

May 2017



AHMEDABAD

Air Information & Response Plan

AIR

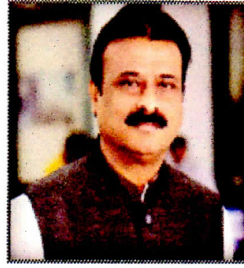


GAUTAM SHAH
MAYOR



AMDAVAD MUNICIPAL CORPORATION
Mahanagar Seva Sadan

May 5, 2017



Mayor's Message

I am delighted to present Ahmedabad's Air Information and Response (AIR) Plan. The Ahmedabad Municipal Corporation (AMC) is proud to join international public health and air pollution experts from the Indian Institute of Public Health-Gandhinagar (IIPH-G), Natural Resources Defense Council (NRDC) and the Indian Institute of Tropical Meteorology, Pune (IITM) in developing and implementing this plan.

In an effort to protect local communities from rising air pollution levels, the AMC is developing an air quality index (AQI) with the technical expertise of the Indian Institute of Tropical Meteorology, Pune (IITM) and SAFAR (System of Air Quality and Weather Forecasting And Research). AQI systems already operate in key cities in India, including Pune, Delhi, and Mumbai, among others, as well as internationally.

To support the AQI, IIPH-G and NRDC are working with the AMC on information, education, and communication strategies for the new AQI in Ahmedabad. The combined efforts of government agencies, health professionals, and community leaders can serve to effectively inform the public about rising air pollution health risks in India, and how to take steps to protect community and individual health. The AIR plan is a new program on air quality alerts and advisories, interagency coordination, public awareness and community outreach, assessing health impacts and monitoring to strengthen actions and integrating the health strategies into Gujarat Pollution Control Board's City Clean Air Plan for Ahmedabad.

(Gautam Shah)
Mayor

MUKESH KUMAR, I.A.S.
Municipal Commissioner



MUKESH KUMAR, IAS



**AHMEDABAD
MUNICIPAL CORPORATION**
sardar patel bhavan, ahmedabad-380001. india
May 5, 2017.

Foreword

Air pollution is a global public health risk. It is one of the highest-ranking environmental health challenges in the world. Ahmedabad is one of India's largest and fastest growing cities with a population nearly 7 million. According to studies, Ahmedabad has some of the highest air pollution levels in India and we are delighted to be working with national and international experts from the Indian Institute of Public Health – Gandhinagar (IIPH – G), the Natural Resources Defense Council (NRDC) and the Indian Institute of Tropical Meteorology to develop an Air Information and Response (AIR) Plan for Ahmedabad for the citizens of Ahmedabad.

The Ahmedabad AIR Plan is a health-based program designed to protect and increase awareness among residents on air pollution. With the air quality index as the center point, the Ahmedabad AIR Plan focuses on health risk communication with immediate and

longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of air pollution on vulnerable populations. The Ahmedabad AIR Plan is the first of its kind in India, and developed with learning from global best practices on AQI health risk communication from Beijing, Los Angeles, Mexico City and New Delhi.

The central aim of the plan is to save lives and helping the people of Ahmedabad to create healthier communities, more secure from the dangers of air pollution, and prosperous economy. Through the AQI and the AIR Plan, countless lives can be saved from air pollution, while also opening collaborative pathways to pollution reduction.

(MUKESH KUMAR)
MUNICIPAL COMMISSIONER

Introduction

Air pollution is a major global public health risk in cities across the world. It is one of the highest-ranking environmental health challenges in the world, especially in developing countries like India. Ahmedabad is one of India's largest and fastest growing cities with a population nearly 7 million. According to the Central Pollution Control Board, Ahmedabad has some of the highest air pollution levels in India. The World Health Organization has also found that Ahmedabad ranks among the most polluted cities in the world.^[1]

In an effort to protect local communities from rising air pollution levels, the Ahmedabad Municipal Corporation (AMC) has developed two key tools: an air quality index (AQI), and this Air Information & Response (AIR) Plan. The Ahmedabad AQI is supported by technical expertise of the Indian Institute of Tropical Meteorology, Pune (IITM) and Indian Meteorological Department's System of Air Quality and Weather Forecasting And Research (SAFAR) program. Air Quality Index (or AQI) systems operate in three leading cities in India, Delhi, Pune and Mumbai, and in many cities internationally.

The Ahmedabad AIR Plan is a health-based program designed to protect and increase awareness among residents on air pollution. With the AQI as the center point, the Ahmedabad AIR Plan focuses on health risk communication with immediate and longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of air pollution on vulnerable populations. The Ahmedabad AIR Plan is the first of its kind in India, and developed by the AMC with national and international experts and learning from global best practices on AQI health risk communication from Beijing, Los Angeles, Mexico City and New Delhi.

Purpose of the Ahmedabad AIR Plan

The central aim of this project is about saving lives and helping the people of Ahmedabad to create healthier communities, more secure from the dangers of air pollution, and prosperous economy. Through the AQI and the AIR Plan, lives can be saved from air pollution, while also opening collaborative pathways to pollution reduction.

For the pilot year, the Ahmedabad AIR Plan for 2017 will focus on five key strategies:

- 1. Pilot Health-Based AQI Warning and Interagency Coordination** - develop interagency coordination plan and pilot an AIR alert system.
- 2. Public Awareness and Community Outreach** - update AMC website with AQI and AIR Plan; engage media on AQI and AIR plan; develop information, education and communication (IEC) materials.
- 3. Focused Activities for Vulnerable Groups** - create pamphlets, hoardings, videos, SMSs; initiate school flag program that coordinates with schools to display coloured flags corresponding to AQI levels for each day.
- 4. Capacity Building Among Medical Professionals** - engage with private and public medical professionals to build health awareness and protection strategies on air pollution.
- 5. Initiate Research on Future Exposure Reduction and Mitigation Pathways** – identify the future mitigation and exposure control and reduction measures with key partners.

