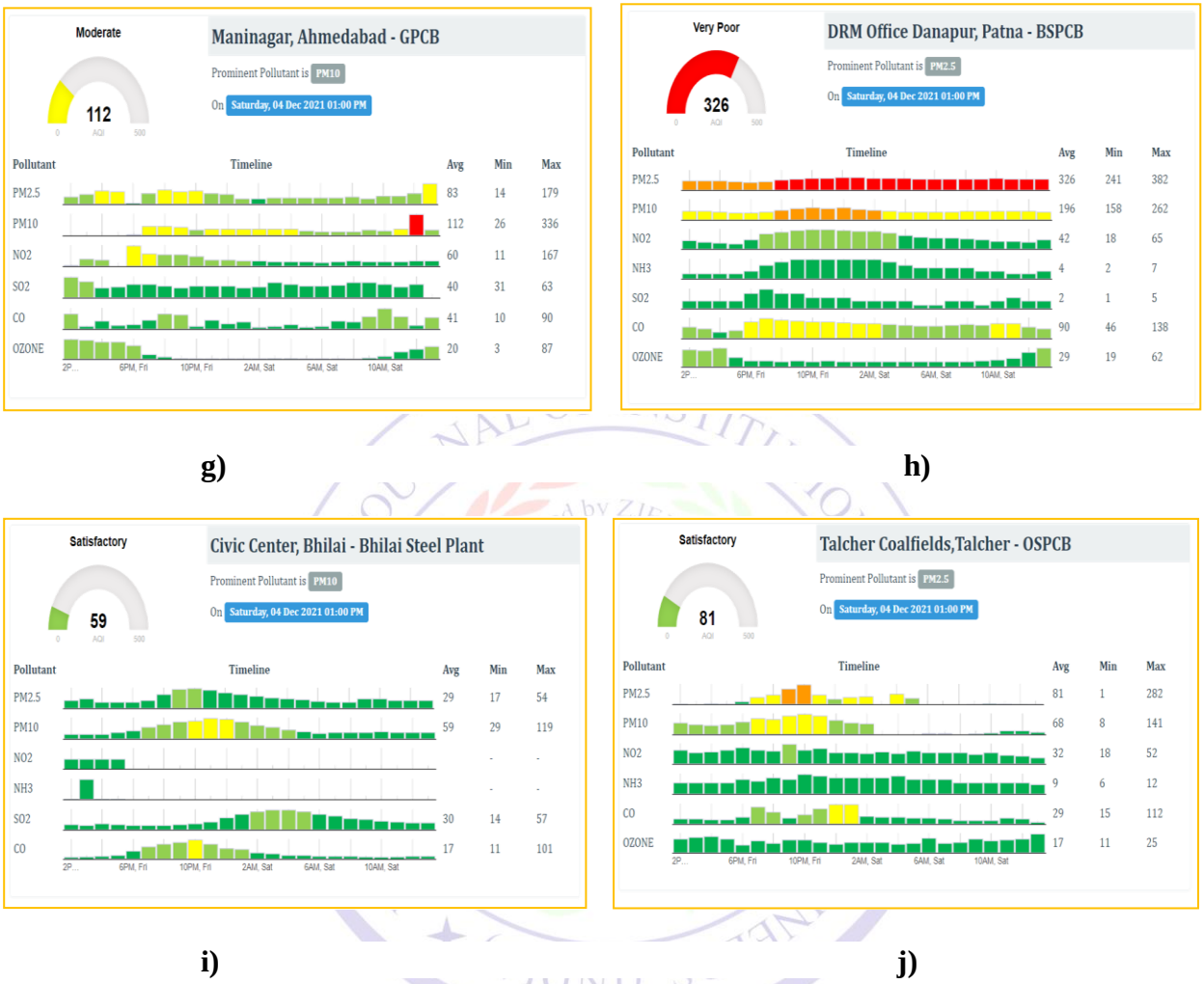

Fig. 2, Sources: https://app.cpcbccr.com/AQI_India/ dated 4 Dec. 2021

4. Causes of Poor Air Quality

There may be several reasons to increase AQI

The Burning of Fossil Fuels: Burning of fossil fuels such as coal, oil, gasoline to produce energy release carbon monoxide in high level indicates how much fossil fuel is burned. This results emission of other toxic pollutants. Such pollutants effect to air quality.

