

UNFIT TO BREATHE 2021

**Air Quality Levels across the City of
Chennai, Tamil Nadu**



JULY 2021

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EXECUTIVE SUMMARY

As part of the annual air quality documentation and study of Chennai City, Healthy Energy Initiative (India) and Coastal Resource Center carried out a round of sampling at 20 sites across the city in February - March 2021.

The samples were taken from Thiruvottiyur, Kasimedu, Thoraipakkam, Kuruvimedu, Sholinganallur, Velachery, Nochikuppam, Kodungaiyur, Minjur, Urnamedu, Seppakkam, Kattupalli Kuppam, Sriperumbudur, T Nagar, Parrys Corner, Thirusulam, Vyasarpadi, Athipattu, Kattukuppam, Ambattur. The sample sites were chosen in order to represent the different locations in the city to understand the range of pollutants in these regions. Sixteen out of 20 samples were taken from the rooftops of residential homes in these neighbourhoods and one sample (Kodungaiyur) was taken from a child care centre rooftop facing the main road, one sample (Kattukuppam) was taken from the temple rooftop and two samples (Parrys Corner and Vyasarpadi) were taken from the commercial buildings

In each site, samples were taken for 24-hour samples using pre-weighted Teflon filters fitted to a low volume air sampler - Minivol and analyzed for Particulate Matter less than 2.5 micrometres in size (PM_{2.5}) and heavy metals. The samples were analysed in Chester LabNet in Oregon, USA.

The study results revealed that:

- Air quality in Chennai in February-March 2021 was consistently poor. Seventeen of the 20 air samples (highlighted in red in Table 2) substantially exceeded the Indian 24-hour National Ambient Air Quality Standard (NAAQS) for PM_{2.5} of 60 µg/m³ by 1.1 to 3.8 times. The three samples (Kuruvimedu, Nochikuppam and Kattupalli Kuppam) did not exceed the 24-hour NAAQS for PM_{2.5}. The three samples (Thirusulam- 228.6µg/m³, Vyasarpadi- 214.2µg/m³ and Parrys Corner- 175µg/m³) had the highest levels of PM_{2.5}.
- A total of 19 samples had silica levels higher than that of California OEHHA annual average for exposure of 3 µg/m³ except for S12 Kattupalli Kuppam, which shows the lowest value of 2.61 µg/m³. S16 Thirusulam showed the highest level of Silica. Both coal ash and construction sand have high levels of crystalline silica and could be prominent contributors. Acute exposure to silica causes a fatal lung disease called Silicosis. Silica also irritates the respiratory system and causes lung disorders.

- Samples from 12 locations out of 20 had Manganese exceeding the US EPA reference concentration (0.05 µg/m³). Out of these 14 samples, two samples (S16 Thirusulam, S17 Vyasarpadi) showed Manganese levels above the WHO annual health-based guidelines value of 0.15 µg/m³. There are no standards in India for Manganese in ambient air. Manganese is a known neurotoxin and affects neurobehavioral functions.
- Nickel levels in all samples except in Kattupalli Kuppam exceed the WHO annual health-based guidelines value of 0.0025 ug/m³. Nickel is a carcinogen and it also affects the respiratory and immune systems in the body.
- Lead is a known neurotoxin. Children are particularly vulnerable to the effects of this heavy metal. Exposures to even low levels of the lead early in life have been linked to effects on IQ, learning, memory and behaviour.

Recommendations to the Tamil Nadu government bodies concerned with air pollution control:

1. Include Chennai city as one of the non-attainment cities in the National Clean Air Programme and initiate a time-bound Clean Air Action Plan.
2. Set up a robust pan-city, citizen-friendly air quality monitoring network to capture air quality trends in Chennai City.
3. Rely on monitoring data and trends to develop a short term and long term action plan to control air pollution and protect public health.
4. Carry out vulnerability mapping to identify sensitive areas like schools, hospitals and carry out effective communication, issue advisories about air pollution and health while taking steps to reduce pollution levels around sensitive locations.
5. Conduct health impact assessment studies to explore the health status of the individuals residing in the highly polluted areas to establish the impacts of pollution on human health and provide adequate accessible health infrastructure to address the issue.
6. A complete moratorium on expansion or setting up of new polluting units in North Chennai, Ennore region till the air quality is restored.
7. Conduct regular monitoring of industrial emissions and impose stringent regulations on the industries violating the emission norms.
8. Plan and Implement the vehicular emission norms; establish Pollution Under Control points and impose fines on the violators.