Organization and Implementation of the Ahmedabad AIR Plan

As the lead agency, the AMC Health Department has the overarching responsibility for the coordination of the AQI and AIR Plan related to health activities. This includes monitoring the daily AQI and alerts and disseminating public health messages to local departments and community service providers. The AMC Health Department will also work with the AMC press office to increase media, including local language and social media, around protection from harmful air pollution levels.

The AIR Plan serves to focus attention on those individuals who are most at risk from air pollution, including people with respiratory and heart ailments, children, pregnant women, outdoor workers and the elderly. The Plan also focuses on individuals and organizations, such as Urban Health Centres (UHCs) and link workers, who frequently work with at-risk populations and can provide early diagnosis of asthma and other respiratory illnesses. Individuals and community groups are also essential in fighting the effects of air pollution. Individuals can take specific preventative steps to protect themselves, their families, and their communities from harmful air pollution, including learning about early signs of respiratory and cardiovascular illness and limiting outdoor activities, using masks and air filters, as well as, raising awareness on pollution levels.

The media is vital in spreading the word about air pollution and the AQI. The media plays an essential awareness-building role by sharing news about health threats, and increases public protection by running ads and providing local resources information.

Key Stakeholders of the Ahmedabad AIR Plan

The Ahmedabad AIR Plan is part of a broader collaboration between AMC and public health and policy experts at the Indian Institute of Public Health, Gandhinagar, and Natural Resources Defense Council as well as Indian Institute of Tropical Meteorology and Indian Meteorological Department's SAFAR project.

The Gujarat State Pollution Control Board and the Gujarat State Climate Change Department are also critical to the creation of the plan, as are key local researchers and civil society groups. The combined efforts of government agencies, health professionals, and community leaders can serve to effectively inform the public about rising air pollution health risks in India, and how to take steps to protect community and individual health.

In support of the Ahmedabad AIR Plan, in 2016 and early 2017, the AMC along with IIPHG, NRDC and IITM engaged in a series of stakeholder discussions on air pollution in India and Ahmedabad. In December 2016, hosted by the Honourable Mayor, the AMC and partners convened an international workshop “*Air Pollution and Health: Laying the Foundation for Effective Use of Ahmedabad Air Quality Index*”, and released underlying issue brief on the evidence base for creating the AIR Plan, “*Protecting Health from Rising Air Pollution in Ahmedabad.*” In February 2017, the AMC and partners convened another discussion on the draft *Air Information and Response Plan* for the city.

The discussions have focused on translating increased monitoring through the SAFAR's AQI and monitoring network and growing public awareness, into usable health advisories and impactful policy changes that target some of the key sources of air pollution. The discussions included international best practices on reducing health risks at individual and community levels, regional challenges in India's major cities, including Ahmedabad, Delhi, among others and ways to increase awareness about air pollution among the general population.

Air Pollution Levels and Health Effects in Ahmedabad

While sulfur dioxide (SO₂), nitrogen oxides (NO_x), ozone (O₃), ammonia (NH₃), carbon monoxide (CO), coarser particles (PM₁₀), fine particles (PM_{2.5}), lead (Pb), arsenic, nickel, benzene and benzo-a-pyrene are all health-harming pollutants, PM₁₀ and PM_{2.5}, are the primary pollutants of concern and most frequently monitored in Ahmedabad, because they can penetrate deeply into the respiratory tract and pose grave health risks.

Since at least 2008, Ahmedabad has exceeded both WHO standards and India's air quality standards for particulate matter. The WHO Global Ambient Air map reports annual mean concentrations of 100 µg/m³ for PM_{2.5} and 83 µg/m³ for PM₁₀,^[2] in Ahmedabad for 2013 and 2012, respectively.^[3] PM₁₀ levels in Ahmedabad exceeded permissible limits for all five years between 2008 and 2012, exceeding the national standards in India, which are less restrictive than the WHO guidelines, by 30–50 percent.^[4] Similarly, studies show that PM_{2.5} levels in Ahmedabad also exceed national standards.^[5] According to air pollution experts, Ahmedabad's high PM_{2.5} and O₃ levels, like those in Ahmedabad can pose serious health risks, such as more premature deaths, increased hospitalizations and emergency room visits for respiratory and cardiovascular illnesses, allergic effects, increased risks of bacterial or fungal infection and fibrosis.^[6]

In 2010, Ahmedabad experienced over 4,900 premature deaths attributed to excessive ambient air pollution, as estimated by recent research.^[7] Deteriorating air quality in Ahmedabad has also resulted in serious health concerns including increased morbidity, especially affecting vulnerable populations.

Ahmedabad Pollution Sources

The World Health Organization urban air quality database, and several international and Indian studies have identified Ahmedabad as one of the most polluted cities in the world.^[8] New Delhi, Beijing and other Asian cities are at the top of this list and grappling with increasing air pollution levels.