Industrial Emission: Industries is also source of emission of pollutant such as PM_{10}, $PM_{2.5}$, SOx, NOx, CO & other Pollutants. Such pollutant mix with air and effect to quality

Poor waste management: Waste generated from municipal, rural area not dispose properly in many cases increase risk of Poor air quality.

Transportation: Transportation is also major factor to increase AQI. Vehicle emits carbon monoxide (CO), Nitrogen, hydrocarbons and particulate matter (PM). Such pollutants mix in air and pollute them

Open Burning & Wildfires: Open Burning emits toxic gases that pollute to environment. Wildfire results $PM_{2.5}$ in air. It emits chemical gas, smog that results poor air quality.

Construction Work: Construction activities also increase AIR. Different Pollutants emits and mix in air and pollute them

Microbial decaying process release CO, Hydrocarbons and other Pollutant. Poor method to use of hazardous Chemical, hazardous agents generate during agriculture activities are several reason to increase AQI.

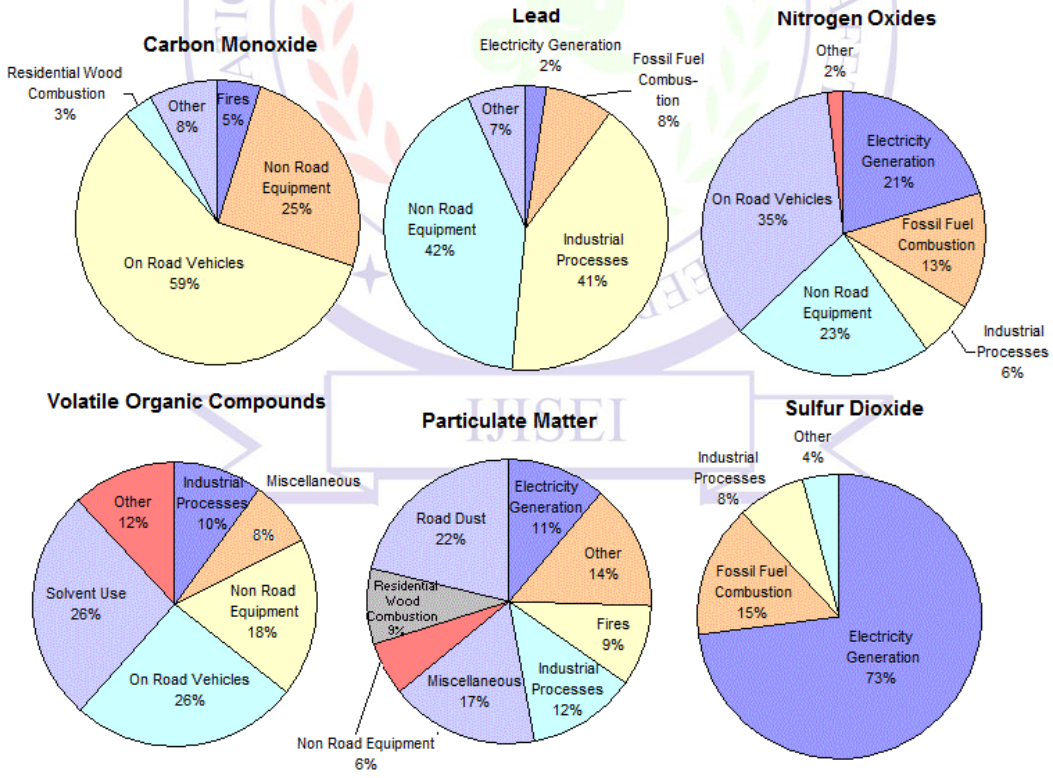

Fig. 3 Sources of Air Pollution, http://www.epa.gov/air/emissions/index.htm

5. How to know that Air Quality is Poor;

Time to Time we get information from Social media including news channel about air quality. Government has made several station to measure the quality of air to know and aware to us.

