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# Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP)

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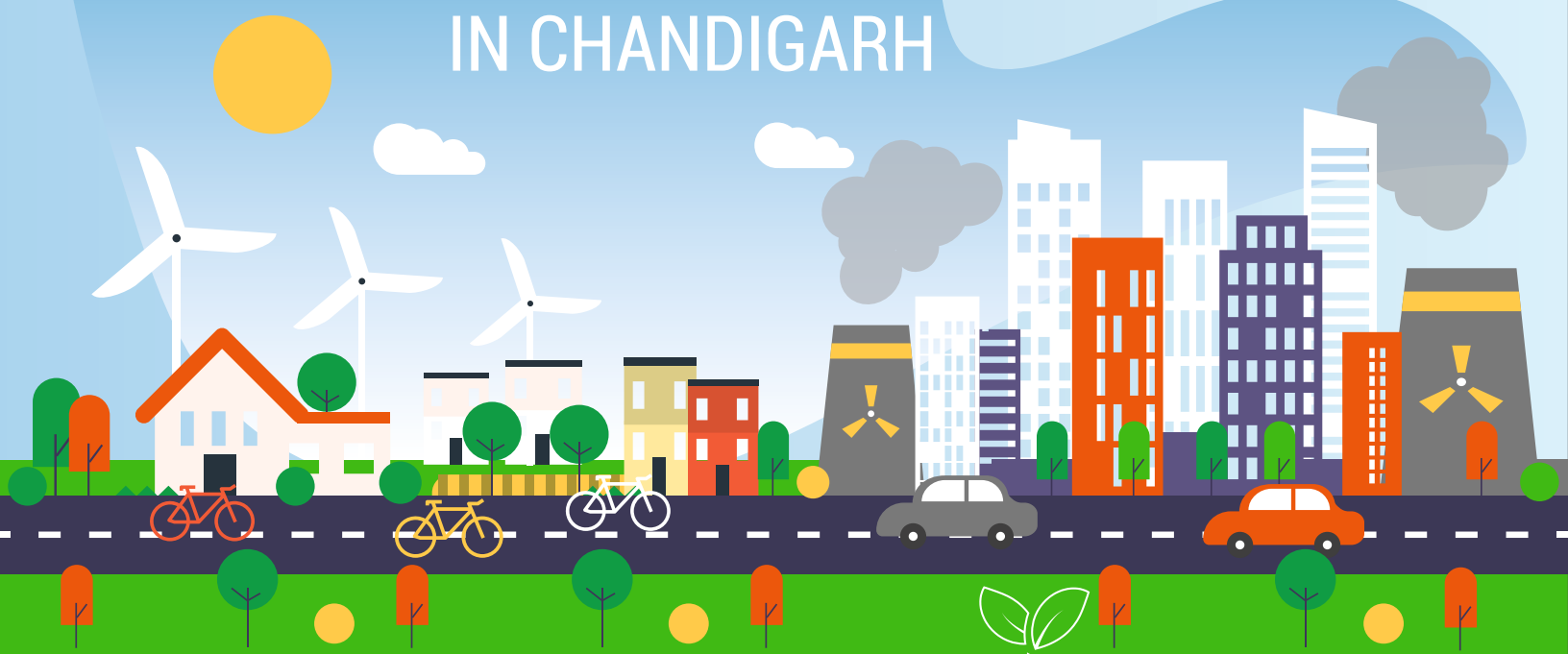
# AIR QUALITY IN CHANDIGARH



paryavaran patra

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# AIR AND ITS QUALITY IN CHANDIGARH

Air is a vital component of our environment, comprising primarily gases (Nitrogen, Oxygen, Argon, $CO_2$), water vapor, and dust particles. Air quality, which indicates how clean or polluted the air is, has significant implications for health and the environment. Pollutants like particulate matter, nitrogen dioxide, sulphur dioxide, ozone, carbon monoxide, and volatile organic compounds can degrade air quality, leading to respiratory problems, cardiovascular diseases, and even premature death. Poor air quality also harms ecosystems, damages crops, and contributes to climate change, resulting in economic losses. Improving air quality through regulations, technological advancements, and public awareness is crucial for a healthier, more sustainable future.

## SOME OF INITIATIVES TO MONITOR AIR QUALITY IN INDIA

### • National Air Quality Monitoring Programme NAMP

Central Pollution Control Board is executing a nation-wide programme of ambient air quality monitoring known as National Air Quality Monitoring Programme (NAMP). The network consists of 804 operating stations covering 344 cities/towns in 28 states and 6 Union Territories of the country.

The objectives of the N.A.M.P. are

1. To determine status and trends of ambient air quality
2. To ascertain whether the prescribed ambient air quality standards are violated
3. To Identify Non-Attainment Cities
4. To obtain the knowledge and understanding necessary for developing preventive and corrective measures and to understand the natural cleansing process undergoing in the environment through pollution dilution, dispersion, wind-based movement, dry deposition, precipitation and chemical transformation of pollutants generated.

### • National Clean Air Programme (NCAP)

National Clean Air Programme has been launched by the Ministry of Environment, Forest and Climate Change as a comprehensive initiative in partnership with various Ministries and States to improve air quality at city, regional and national level. It is a focused and time bound scheme to implement various sectoral policies, strengthen monitoring and enhance public participation in more than 100 cities for effective air quality management. Tentative national level target of 20%–30% reduction of Particulate Matter (PM10 and PM2.5) concentration by 2024 is proposed under NCAP. These interim targets are in line with global experiences which highlight that city specific actions led to 35%–40% PM2.5 reduction in five years for cities, such as Beijing and Seoul, whereas cities, such as Santiago and Mexico City have shown 73% and 61% reduction in 22 to 25 years with regard to PM2.5 and PM10 concentrations, respectively.