METHODOLOGY

Neighbourhoods across the city were profiled for general and point sources of air pollution and 20 sampling sites were chosen across Chennai city (Table 1). Samples of dust in the ambient air were taken from all the chosen locations from the rooftops of residential homes, commercial buildings, temple etc. The residential homes in the places of Seppakkam, Kuruvimedu, Kattupalli Kuppam, Athipattu, Urnamedu, Kattukuppam were in the vicinity of the thermal power plants and/or coal fly ash ponds/coal handling yards. The sampling sites in Kodungaiyur and Thiruvottiyur were in the vicinity of the garbage dump yard and Manali industrial complex respectively. In places like Sholinganallur, Velachery, and Nochikuppam, the sampling sites were residential in nature with no industrial activities in the surrounding areas. The sampling site in Poonamallee Highway (Sriperumbudur), Ambattur sample was from a residential neighbourhood which was in the vicinity of an industrial estate. The sampling sites in Kasimedu, Parys Corner, Minjur, T Nagar and Thoraipakkam, were in areas of commercial nature. Along with them Vyasarpadi which is one of the sampling areas is also of commercial nature with an electroplating industry. Thirusulam is a residential area situated in a stone quarry and M-sand production site.

The sampling exercise was conducted in the months of February and March 2021. The dust samples were collected using Teflon filters fitted to a low volume air sampler (MiniVol low volume air-sampling device). All the 20 samples were taken continuously for a period of 24-hours. All samples were analysed for the presence of PM_{2.5} and heavy metals in the Chester LabNet, a laboratory based in Oregon, USA. The laboratory tested the samples using the US EPA approved techniques namely gravimetry technique and X-Ray Fluorescence (XRF) technique. In the samples, PM_{2.5} was analysed using gravimetric technique and the presence of heavy metals were detected using the XRF technique.



Table 1: List of the sample sites, the details of the weather conditions on the day of sampling and local sources of pollution within 5Km radius, Chennai city

Sample ID	Sample Location	Weather Conditions	Local sources of Pollution (within 5km radius)
S1	Thiruvottiyur	Clear & Sunny	Emissions from Thermal Power Plants, Emissions from heavy vehicles, Manali industrial estate.
S2	Kasimedu	Clear & Sunny	Emissions from heavy vehicles, Garbage burning, and emissions from diesel fishing boats
S3	Thoraipakkam	Clear & Sunny	Garbage burning, emissions from heavy vehicles, road dust, construction works
S4	Kuruvimedu	Clear & Sunny	Coal Ash, Emissions from Thermal Power Plants, Cement plant, Truck shop, Emissions from heavy vehicles, Road dust
S5	Sholinganallur	Clear & Sunny	Vehicular emission, construction
S6	Velachery	Clear & Sunny	Vehicular emission, construction, Diesel emission from Railway station
S7	Nochikuppam	Clear & Sunny	Vehicular emission, construction
S8	Kodungaiyur	Cloudy	Garbage burning, emissions from heavy vehicles, road dust, Manali industrial estate
S9	Minjur	Clear & Sunny	Coal and Coal Fly Ash transportation, emissions from heavy vehicles, road dust, construction
S10	Urnamedu	Clear & Sunny	Emissions from Thermal Power Plants, Coal Ash Ponds, Emissions from heavy vehicles
S11	Seppakkam	Clear & Sunny	Emissions from Thermal Power Plants, Coal Ash Ponds, Emissions from heavy vehicles
S12	Kattupalli Kuppam	Clear & Sunny	Emissions from Thermal Power Plants, Coal Ash Ponds, Emissions from heavy vehicles
S13	Sriperumbudur	Clear & Sunny	Emission from heavy vehicles, construction, Industrial emission
S14	T Nagar	Clear & Sunny	Vehicular emission, construction
S15	Parrys Corner	Clear & Sunny	Vehicular emission
S16	Thirusulam	Clear & Sunny	Vehicular emission, stone quarry and M-sand production, construction
S17	Vyasarpadi	Clear & Sunny	Vehicular emission, electroplating industry, construction
S18	Athipattu	Clear & Sunny	Coal Ash, Emissions from Thermal Power Plants, Emission from heavy diesel vehicles, Diesel emission from Railway station
S19	Kattukuppam	Sunny	Coal Ash, Emissions from Thermal Power Plants, Emissions from heavy vehicles, Ferrous Foundries
S20	Ambattur	Clear & Sunny	Vehicular emission, construction, Industrial Emission