This can be also measure through AQI digital meter. Different Software available with play store of mobile and this can be downloaded and measure level of pollution. Mobile Software is also economic tools to know the quality of Air.

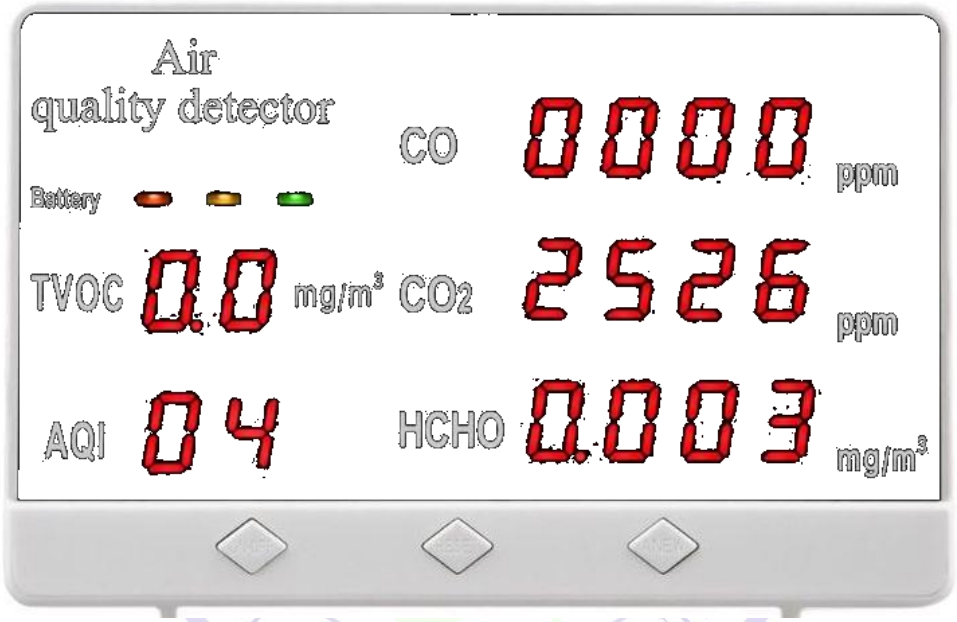

Fig. 4, Air Quality Monitor/Detector

6. How Poor Air quality effect to human:

Poor air quality exposed to person. This effect to respiratory system. Inhalation is main route of exposure of poor air quality. Poor Air Quality expose to eye, Nose, Throat and effect to respiratory system. Effect of respiratory system may be cough, wheezing, shortness of breath, tightness of chest, chest pain, Asthma. Air quality also effect to cardiovascular system. Long Time exposure of Poor Air Quality results serious health issue. Poor quality of air effect to human and other living thing.

Health effect depends on AQI value, Duration of exposure, available safety measure & person body susceptibility.

7. How to ensure good Air quality:

- Avoid to use bike , car like vehicle & use Public Transport
- Control Pollutant from source
- Effective waste management must be ensure
- Effective enforcement of Rules
- Dust control during construction activities.
- Impact Assessment & mitigation for construction or any industrial activity must be ensure.
- Avoid to use Fire cracker
- Increase awareness level among employees
- Water sprinkling on dust generation area

Control to forest fire, Plantation, Control emission of pollutant from industries, Avoid open burning of any material must be control to ensure good air quality.

8. Conclusion:

Air quality is important parameter to know the status of Air quality. PM_{10}, $PM_{2.5}$, CO, SOx, NOx like pollutants considered under AQI. AQI range in India is 0-500. 0-50 range is good air quality. Poor air quality always effect to human. To improve air quality always know to control Pollutants that emits from industries, avoid to burning of materials, use less transport, control to construction activity to prevent dust emission and there are several method apply to prevent to pollution and increase Air quality status. Basically Poor Air quality exposed to personnel through inhalation and effect to respiratory illness. Long term exposure may be cause of serious injury. Good Air quality is prime need for everyone and future generation.

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