**Objectives**

1. To ensure stringent implementation of mitigation measures for prevention, control and abatement of air pollution.
2. To augment and evolve effective and proficient ambient air quality monitoring network across the country for ensuring a comprehensive and reliable database.
3. To augment public awareness and capacity-building measures encompassing data dissemination and public outreach programmes for inclusive public participation and for ensuring trained manpower and infrastructure on air pollution. (https://prana.cpcb.gov.in/#/about)

### • SAFAR (System of Air Quality and Weather Forecasting and Research)

Under the plan scheme “Metropolitan Advisories for Cities for Sports, Tourism (Metropolitan Air Quality and Weather Services), Ministry of Earth Sciences (MoES), Govt. of India, has introduced a major national initiative, "System of Air Quality and Weather Forecasting and Research" known as "SAFAR" for greater metropolitan cities of India to provide location specific information on air quality in near real time and its forecast 1-3 days in advance for the first time in India. It has been combined with the early warning system on weather parameters. The SAFAR system is developed by Indian Institute of Tropical Meteorology, Pune, along with ESSO partner institutions namely India Meteorological Department (IMD) and National Centre for Medium Range Weather Forecasting (NCMRWF). The implementation of SAFAR is made possible with an active collaboration with local municipal corporations and various local educational institutions and governmental agencies in that Metro city. The ultimate objective of the project is to increase awareness among general public regarding the air quality in their city well in advance so that appropriate mitigation measures and systematic action can be taken up for betterment of air quality and related health issues. It engineers awareness drive by educating public, prompting self-mitigation and also to help develop mitigation strategies for policy makers. (https://safar.tropmet.res.in /PRODUCTS-21-6-Details)

## AIR MONITORING IN CHANDIGARH

In Chandigarh, there are three stations for real-time air quality monitoring located in Sector 25, Sector 22, and Sector 53. Additionally, the CPCC has installed five manual monitoring stations. An Air Quality Monitoring Committee has been established in Chandigarh to oversee air quality management under the National Clean Air Programme.

### • Factors affecting Air Quality in Chandigarh

**Increase in Vehicles:** The rise in the number of vehicles in Chandigarh is a major contributor to air pollution. As the population of Chandigarh grows, the demand for personal and public transportation is increasing. This leads to higher emissions of pollutants such as nitrogen oxides (NOx), sulphur oxide ($SO_x$), and particulate matter (PM2.5 and PM10). Traffic congestion exacerbates this problem, as idling vehicles produce more emissions. Additionally, older vehicles, which may lack modern emission control technologies, contribute significantly to the pollution levels.

**Industries:** Industrial activities in and around Chandigarh play a significant role in air pollution. Factories, manufacturing units, and brick kilns emit various pollutants, including Sulfur dioxide ($SO_2$), NOx, volatile organic compounds (VOCs), and particulate matter. These emissions result from the combustion of fossil fuels and other industrial processes. The industrial sector's contribution to air pollution is a critical issue that requires stringent regulatory measures and the adoption of cleaner technologies.

**Pollens:** Chandigarh is known for its extensive green cover, which provides numerous environmental benefits, such as reducing the urban heat island effect and improving air quality by absorbing pollutants. However, this green cover also produces pollen, which can contribute to air quality issues, particularly for individuals with allergies and respiratory conditions. High pollen levels can exacerbate respiratory problems and reduce overall air quality, especially during specific seasons when pollen production peaks.

**Other Sources:** Several other sources contribute to air pollution in Chandigarh:

Stubble Burning: Agricultural practices in neighbouring states, particularly the burning of crop residues (stubble), have a significant impact on Chandigarh's air quality. During certain times of the year, smoke from these fire drifts into the city, leading to a sharp increase in particulate matter and other pollutants.

**Natural Factors:** Natural factors such as dust storms, temperature inversions, and meteorological conditions also influence air quality. Dust storms can carry large amounts of particulate matter over long distances, while temperature inversions can trap pollutants close to the ground, preventing their dispersion.

**Construction Activities:** Ongoing construction projects in the city generate dust and particulate matter. The transportation of construction materials and the operation of machinery contribute to the emission of pollutants.

**Waste Burning:** Although efforts are being made to curb the burning of waste, unauthorized burning of garbage and dry leaves continues to be a problem. This practice releases harmful pollutants into the air, further degrading air quality.

## AIR POLLUTANTS AND THEIR STATUS IN CHANDIGARH

**RSPM:** Respirable Suspended Particulate Matter (RSPM), also known as Particulate Matter 10 (PM10), comprises airborne particles with diameters of 10 micrometres or less. These tiny particles originate from both natural and human-made sources, including windblown dust, pollen, sea spray, volcanic ash, industrial emissions, vehicle exhaust, construction activities, residential heating, and agricultural practices. PM10 can penetrate the respiratory tract, causing irritation, inflammation, and increased risk of respiratory infections, bronchitis, asthma, and chronic obstructive pulmonary disease (COPD). Long-term exposure is linked to cardiovascular diseases, including heart attacks and strokes, due to particles entering the bloodstream and causing systemic inflammation. Environmental impacts of PM10 include reduced visibility due to haze, which affects transportation and scenic views, as well as harm to soil, water quality, and ecosystems, disrupting nutrient cycles and ecosystem balance. Additionally, PM10 influences climate by affecting sunlight absorption and scattering, as well as cloud and precipitation formation. Monitoring and controlling PM10 levels are essential for protecting public health, maintaining environmental quality, and ensuring sustainability. Strategies such as reducing industrial emissions, promoting cleaner transportation, and raising public awareness are crucial to mitigate the harmful effects of PM10.

**Status of RSPM in Chandigarh:** Figure 1 illustrates that the yearly RSPM values exceeded the annual limit of 60 ($\mu g/m^3$) at all stations. In 2020 and 2021, Industrial Area I had the highest RSPM readings, while PEC recorded the lowest. In 2022, the highest RSPM levels were observed in both Industrial Area I and Kaimbwala, with the lowest in Sector 17. In 2023, the highest RSPM levels were observed in Industrial Area I, while the lowest levels were recorded in Sector 17.

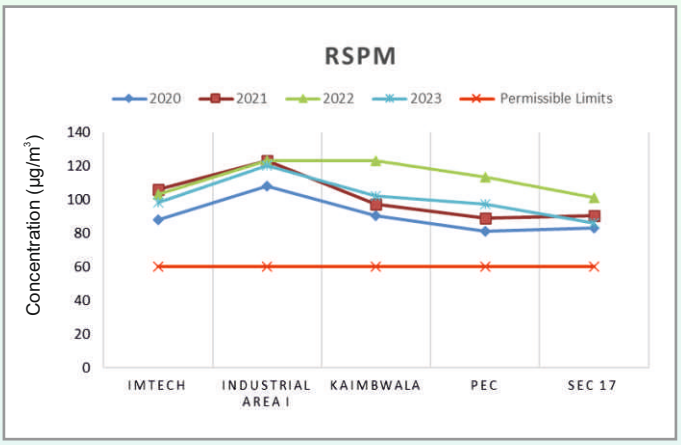



**Fig 1: Annual RSPM values for different monitoring stations (2020-2023)**

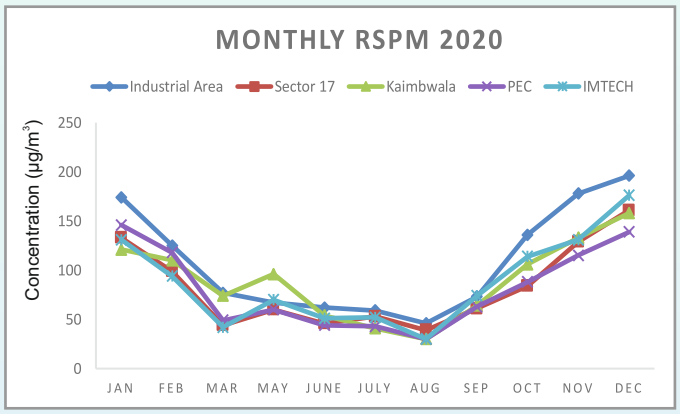



**Fig 2: Monthly RSPM 2020**

### 2020

**Industrial Area:** Notable peaks in November (178 $\mu g/m^3$) and December (196 $\mu g/m^3$) (Fig 2). The lowest value is recorded in August (46 $\mu g/m^3$).There is a significant increase in air pollution levels towards the end of the year, with relatively lower concentrations during the mid-year months (May to August).