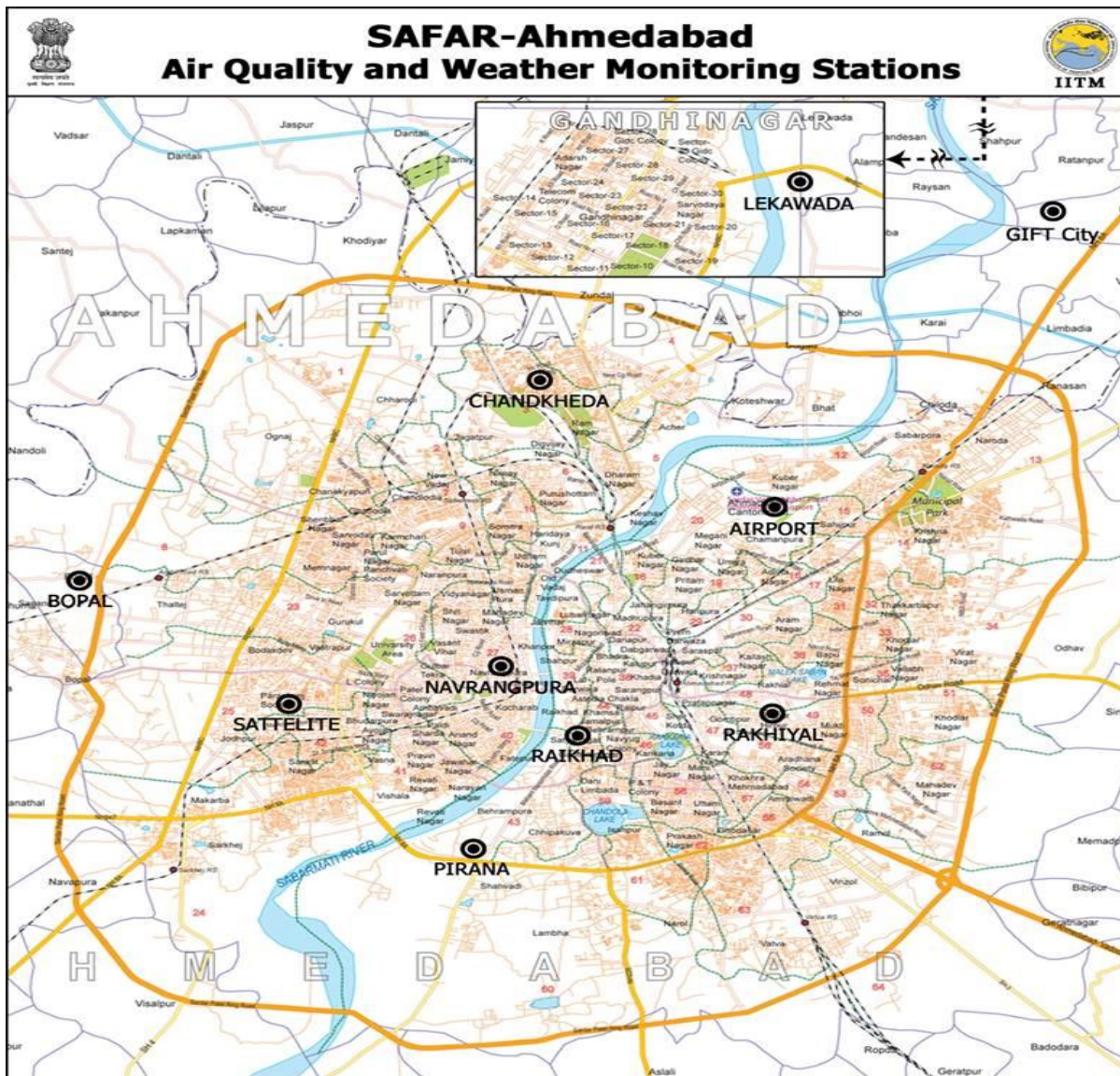
In 2010, the Government of India, through the Ministry of Environment, Forests and Climate Change (MOEFCC), issued a memorandum that declared Ahmedabad and key cities as critically polluted areas. Additionally, the Gujarat Pollution Control Board (GPCB) in Gandhinagar is actively working with the city of Ahmedabad to address air pollution through a city clean air program.^[9]

Air pollution is emitted from several local sources in Ahmedabad. Available studies suggest that rapid urban growth has led to increase in air pollution from vehicle-related emissions and stationary sources in Ahmedabad. From 2001 to 2011, the number of vehicles, including motorcycles and scooters, reportedly doubled in Ahmedabad, while the population grew at a rate of 58 percent.^[10] Ahmedabad has two thermal coal-fired power plants: the 800 MW Gandhinagar plant and the 400 MW Sabarmati plant, one of the oldest in India. The city also has almost 3,000 industrial units including 855 chemical factories, 511 foundries and 380 textile plants among others.^[11] The surrounding low-efficiency brick kilns and trash burning also contribute to air pollution in the city.

A major 2012 study by Urban Emissions evaluated air quality in six Indian cities that included Ahmedabad, Surat, Rajkot, Pune, Indore and Chennai.^[12] The study examined pollution levels and sources and then modeled emissions, with a focus on PM₁₀. The study found that the major sources for PM₁₀ in Ahmedabad are: 30% road dust; 25% power plants; 20% vehicle exhaust; 15% industry; 5% domestic cooking and heating; 2% diesel generator sets; 2% waste burning and 1% construction activities. The major sources of PM_{2.5} in Ahmedabad are: 31% power plants; 27% transport; 11% brick kilns, 9% domestic cooking; 7% road dust, 5% diesel generator sets, and 5% waste burning.

Ahmedabad's AQI Developed with SAFAR

Ahmedabad's AQI is part of SAFAR's network in Mumbai, New Delhi and Pune. The AQI is an independent effort of the Indian Ministry of Earth Sciences and complements the AQI implemented by the Central Pollution Control Board under the Ministry of Environment, Forest and Climate Change and stations by the Gujarat State Pollution Control Board. For Ahmedabad, SAFAR will install and operate an air quality monitoring network with 8 stations across the city of Ahmedabad, located in Bopal, Satellite, Pirana, Raikhad, Navrangpura, Rakhiyal, Chandkheda and the Airport.



Map of SAFAR Air Quality Monitoring Stations in Ahmedabad and Gandhinagar. Source: SAFAR, Indian Institute of Tropical Meteorology, Pune

As part of the Government of India through IITM, Pune, SAFAR provides location-specific information on air quality in near real-time and forecasts 1-2 days in advance.^[13] This information is combined with an early warning system of weather parameters. SAFAR was developed by IITM, Pune along with the Indian Meteorological Department (IMD). The objective of the SAFAR project is to engage the public and spread citizen awareness about local air quality issues. SAFAR is designed to inform locally-relevant air pollution control measures and systematic actions to reduce health risks associated with air pollution exposure.