**Sector 17:** The highest concentration is in December (161 $\mu g/m^3$), followed by January (133 $\mu g/m^3$) and November (129 $\mu g/m^3$) (Fig 2). The lowest value is in March (44 $\mu g/m^3$).Similar to the Industrial Area, Sector 17 shows a rise in pollution levels towards the end of the year, with a noticeable dip in early spring (March).

**Kaimbwala-** Peaks in December (158 $\mu g/m^3$), followed by November (133 $\mu g/m^3$) and January (121 $\mu g/m^3$) (Fig 2). The lowest value is in August (30 $\mu g/m^3$).Kaimbwala experiences increased pollution in the winter months, with a significant drop during the summer (June to August).

**PEC-** December (139 $\mu g/m^3$) and January (146 $\mu g/m^3$) show the highest concentrations (Fig 2). The lowest value is in August (30 $\mu g/m^3$).The pollution levels are relatively stable but increase towards the year's end, with the lowest levels in the summer months.

**IMTECH-** December (176 $\mu g/m^3$) and January (131 $\mu g/m^3$) have the highest values (Fig 2). The lowest value is in March (42 $\mu g/m^3$). Similar to the other locations, IMTECH sees higher pollution levels in winter, with lower values in spring and summer.

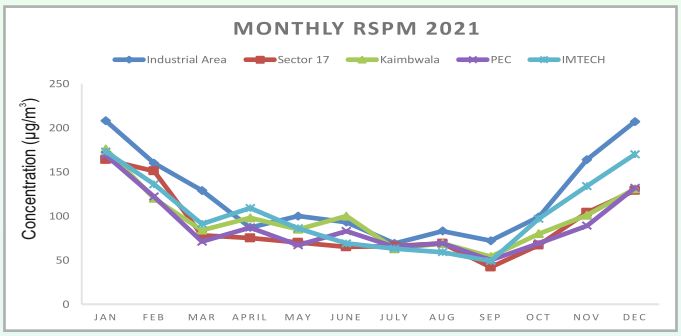



Fig 3: Monthly RSPM 2021

**2021**

**Industrial Area-** The highest values are in January (208 $\mu g/m^3$) and December (207 $\mu g/m^3$) (Fig 3). The lowest value is recorded in July (69 $\mu g/m^3$). The RSPM levels are high at the beginning and end of the year, showing a significant drop during the mid-year months, especially in the summer.

**Sector 17-** The highest concentrations are observed in January (164) and February (151 $\mu g/m^3$) (Fig 3). The lowest value is in September (42 $\mu g/m^3$). Sector 17 exhibits high RSPM levels in the winter months and significantly lower levels in the spring and summer.

**Kaimbwala-** Peaks are observed in January (176 $\mu g/m^3$) and December (131 $\mu g/m^3$) (Fig 3). The lowest values occur in September (54 $\mu g/m^3$). Kaimbwala shows higher pollution levels in the winter months, with a noticeable drop during the summer.

**PEC-** January (169 $\mu g/m^3$) and December (132 $\mu g/m^3$) show the highest values (Fig 3). The lowest value is in September (50 $\mu g/m^3$). PEC follows the general trend of higher RSPM levels during winter and lower levels in the summer months.

**IMTECH-** January (173 $\mu g/m^3$) and December (170 $\mu g/m^3$) have the highest concentrations (Fig 3). The lowest values are in September (49 $\mu g/m^3$). IMTECH shows a similar pattern with higher RSPM levels in winter and lower levels during the summer.

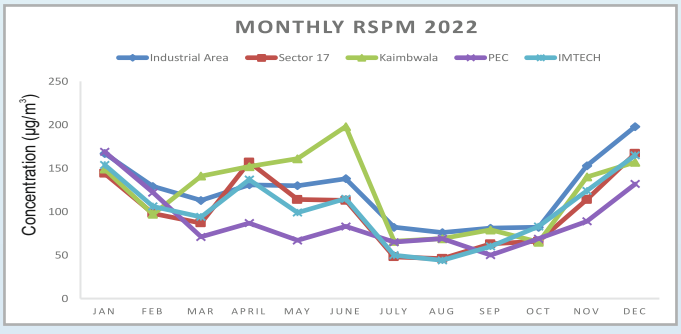



Fig 4: Monthly RSPM 2022

**2022**

**Industrial Area-** The highest values are in December (198 $\mu g/m^3$) and January (167 $\mu g/m^3$) (Fig. 4).The lowest value is recorded in August (76).The RSPM levels are high at the beginning and end of the year, with a noticeable drop during the mid-year months, particularly in the summer.

**Sector 17-** Peaks are observed in December (167 $\mu g/m^3$) and April (157 $\mu g/m^3$) (Fig 4).The lowest value is in August (46 $\mu g/m^3$). Sector 17 shows higher RSPM levels in winter and spring, with lower levels during the summer months.

**Kaimbwala-** Peaks are seen in June (198 $\mu g/m^3$) and December (157 $\mu g/m^3$) (Fig 4). The lowest value occurs in July (66$\mu g/m^3$). Kaimbwala experiences higher pollution levels in the winter and mid-year, with a significant drop during the summer.

**PEC -** January (169 $\mu g/m^3$) and December (132 $\mu g/m^3$) show the highest concentrations (Fig 4). The lowest value is in September (50 $\mu g/m^3$). PEC follows the trend of higher RSPM levels during winter and lower levels in the summer.

**IMTECH -** December (165 $\mu g/m^3$) and January (154 $\mu g/m^3$) have the highest values (Fig 4). The lowest value is in August (44 $\mu g/m^3$). IMTECH shows higher RSPM levels in winter and lower levels during the summer.