AQI Scale and Color-Coded System

The Ahmedabad AQI, as operated by SAFAR, comprises of eight pollutants with sub-indices and health breakpoints calculated for each: PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, and Pb. These eight have short-term (up to 24-hours) India National Ambient Air Quality Standards.^[14] Breakpoints for the five main pollutants that are most prevalent are as follows:^[15]

Description	AQI	PM10 µg/m ³ 24 hr avg	PM2.5 µg/m ³ 24 hr avg	CO ppm 8 hr avg	O3 ppb 24 hr avg	NO2 ppb 24 hr avg
Good + Satisfactory	0-100	0-100	0-60	0-1.7	0-50	0-43
Moderate	101-200	101-250	61-90	1.8-8.7	51-84	44-96
Poor	201-300	251-350	91-120	8.8-14.8	85-104	97-149
Very Poor	301-400	351-430	121-250	14.9-29.7	105-374	150-213
Severe	401-500	431-550	251-350	29.8-40	375-450	214-750

The Ahmedabad AQI scale. Source: SAFAR (2013), available at <http://pune.safar.tropmet.res.in/AQI.aspx>.

The Ahmedabad AQI uses five AQI categories: Good + Satisfactory, Moderate, Poor, Very Poor, and Severe. Each of these categories is based on ambient concentration values of air pollutants and their likely health impacts (known as *health breakpoints*).^[16] AQIs additionally incorporate a more comprehensive data set and a more advanced health assessment model that consider statistics on health data for different diseases including hospital visits, admissions, mortality data and weather conditions.^[17]

The Ahmedabad AQI uses a system in which SAFAR calculates its AQI in two parts: first by forming sub-indices and individual AQI readings for each air pollutant; and second, by determining the health-relevant breakpoints of these sub-indices. Breakpoints are decided by the national ambient air quality standards in conjunction with epidemiological studies describing the relation between air pollution exposures and adverse health risks. Different air pollutants pose health risks to different sensitive groups, when their AQI exceeds 100. The raw concentration measurements from monitoring stations are converted into separate AQI sub-index values for each air pollutants that comprise the AQI. The highest of these sub-index AQI values determines the overall AQI value for the day.

When the AQI is above 100, in some countries' agencies also report which groups are especially vulnerable or sensitive to that pollutant—for example, children, or people with asthma or heart disease. If two or more individual air pollutants have AQI values over 100, all sensitive groups should be reported. For example, if a city's AQI is 140 for particle pollution and 105 for ozone, the AQI value that day would be announced as 140 for particle pollution, and also note that ozone smog levels are also high, alerting groups sensitive to either particle or ozone pollution about how to protect their health.^[18] Some countries provide not only information on today's AQI, but also forecasts for the next day's AQI. This helps people plan their outdoor activities for times when air quality is better, in order to protect their health.

The Ahmedabad AQI and forecasts will be available on the AMC website as part of the Ahmedabad AIR Plan. The SAFAR website at <http://safar.tropmet.res.in/> provides the daily AQI and the associated health impacts for the cities of Delhi, Pune, Mumbai and Ahmedabad, along with the next day's forecast.^[19] In addition to the website, people can download the SAFAR-Air app on their smart phones. People can also access the AQI through a toll-free telephone number twice a day. Ahmedabad is also planning to use a Digital Display Board System that displays current air quality data to citizens by setting up large LED screens in populated areas in each of the cities.

Ahmedabad Air Information and Response (AIR) Strategies

1: Health-Based AQI Warning and Interagency Coordination

As part of the Air Information & Response Plan, the Ahmedabad Municipal Corporation will issue a health alert when the air quality index is forecasted to be “Very Poor” (levels 301 – 400) and a health warning when the air quality index is forecasted to be “Severe” (levels 401 – 500).

Health Advisory to vulnerable group when the air quality index is forecasted “Poor” (levels 201 – 300)

AIR Health Alert: An AIR health alert would be called when AQI levels are forecasted to be 301 or greater in the next 24 hours.

Actions to be carried out under health alert:

- ✓ *Nodal officer to inform urban health centres as well as private medical practitioners including pulmonologists, paediatricians to alert them to expect and be prepared for more cases of respiratory health effects*

AIR Health Warning: An AIR health warning would be called when AQI levels are forecasted to be equal to or greater than 401 in the next 24 hours.

Actions to be carried out for a health warning:

1. Nodal Officer

- ✓ *Nodal officer to inform urban health centres as well as private medical practitioners including pulmonologists, paediatricians to expect and be prepared for more cases of respiratory health effects*
- ✓ *Nodal officer to inform 108 EMRI Ambulance Service that air pollution levels are forecasted at “Severe”*
- ✓ *Nodal officer to inform other AMC departments including transport, traffic police, estate department, schools & colleges, and environmental management*

2. Media

- ✓ *Publish AIR Health Warning in print and broadcast media, including newspapers, radio, and television*

AQI Colour Signal System for AIR Health Alerts & AIR Health Warnings

The AMC will issue AQI alerts, as an additional means of communication by using the following colour signal system.

Air Quality Index (AQI)	PM 2.5 Health Advisory	PM 2.5 Health Effect Statement	Overall Associated Health Impact with AQI Level
Good (0 – 100)	No cautionary action required	Air pollution poses little or no risk	Minimal impact
Moderate (101 – 200)	Unusually sensitive people should consider reducing prolonged or heavy exertion and heavy outdoor work	Air quality acceptable for general public but moderate health concern for sensitive people	May cause breathing discomfort to the people with lung disease such as asthma and discomfort to people with heart disease, children and older adults
Poor (201 – 300)	Children and adult with heart or lung disease, should reduce prolonged or heavy exertion and limit outdoor activity	Children and adult people at risk. More chances of precipitating respiratory symptoms in sensitive individuals.	May precipitate severe attack on short term exposure in high risk individuals and respiratory symptoms (breathing discomfort) in normal individual on long term exposure.
Very Poor (301 – 400) Triggers “ Health Alert ”	Everyone should reduce prolonged or heavy exertion. More caution for children or adult with heart or lung disease.	Triggers health alert. Everyone may experience more health effects. Significant increase in respiratory effects in general population	May cause mild respiratory problems in normal individual/ more pronounced in people with lung and heart disease.
Severe (401 – 500) Triggers “ Health Warning ”	Everyone should avoid all outdoor physical activity. Sensitive individual should remain indoor with minimal activity.	Should be declared as emergency condition. Serious risk of respiratory effect in general population as high risk.	May cause respiratory effects even on healthy people and serious health impacts on people with lung and heart diseases. The health impacts may be experienced even during light physical activity