**2023**

**Industrial Area:** Notable peaks of RSPM are observed in January (207 $\mu g/m^3$) and December (185 $\mu g/m^3$). The lowest value is recorded in March (75 $\mu g/m^3$) (Fig 5). There is a significant increase in values towards the start and end of the year, with relatively lower concentrations during the mid-year months (March to August).

**Sector 17:** The highest concentration of RSPM is in January (157 $\mu g/m^3$), followed by December (152 $\mu g/m^3$) and November (112 $\mu g/m^3$) (Fig 5). The lowest value is in June (40 $\mu g/m^3$). Similar to the Industrial Area, Sector 17 shows a rise in values towards the start and end of the year, with a noticeable dip during summer (March to October).

**Kaimbwala:** RSPM Peaks in January (170), followed by December (152 $\mu g/m^3$) and November (151 $\mu g/m^3$) (Fig 5). The lowest value is in June (54 $\mu g/m^3$). Kaimbwala experiences increased values in the winter months, with a significant drop during the summer (March to August).

**PEC:** December (167 $\mu g/m^3$) and January (161 $\mu g/m^3$) show the highest concentrations of RSPM (Fig 5). The lowest value is in June (48 $\mu g/m^3$). The values remain relatively stable but increase towards the year's end, with the lowest levels in the summer months.

**IMTECH:** December (183 $\mu g/m^3$) and January (181 $\mu g/m^3$) have the highest values (Fig 5). The lowest value is in July (51 $\mu g/m^3$). Similar to the other locations, IMTECH sees higher values in winter, with lower concentrations in summer and monsoon months.

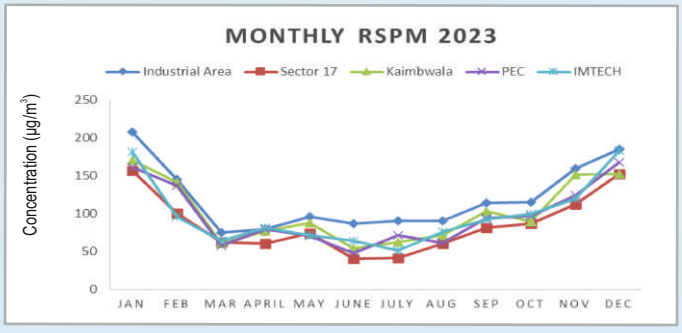



Fig 5: Monthly RSPM 2023

**$SO_2$:** Sulphur Dioxide ($SO_2$) is a colourless, pungent gas produced primarily from the burning of fossil fuels, such as coal and oil, in power plants, industrial

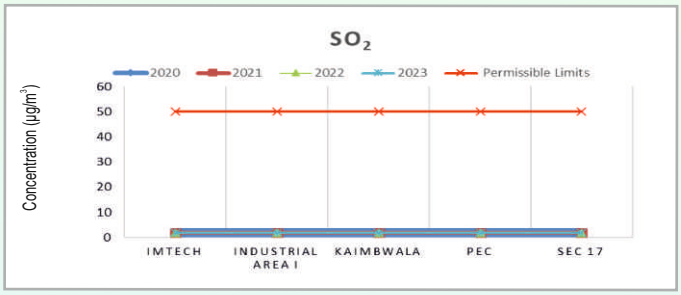



Fig 6: Annual $SO_2$ values for different monitoring stations (2020-2023)

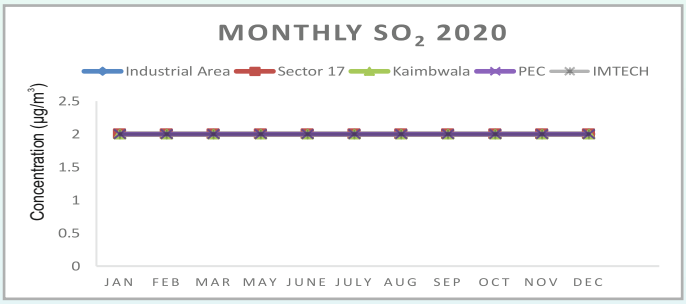



Fig 7: Monthly $SO_2$ 2020

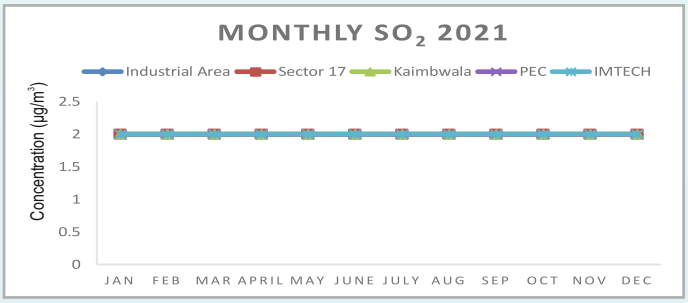



Fig 8: Monthly $SO_2$ 2021

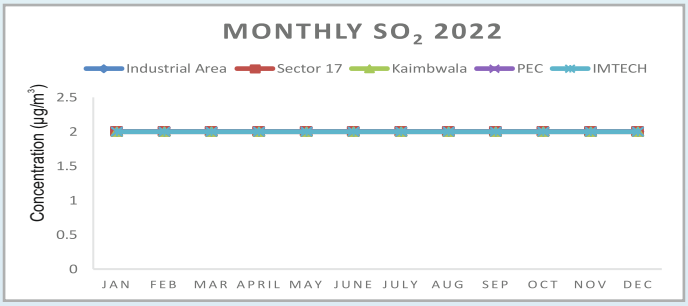



Fig 9:Monthly $SO_2$ 2022

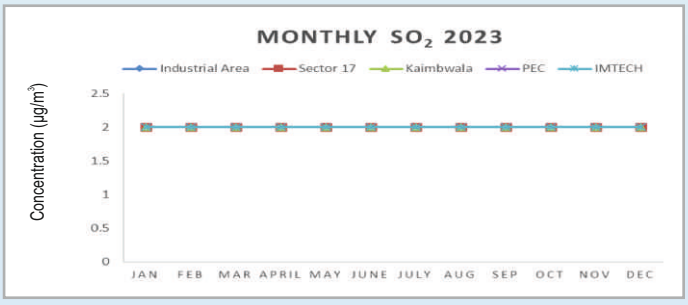



Fig 10: Monthly $SO_2$ 2023

processes, and vehicles. It can also be emitted from volcanic eruptions and certain industrial activities. $SO_2$ poses significant health risks as it irritates the respiratory system, causing coughing, wheezing, and exacerbating conditions like asthma and chronic bronchitis. Long-term exposure can lead to decreased lung function, increased respiratory infections, and cardiovascular problems. Environmentally, $SO_2$ contributes to the formation of acid rain, which can damage forests, water bodies, and soil, leading to detrimental effects on plant and aquatic life. It also contributes to haze, reducing visibility and impacting air quality. Moreover, acid rain resulting from $SO_2$ can disrupt ecosystems by altering soil chemistry and nutrient availability. Effective monitoring and control of $SO_2$ emissions are vital to safeguard public health, protect the environment, and mitigate the harmful effects of acid rain. Measures such as implementing cleaner technologies, improving fuel quality, and enforcing emission standards are essential to reduce $SO_2$ pollution and its impacts.

**Status of $SO_2$ in Chandigarh:** The annual $SO_2$ readings for all stations in Chandigarh consistently measured 2 micrograms which is below detectable limit, well far more below the permissible limit of 50 micrograms (Fig. 6).

The monthly concentration of $SO_2$ from 2020 to 2023 remained unchanged and steady at 2 micrograms i.e., below detectable limit throughout all months (Fig. 7-10).

**$NO_2$:** Nitrogen Dioxide ($NO_2$) is a reddish-brown gas with a characteristic sharp odour, primarily produced from combustion processes, such as those in vehicles, power plants, and industrial facilities. It is a significant air pollutant that contributes to the formation of ground-level ozone and fine particulate matter (PM2.5). $NO_2$ can irritate the respiratory tract, leading to coughing, wheezing, and exacerbating conditions like asthma and chronic bronchitis. Long-term exposure to $NO_2$ can impair lung function, increase susceptibility to respiratory infections, and contribute to the development of chronic obstructive pulmonary disease (COPD) and cardiovascular problems. Environmentally, $NO_2$ contributes to the formation of smog and acid rain, which can damage vegetation, soil, and water bodies. Acid rain resulting from $NO_2$ can disrupt nutrient cycles and harm aquatic ecosystems. Additionally, $NO_2$ impacts visibility by contributing to haze, which reduces air quality and scenic views. Monitoring and controlling $NO_2$ levels are essential for protecting public health and maintaining environmental quality. Strategies include improving fuel quality, implementing stricter emission standards, and promoting cleaner technologies to reduce $NO_2$ emissions and their adverse.

**Status of $NO_2$ in Chandigarh:** The $NO_2$ levels in Chandigarh for the year 2020 were highest in Industrial Area I and lowest in Kaimbwala. In 2021 and 2023, Industrial Area I continued to have the highest yearly readings, while PEC recorded the lowest. Despite these variations, all readings remained below the permissible limit of 40 micrograms (Fig. 11).

**2020**

**Industrial Area-**The highest value is in January (31 $\mu g/m^3$).The lowest value is recorded in May (8 $\mu g/m^3$) (Fig. 12). $NO_2$ levels are highest at the beginning of the year and show a general decline through the spring and summer, with slight increases towards the end of the year.

**Sector 17**-Peaks are observed in January (23 $\mu g/m^3$) and December (21 $\mu g/m^3$). The lowest value is in May (6 $\mu g/m^3$) (Fig. 12). Sector 17 experiences higher $NO_2$ levels in winter and lower levels in the summer months.

**Kaimbwala-**The highest concentration is in January (23 $\mu g/m^3$). The lowest value is in May (7 $\mu g/m^3$) (Fig. 12). Kaimbwala shows higher $NO_2$ levels at the start of the year, with a decrease through the spring and summer, and then a slight increase towards the end of the year.

**PEC-** January (29 $\mu g/m^3$) shows the highest concentration. The lowest value is

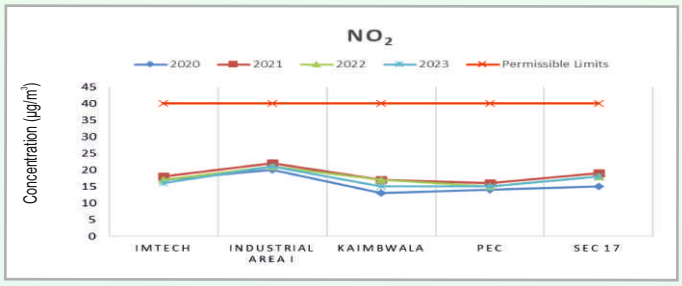



**Fig 11: Annual $NO_2$ values for different monitoring stations (2020-2023)**

in May (6 $\mu g/m^3$) (Fig. 12). PEC follows the general trend of higher $NO_2$ levels in winter and lower levels in the summer months.

**IMTECH-**Peaks are observed in January (24 $\mu g/m^3$) and November (20 $\mu g/m^3$) (Fig. 12).The lowest value is in May (8 $\mu g/m^3$).IMTECH shows higher $NO_2$ levels in the winter months and lower levels during the summer.

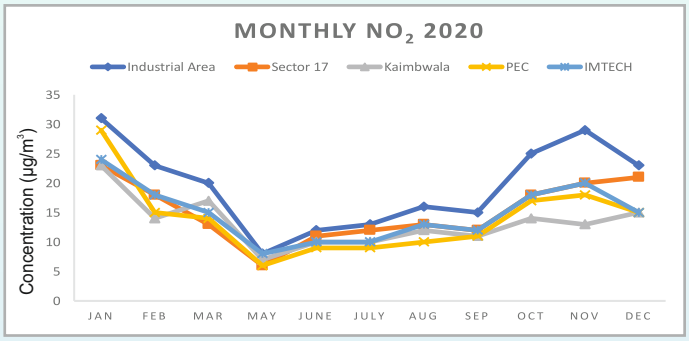



**Fig 12: Monthly $NO_2$ 2020**

## 2021

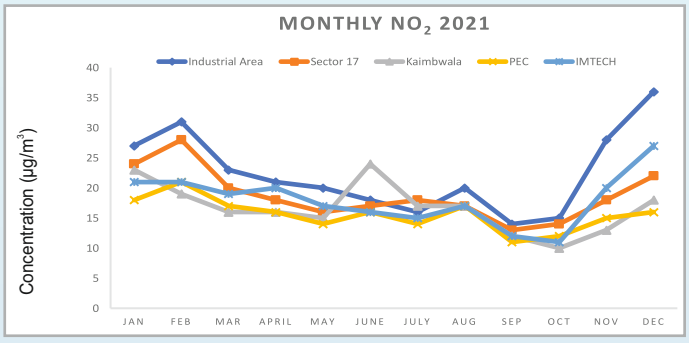



**Fig 13: Monthly $NO_2$ 2021**

**Industrial Area-**The highest value is in December (36 $\mu g/m^3$) (Fig. 13). The lowest value is in July (16 $\mu g/m^3$). $NO_2$ levels are highest at the end of the year and show a general decline through the summer months, with a noticeable increase towards the end of the year.