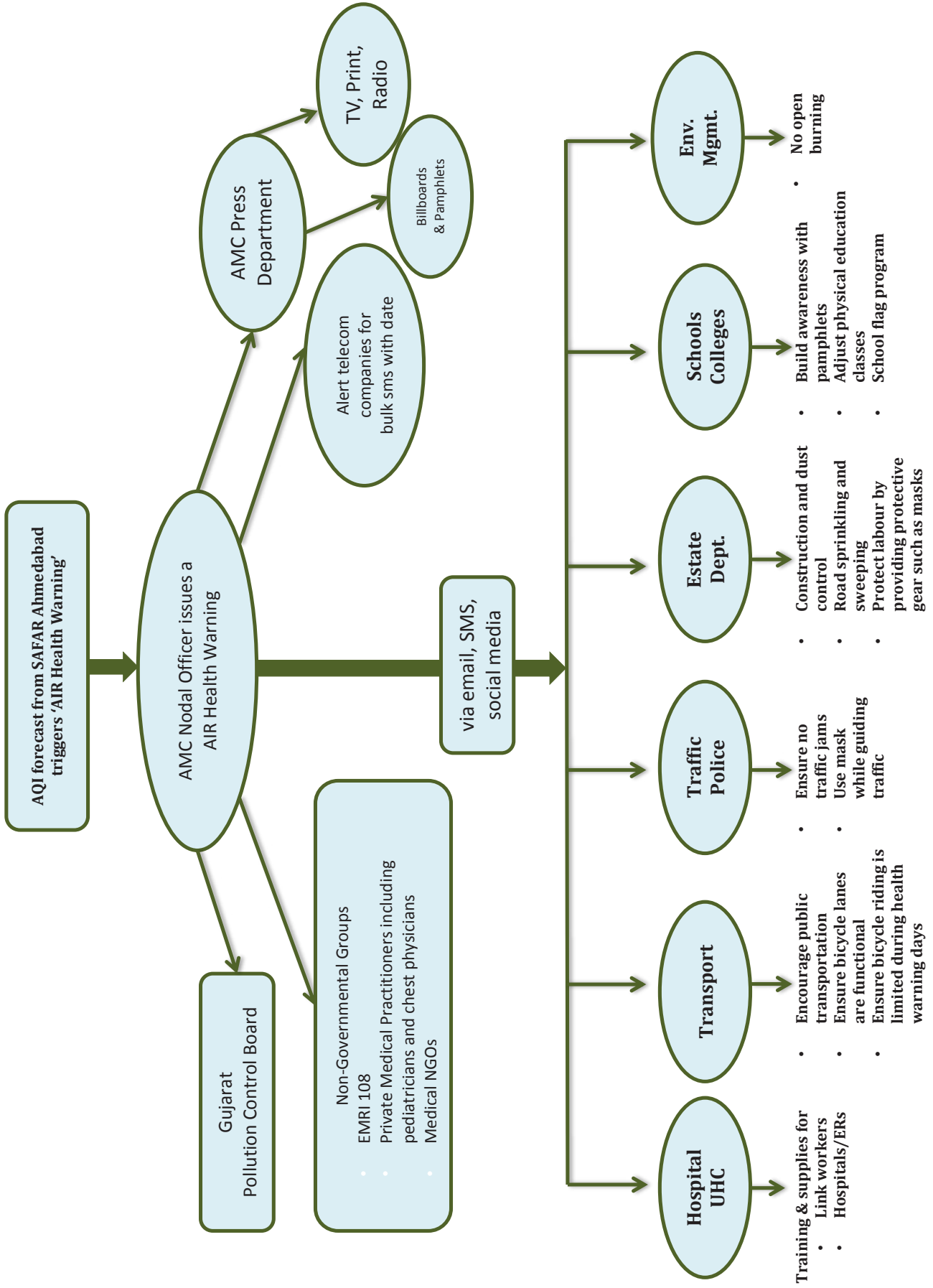
AQI index value ranges are shown on the left; associated public health impacts in the middle; and air quality descriptors on the right.

Interagency Coordination Plan

Successful implementation of the AIR Plan requires coordinated action between many diverse stakeholders, including government departments; health care professionals including emergency medical personnel, health centre staff, and hospital staff; and community groups.

Following the forecasting of air pollution events, immediate notification of the public and all those participating in the response is critical to ensure the plan is activated.

AHMEDABAD AIR PLAN
Draft AIR Health Warning and Interagency Coordination Plan



2: Public Awareness and Community Outreach

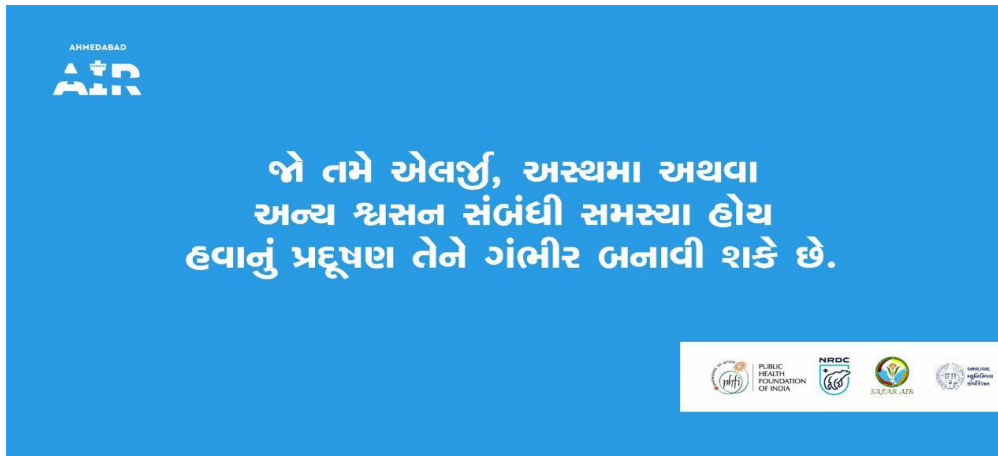
The Ahmedabad Municipal Corporation will update the AMC website with AQI and AIR Plan; engage media on AQI and AIR plan; develop information, education and communication (IEC) materials.