**Sector 17-**Peaks are observed in February (28 $\mu g/m^3$) and December (22 $\mu g/m^3$) (Fig. 13). The lowest value is in September (13 $\mu g/m^3$). Sector 17 experiences higher $NO_2$ levels in winter months and lower levels during the summer, with relatively stable readings in between.

**Kaimbwala-**The highest concentration is in December (18 $\mu g/m^3$) (Fig. 13). The lowest value is in March (16 $\mu g/m^3$). Kaimbwala shows higher $NO_2$ levels at the end of the year, with a general decrease through the spring and summer, and a slight increase towards the end of the year.

**PEC-**The highest concentration is in December (27 $\mu g/m^3$) (Fig. 13). The lowest value is in May (14 $\mu g/m^3$). PEC follows a similar trend of higher $NO_2$ levels in winter months and lower levels during the summer, with a noticeable increase towards the end of the year.

**IMTECH-**Peaks are observed in December (27 $\mu g/m^3$) and February (21 $\mu g/m^3$) (Fig. 13). The lowest value is in July (15 $\mu g/m^3$). IMTECH shows higher $NO_2$ levels in the winter months and lower levels during the summer, with significant variability throughout the year.

## 2022

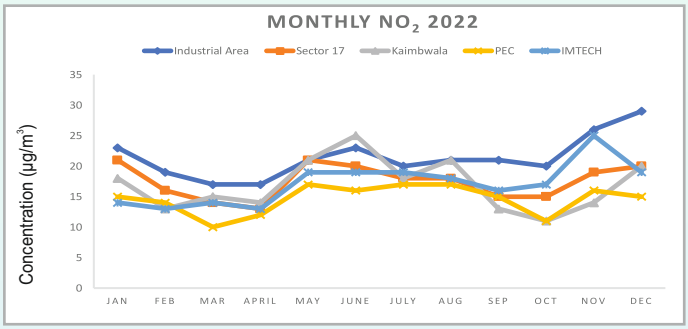



**Fig 14: Monthly $NO_2$ 2022**

**Industrial Area-**The highest value is in December (29 $\mu g/m^3$) (Fig. 12). The lowest value is in March (17 $\mu g/m^3$). $NO_2$ levels show an increase towards the end of the year with peaks in December and November. There is a general fluctuation with higher levels in summer and winter months.

**Sector 17-**Peaks are observed in January (21 $\mu g/m^3$) and November (19 $\mu g/m^3$) (Fig. 14). The lowest value is in April (13$\mu g/m^3$). Sector 17 experiences higher $NO_2$ levels at the beginning and end of the year, with lower levels during the spring months.

**Kaimbwala-**The highest concentration is in June (25 $\mu g/m^3$) (Fig. 14). The lowest value is in February (13 $\mu g/m^3$). Kaimbwala shows higher $NO_2$ levels in the summer months, with a decrease in the winter and spring, and a slight rise towards the end of the year.

**PEC-**The highest concentration is in May (17 $\mu g/m^3$) (Fig. 14). The lowest value is in March (10$\mu g/m^3$). PEC shows a general trend of higher $NO_2$ levels in late spring and summer, with lower levels in early spring and fluctuating towards the end of the year.

**IMTECH-**Peaks are observed in November (25 $\mu g/m^3$) and December (19 $\mu g/m^3$) (Fig. 14). The lowest value is in January (14$\mu g/m^3$). IMTECH has higher $NO_2$ levels towards the end of the year, with relatively stable levels during the summer and a noticeable decrease in early months.

## 2023

Industrial Area: $NO_2$ Notable peaks are observed in January (36 $\mu g/m^3$) and December (26 $\mu g/m^3$) (Fig 15). The lowest value is recorded in February, August, November (16 $\mu g/m^3$). There is a significant increase in values during January and December, with relatively moderate levels throughout the rest of the year.

**Sector 17:** The highest concentration of $NO_2$ is in January (28 $\mu g/m^3$), followed by December (24 $\mu g/m^3$). The lowest value is in April (12 $\mu g/m^3$). Sector 17 shows a peak at the start of the year, with a noticeable dip in spring and moderate levels during mid-year.

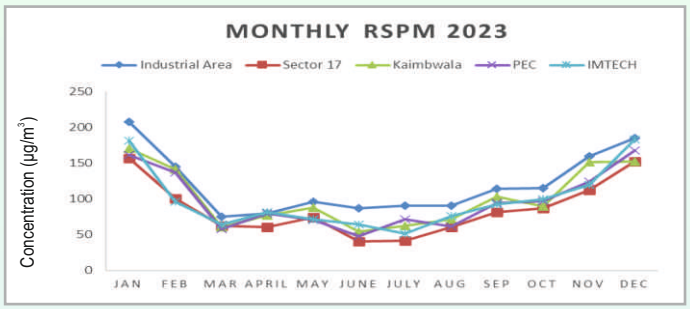



**Fig. 15: Monthly NO2 2023**

**Kaimbwala:** $NO_2$ Peaks in January (29 $\mu g/m^3$), followed by May (19 $\mu g/m^3$) (Fig 15). The lowest values are in April and November (11 $\mu g/m^3$). Kaimbwala experiences its highest values during winter and early summer, with a noticeable drop in spring.

**PEC:** The highest values of $NO_2$ are observed in January (17 $\mu g/m^3$) and December (18 $\mu g/m^3$)(Fig 15). The lowest concentration is recorded in March (12 $\mu g/m^3$). PEC shows relatively stable values throughout the year, with a slight rise during the winter months.

**IMTECH:** January (22 $\mu g/m^3$) records the highest value of $NO_2$, followed by December (18 $\mu g/m^3$)(Fig 15). The lowest values are in February and September (13 $\mu g/m^3$). IMTECH experiences moderate levels throughout the year, with a noticeable peak at the start.

Overall, the concentration of $NO_2$ and RSPM levels is typically higher in winter and lower in summer may be due to several factors. In winter, temperature inversions trap pollutants close to the ground, while the increased use of heating systems burns more fossil fuels, leading to higher emissions. Stagnant weather conditions and cold engines producing more emissions until they warm up also contribute to the problem. Additionally, shorter days and lower sun angles reduce the photochemical reactions that help break down pollutants. In contrast, summer brings greater atmospheric dispersion due to warmer temperatures and more mixing, as well as stronger sunlight that enhances photochemical reactions, reducing pollution levels. The reduced use of heating systems, increased vegetation absorbing pollutants, and more wind and rain further help to disperse and wash away pollutants, leading to generally lower pollution levels in summer.

# STEPS TAKEN TO IMPROVE AIR QUALITY IN CHANDIGARH

**Clean Mobility:** The transportation sector has been a major contributor to air pollution. With the population of Chandigarh increasing, the number of vehicles in the Union Territory has also risen, adding to the pollution. To address this issue, the Chandigarh Administration is promoting clean mobility by encouraging cycling and the use of electric vehicles. The city has established 617 e-bike docking stations in various sectors for its public bike-sharing program. Additionally, over 210 km of cycle tracks have been built to encourage cycling. For clean public transportation, 80 electric buses are operating in the city to reduce pollution. Furthermore, the administration is offering incentives to residents who purchase electric vehicles to promote their use.

**Fines on Burning Waste:** To reduce incidents of garbage burning, littering, and unauthorized dumping of waste, Chandigarh has implemented heavy penalties. This measure has led to improved air quality in the Union Territory.

**Sprinkler Vehicles:** To combat rising air and dust pollution in Chandigarh, the Administration have employed sprinkler vehicles equipped with inbuilt tracking systems under the National Clean Air Programme (NCAP).

**Proper Waste Disposal Facilities:** A Construction and Demolition (C&D) waste processing facility with a capacity of 160 MT per day has been established in Chandigarh's industrial area. Additionally, to reduce air pollution from waste, three Material Recovery Facilities have been set up in the Union Territory

**Awareness and Capacity Building Programs:** The Chandigarh Administration frequently organizes various programs for school and college children, teachers, public, and other stakeholders to raise awareness about air pollution. Cycle rallies, hackathons, and marathons on the theme of air pollution are conducted by different departments to further spread awareness among citizens.

**GRAP** (Graded Response Action Plan for Chandigarh

Steps to combat air pollution and health emergencies

The National Green Tribunal issued an order in 2019 to create a comprehensive Graded Response Action Plan (GRAP) specifically designed for Chandigarh's unique pollution challenges. The primary objective of this plan is to provide timely and accurate information to the public while implementing effective strategies to control and mitigate air pollution.

Activation Mechanism: When air quality consistently remains "very poor" for two consecutive days and weather forecasts predict unfavourable conditions for the next two days, a dedicated Task Force will convene to review the situation comprehensively. Based on their detailed assessment, the Task Force may decide to activate specific GRAP measures, which are strategically developed using the Air Quality Index (AQI) and targeting the primary pollution sources in Chandigarh.

Implementation and Enforcement: Strict adherence to the GRAP plan is mandatory in Chandigarh. Authorities are required to enforce all protective measures to safeguard citizens from the detrimental effects of poor air quality. In the event of an air quality emergency, the Task Force will recommend additional targeted actions aimed at reducing pollution levels and improving overall air quality.

The ultimate goal is to minimize public exposure to harmful pollutants by providing early warnings and implementing proactive interventions before air quality deteriorates to a "severe" level.

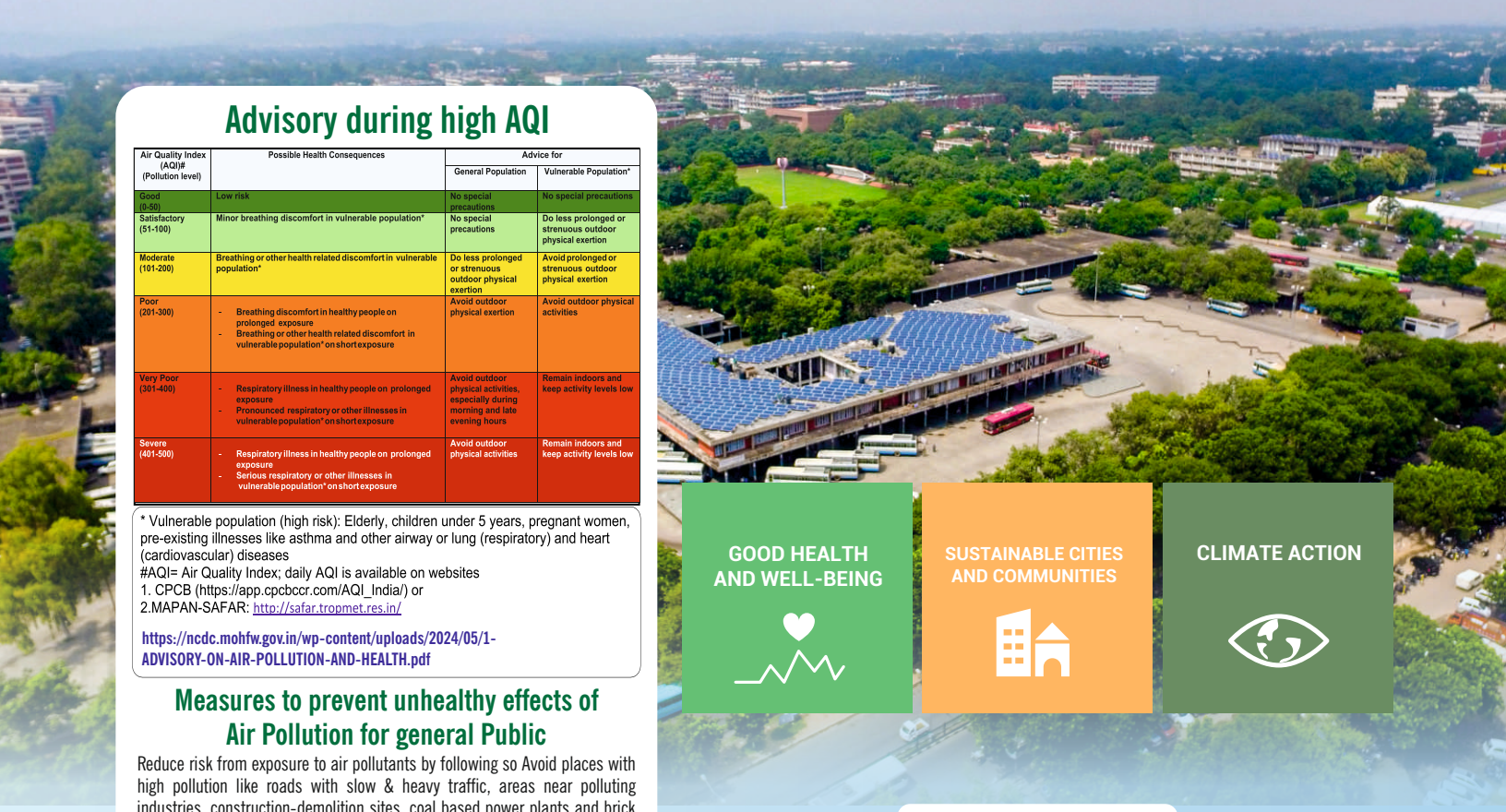
Comprehensive Action Strategies: The GRAP encompasses a wide range of actions involving both government agencies and the general public to effectively control pollution and reduce exposure to harmful outdoor air based on AQI category. For example:

- Public awareness campaigns delivered through television and radio
- Rigorous monitoring of polluting vehicles
- Temporary ban on diesel generators (with exceptions for emergency situations)
- Implementing a zero-tolerance policy for visible vehicle emissions
- Media-based warnings for individuals with heart or lung conditions
- Potential school closures to protect children from pollution-related health risks

**Other Initiatives by Chandigarh Administration:** Under the National Clean Air Programme (NCAP), the Chandigarh Administration has undertaken multiple initiatives to improve air quality in the city. Mechanical Street Sweepers have been deployed to enhance road cleanliness and minimize dust emissions, a major source of particulate matter. In addition, a Construction & Demolition Waste Processing facility has been established to manage and recycle debris, reducing air pollution from unprocessed construction waste.

To strengthen air quality monitoring, Continuous Ambient Air Quality Monitoring Stations (CAAQMS) have been installed, with two key stations set up in commercial and traffic-dominated areas under NCAP, providing real-time data to identify pollution hotspots. Greening and paving activities have also been intensified, especially along major roads, with an emphasis on creating green buffers to absorb pollutants. The city has promoted vertical gardening to add greenery on walls and pillars, contributing to air purification and urban aesthetics.

Further, the administration has expanded the network of Piped Natural Gas (PNG) and Compressed Natural Gas (CNG), encouraging cleaner fuel use in residential and transportation sectors, thereby reducing emissions from conventional fuels. These comprehensive measures underscore Chandigarh's commitment to a cleaner, healthier environment under NCAP. Additionally, the Department of Environment, Chandigarh, has launched the CarbonWatch App, which allows individuals to track their carbon footprint and monitor factors contributing to air pollution.



## Advisory during high AQI

| Air Quality Index (AQI)# (Pollution level) | Possible Health Consequences | Advice for | |
|---|---|---|---|
| | | General Population | Vulnerable Population* |
| Good (0-50) | Low risk | No special precautions | No special precautions |
| Satisfactory (51-100) | Minor breathing discomfort in vulnerable population* | No special precautions | Do less prolonged or strenuous outdoor physical exertion |
| Moderate (101-200) | Breathing or other health related discomfort in vulnerable population* | Do less prolonged or strenuous outdoor physical exertion | Avoid prolonged or strenuous outdoor physical exertion |
| Poor (201-300) | - Breathing discomfort in healthy people on prolonged exposure<br>- Breathing or other health related discomfort in vulnerable population* on short exposure | Avoid outdoor physical exertion | Avoid outdoor physical activities |
| Very Poor (301-400) | - Respiratory illness in healthy people on prolonged exposure<br>- Pronounced respiratory or other illnesses in vulnerable population* on short exposure | Avoid outdoor physical activities, especially during morning and late evening hours | Remain indoors and keep activity levels low |
| Severe (401-500) | - Respiratory illness in healthy people on prolonged exposure<br>- Serious respiratory or other illnesses in vulnerable population* on short exposure | Avoid outdoor physical activities | Remain indoors and keep activity levels low |

* Vulnerable population (high risk): Elderly, children under 5 years, pregnant women, pre-existing illnesses like asthma and other airway or lung (respiratory) and heart (cardiovascular) diseases
#AQI= Air Quality Index; daily AQI is available on websites
1. CPCB (https://app.cpcbccr.com/AQI_India/) or
2.MAPAN-SAFAR: http://safar.tropmet.res.in/

https://ncdc.mohfw.gov.in/wp-content/uploads/2024/05/1-ADVISORY-ON-AIR-POLLUTION-AND-HEALTH.pdf

## Measures to prevent unhealthy effects of Air Pollution for general Public

Reduce risk from exposure to air pollutants by following so Avoid places with high pollution like roads with slow & heavy traffic, areas near polluting industries, construction-demolition sites, coal based power plants and brick kilns etc.

- Reschedule outdoor activities as per AQI level, and remain indoors on days with poor to severe AQI.
- On days with poor to severe AQI, avoid outdoor morning and late evening walk, run, jog and physical exercise. Do not open external doors and windows during morning and late evening hours, may ventilate if necessary between 12 p.m. to 4 p.m. in afternoon.
- Avoid burning biomass such as wood, coal, animal dung, kerosene. Use clean smokeless fuels (gas or electricity) for cooking and heating purposes. If using biomass, use clean cook stoves.
- Avoid burning firecrackers.
- Avoid burning in open any form of wood, leaves, crop residues, and waste.
- Do not smoke cigarettes, bidis and related tobacco products.
- Avoid burning mosquito coils and incense sticks in closed premises.
- Practice wet mopping instead of sweeping or vacuum cleaning inside homes. If you choose to use vacuum cleaner, use those which has High Efficiency Particulate Air (HEPA) filter.
- Keep washing your eyes with running water regularly and do regular gargles with warm water.
- Consult the nearest doctor in case of breathlessness, giddiness, cough, chest discomfort or pain, irritation in eyes (red or watery).
- As a "no-regret" strategy, healthy diet, with fruit and vegetables rich in antioxidants, and adequate amount of hydration by drinking water is advocated.

**Vulnerable Population – additional measures**

Patients with underlying medical conditions such as chronic pulmonary or cardiovascular problems etc. should

- Be more careful to avoid exposure to air pollution.
- Avoid any strenuous activity if AQI levels are poorer
- Keep a check on exacerbations of symptoms during poorer AQI levels
- Properly follow personal doctor's instructions on healthcare.
- Keep their prescribed medications readily available.
- Seek immediate medical advice if symptoms worsen.

**Optional Choice:**

- If you choose to use face mask, the disposable N95 or N99 is useful provided user instructions are followed. These masks may help provided the period of exposure is short. Masks should have proper fitting on users' mouth and nose. Ensure to replace the masks after usage as instructed. Paper masks, handkerchiefs, scarves and cloth are not effective.
- If you choose to use air purifier, follow manufacturers' guidelines. Ensure to replace and clean filters as instructed. Avoid using an air purifier that works by generating ozone, as it increases pollution inside rooms.
- When operating air conditioners in buildings or vehicle, use in "re-circulate" mode to avoid contact with outside air.

GOOD HEALTH AND WELL-BEING

SUSTAINABLE CITIES AND COMMUNITIES

CLIMATE ACTION

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