For the pilot year, the AMC and partners will focus on:

- Developing information, education and communication (IEC) materials for hoardings, pamphlets and videos for general public awareness.
- Updating AMC website with AQI and AIR Plan which can also provide access to useful information on air quality related FAQs.
- Engaging media on AQI and AIR plan for regular broadcast of AQI in newspapers and associated health advisories whenever issues by AMC.
- Six months city awareness campaign.



(English translation: “Do you know the air quality of your city?”)



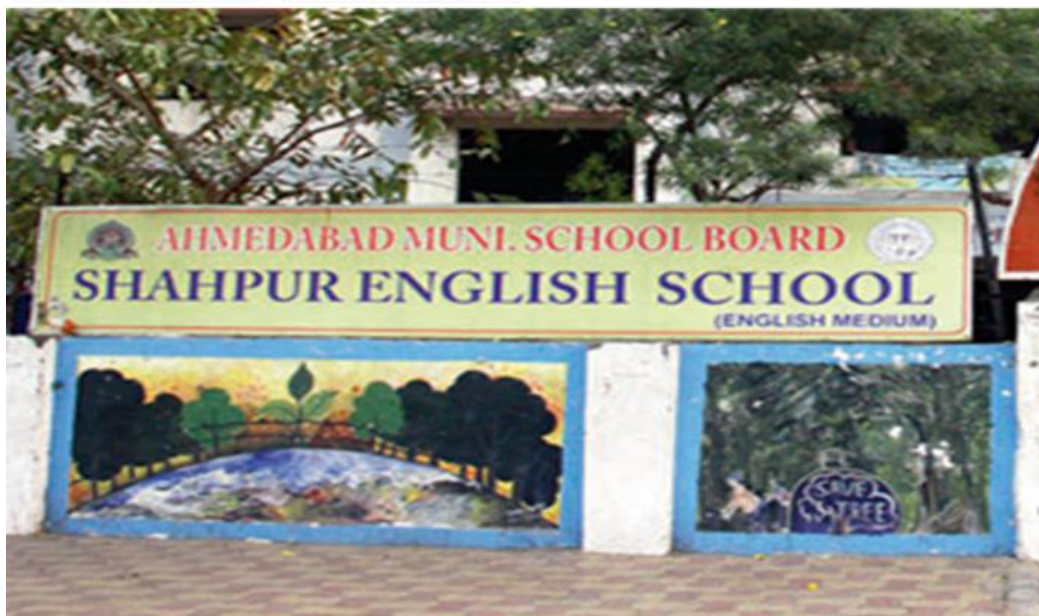
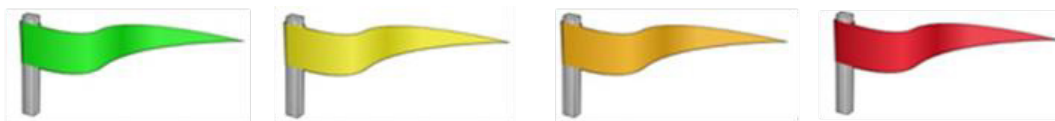
(English translation: “If you have allergies, asthma or other respiratory illnesses, then air pollution can worsen your symptoms”)

3: Focused Activities for Vulnerable Groups

The Ahmedabad Municipal Corporation will create pamphlets, hoardings, videos, SMSs; initiate school flag program that coordinates with schools to display coloured flags corresponding to AQI levels for each day.

For the pilot year, the AMC and partners will focus on:

- Implementing school flag program that coordinates with schools to display coloured flags corresponding to AQI levels for each day.
- Studying chronic respiratory illness patients and children sensitization programs with the help of government and private doctors.
- Developing specific sensitization programs for communities living in high level AQI localities of Ahmedabad
- Asthma Clinics & Pulmonary Health Promotion Program.
- SMS Alerts to Asthma/COPD patients



4: Capacity Building Among Medical Professionals

The Ahmedabad Municipal Corporation will engage with private and public medical professionals to build health awareness and protection strategies on air pollution.



For the pilot year, the AMC and partners will focus on:

- Trainings of medical and paramedical workforce to build their capacity over the issues of air pollution and health and mitigations measures.
- Engaging with private and public medical professionals to build health awareness and protection strategies on air pollution.

5: Initiate Research on Future Exposure Reduction and Mitigation Pathways – identify the future mitigation and exposure reduction measures with key partners.

For the pilot year, the AMC and partners will focus on:

- Identify the future mitigation and exposure reduction measures with key partners.
- Initiate research for local evidence building focused on exposure reduction and health.



Suggested Agency Activities for Pilot Year

	On Going Continuous Activities	AIR Health Alert (301 – 400)/ Air Health Warning (401 – 500)
<i>AMC Nodal Officer</i>	<ul style="list-style-type: none"> • Monitor and increase the AIR alert/warning level when necessary to match the severity of the AQI forecast, and have the Municipal Commissioner convene a special meeting with key agency leaders. • Identify and set up public displays of AQI, such as LED electronic scrolling boards with SAFAR. • Develop materials for the school flag program and implement • Organize sensitization and training workshops with UHCs and private medical professionals 	<ul style="list-style-type: none"> • Activate an AIR health warning and the local response citywide when severe AQI events are forecasted by notifying the key agency leaders, AMC Deputy Municipal Commissioners and the Gujarat state agencies in accordance with the Communication Plan above. • Hold a frequent, possibly daily, conference call to discuss reports and breaking developments • During an AIR health warning, ensure that communication channels remain operational. • Notify agencies when the AIR alert is over
<i>Media and AMC Press Officer</i>	<ul style="list-style-type: none"> • Commence public messaging to the public about the dangers of respiratory illness with the AMC Nodal Officer via AMC press conferences • Publish the daily AQI number in the print media similar to the weather forecast • Develop an SMS alert system to send direct messages to private practitioners in addition to the medical professionals at public hospitals and UHCs • Explore other means of communications, such as broader use of social media, for example, Facebook and the WhatsApp mobile application 	<ul style="list-style-type: none"> • Circulate warnings via text alerts or WhatsApp mobile messages, in collaboration with private sector telecom companies utilizing centralized mobile databases, in addition to traditional media during an AIR health warning • Circulate warnings in bulk to the public via centralized email databases during an AIR health warning • Utilize local radio FM broadcasts to disseminate heat protection tips and high AQI warnings to the city's at-risk populations during an AIR health warning • Develop messages that can be announced at multiplexes during the AIR health warning
<i>AMC Health Department and Medical Professionals</i>	<ul style="list-style-type: none"> • Post respiratory illness prevention tips and ensure medical supplies are available • Develop a registry of patients with existing respiratory conditions • Distribute awareness building pamphlets and information to patients, especially those in the 	<ul style="list-style-type: none"> • Ensure adequate medical supplies are available • Have zonal health officer visit UHCs to confirm proper preparation has been made for AIR alert and AIR health warning • Produce weekly reports of the public health impact for AMC

	<p>registry</p> <ul style="list-style-type: none"> • Develop identification cards for school children that are vulnerable to high levels of air pollution 	<p>Nodal Officer during an AIR health alert and health warning</p> <ul style="list-style-type: none"> • Increase staffing at hospitals and UHCs to attend to the influx of patients during an AIR health alert and health warning. • Increase link worker and community health worker outreach in at-risk neighborhoods during an AIR health alert and AIR health warning
<i>108 Emergency Service</i>		<ul style="list-style-type: none"> • Disseminate SMS text messages to warn local residents during an AIR health warning • Ensure adequate supply of oxygen and medicine during an AIR health warning
<i>AMC Labour and Employment Department</i>	<ul style="list-style-type: none"> • Pilot project to provide respiratory-illness prevention materials to traffic police, BRTS transit staff, solid waste management staff and construction workers 	<ul style="list-style-type: none"> • Encourage employers to have outdoor workers wear masks and shift schedules away during an AIR health warning
<i>Community Groups and Individuals</i>	<ul style="list-style-type: none"> • Monitor the city and location specific AQI on a daily basis and monitor if an AIR health warning is expected 	<ul style="list-style-type: none"> • Limit outdoor and indoor burning, wear masks, stay indoors, during an AIR health warning • Check on vulnerable neighbors, particularly during an AIR health warning Limit heavy work in direct sun or indoors if poorly ventilated, especially during an AIR health warning
<i>Gujarat Pollution Control Board</i>	<ul style="list-style-type: none"> • Ensure and document that activities are carried out under the Ahmedabad City Clean Air Plan with systematic information accessible to all. 	<p>Ensure all concerned state departments are informed if a AIR health warning is called in Ahmedabad</p>

- [1] World Health Organization, *Global Ambient Air Interactive Map*, 2014, http://www.who.int/phe/health_topics/outdoorair/databases/cities-2014/en/ (accessed December 2, 2016)
- [2] World Health Organization, *Global Ambient Air Interactive Map*, 2016, <http://maps.who.int/airpollution/> (accessed December 2, 2016).
- [3] Ahmedabad's yearly averages for PM for 2014-15: state program (SAMP), S. No. 14-15; national program (NAMP), S. No. 22-18.
- [4] World Health Organization, *Global Urban Ambient Air Pollution Database*, 2016, http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/ (accessed September 27, 2016).
- [5] World Health Organization, *Global Urban Ambient Air Pollution Database*, 2016, http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/ (accessed September 27, 2016); Dey, S. et al., "Variability of outdoor fine particulate (PM_{2.5}) concentration in the Indian Subcontinent," *Remote Sensing of Environment* (2012): 153-161.
- [6] B Sengupta, "Ahmedabad ranks among India's most polluted cities," *Times of India*, December 15, 2015, <http://timesofindia.indiatimes.com/city/ahmedabad/Ahmedabad-ranks-among-Indias-most-polluted-cities/articleshow/50181733.cms> (accessed December 2, 2016); American Lung Association, "Health Effects of Ozone and Particle Pollution," 2016.
- [7] Guttikunda, S.K. and P. Jawahar, "Application of SIM-Air Modeling Tools to Assess Air Quality in Indian Cities," *Atmospheric Environment* 62 (2012), <http://www.cobenefit.org/cop18/pdf/DRI/2012-10-AE-AP-in-Six-Indian-Cities.pdf> (accessed December 2, 2016)
- [8] World Health Organization, *Global Ambient Air Interactive Map*, 2014, http://www.who.int/phe/health_topics/outdoorair/databases/cities-2014/en/ (accessed December 2, 2016)
- [9] Gujarat Central Pollution Control Board, <http://www.gpcb.gov.in/About-Board1.htm> (accessed December 2, 2016).
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- [11] Gujarat Pollution Control Board, December 2016 presentation.
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- [16] SAFAR also uses a segmented linear function to relate the actual concentrations of each pollutant to a non-dimensional number (the AQI). A linear segmented function uses straight-line segments to join discrete coordinates. In this case, the discrete coordinates are the AQI breakpoints. The following equation converts the concentration of key air pollutants to its respective AQI value:

$$I = \frac{I_{high} - I_{low}}{C_{high} - C_{low}}(C - C_{low}) + I_{low}$$

where,

I is the (Air Quality) index,

C is the pollutant concentration,

C_{low} is the concentration breakpoint that is ≤ C,

C_{high} is the concentration breakpoint that is ≥ C,

I_{low} is the index breakpoint corresponding to C_{low},

I_{high} is the index breakpoint corresponding to C_{high}.

This equation, used to convert measured pollutant concentration data to its corresponding AQI, is taken from Dr. Gufran Beig (2015). *System of Air Quality Forecasting and Research*. Annual Report, Geneva: World Meteorological Organization.

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Examples of health risk communication tools

હવાનાં પ્રદૂષણની આરોગ્ય પર અસર

સ્ત્રોક

- ન્યુરોલોજીકલ વિકાસ
- માનસિક સ્વાસ્થ્ય
- ન્યુરોડીજનરેટીવ રોગ

રક્તવાહિની રોગ મૂલ્યુદર

- હૃદયની ભાડીયો ખમ
- એરિથમિયા
- હૃદયની નિષ્ક્રિયાતા
- હૃદયના દર ચલનમાં ફેરફારો
- સેન્ટ રોગમેન્ટમાં ડિપ્રેશન

ત્વચામાં વૃદ્ધિત્વ

- અકાળ જન્મ
- જન્મ દરમ્યાન વજનમાં ઘટાડો
- ગર્ભ વિકાસ
- ગભાશયની વૃદ્ધિમાં ઘટાડો
- વીર્ય ગુણવત્તામાં ઘટાડો

અસન સંબંધી રોગથી મૂલ્યુ

- અસન સંબંધી રોગથી માંદગી
- ફેફસાનું કેન્સર
- ન્યુમોનિયા
- ઉપલા અને નીચલા અસનના લક્ષણો
- હવાથી બળતરા
- ફેફસાની કાર્યક્ષમતામાં ઘટાડો
- ફેફસાની વૃદ્ધિમાં ઘટાડો

રોગ પ્રતિકારક શક્તિમાં ઘટાડો

- ક્રાયાભિદીસ પ્રકાર ૧ અને ૨ થવાની શક્યતા
- અસ્થિ ચયાપચય

દાર્ઢ ઠલકપ્રેશર

- ઇન્ડોથિયાલ તકલીફ
- રક્ત સ્કેટનમાં વધારો
- પ્રણાલીગત બળતરા થવી
- ડીપ વાનસ શ્રોમ્બોસિસ

પUBLIC HEALTH FOUNDATION OF INDIA

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SAFAR AIR

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

Examples of informative pamphlets in Gujarati that can be used in medical OPDs

AHMEDABAD

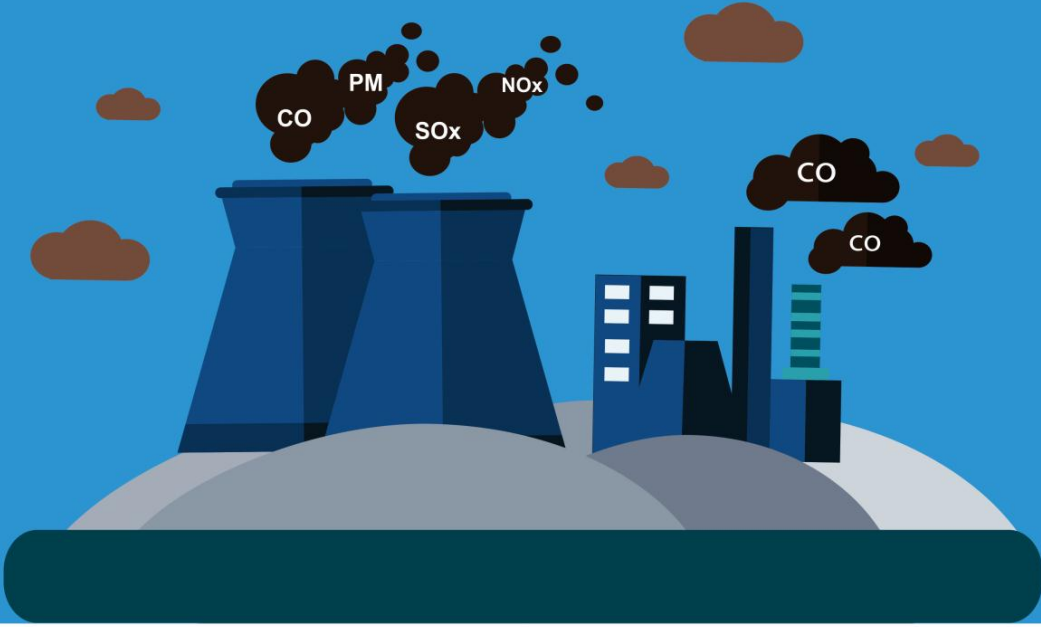


આકાશ ભુરુ છે એનો અર્થ એમ નથી કે હવા તમારા માટે તંદુરસ્ત છે.

જો તમને એલર્જી, અસ્થમા અથવા અન્ય શ્વસન સંબંધી સમસ્યા હોય તો
હવાનું પ્રદૂષણ તેને ગંભીર બનાવી શકે છે.

હવાના પ્રદૂષણ આરોગ્ય પર હાનિકારક અસર કરે છે.
તમારા વિસ્તારની હવા કેટલી પ્રદૂષિત છે તેની જાણકારી અવશ્ય લો.

જો તમે હવા ને પ્રદૂષિત કરશો, તો તમને હવા પ્રદૂષિત કરશે.



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તમારા વિસ્તારની
હવાની ગુણવત્તા જાણવા
સફર એર એપ
ડાઉનલોડ કરો



અમદાવાદ
મ્યુનિસિપલ
કોર્પોરેશન