Sampling Locations

Locations of 24-hour Air Quality Sampling Sites, Chennai City

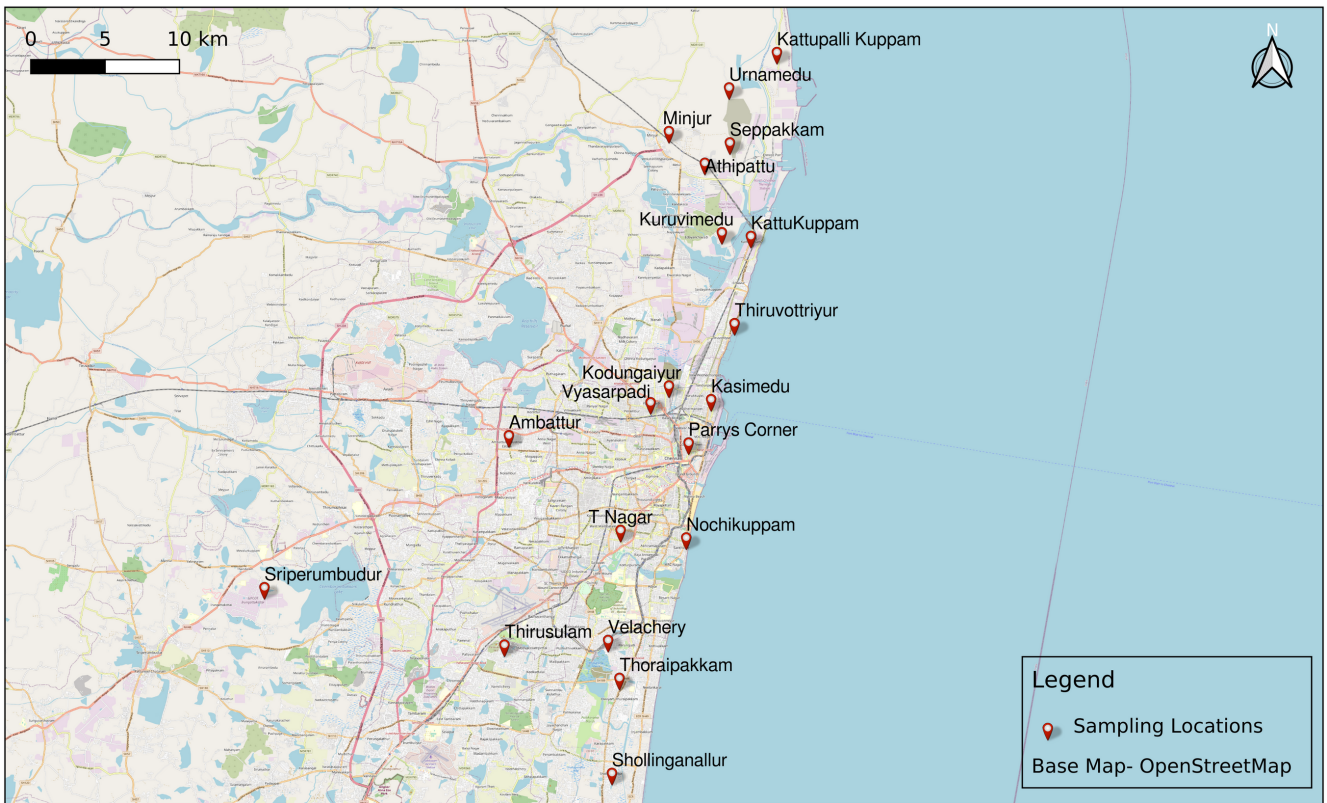


Fig 1: Map showing the locations of the air quality sampling sites, Chennai city



RESULTS

Table 2: Details of the sampling locations and the level of PM2.5 and heavy metals found in the filters.

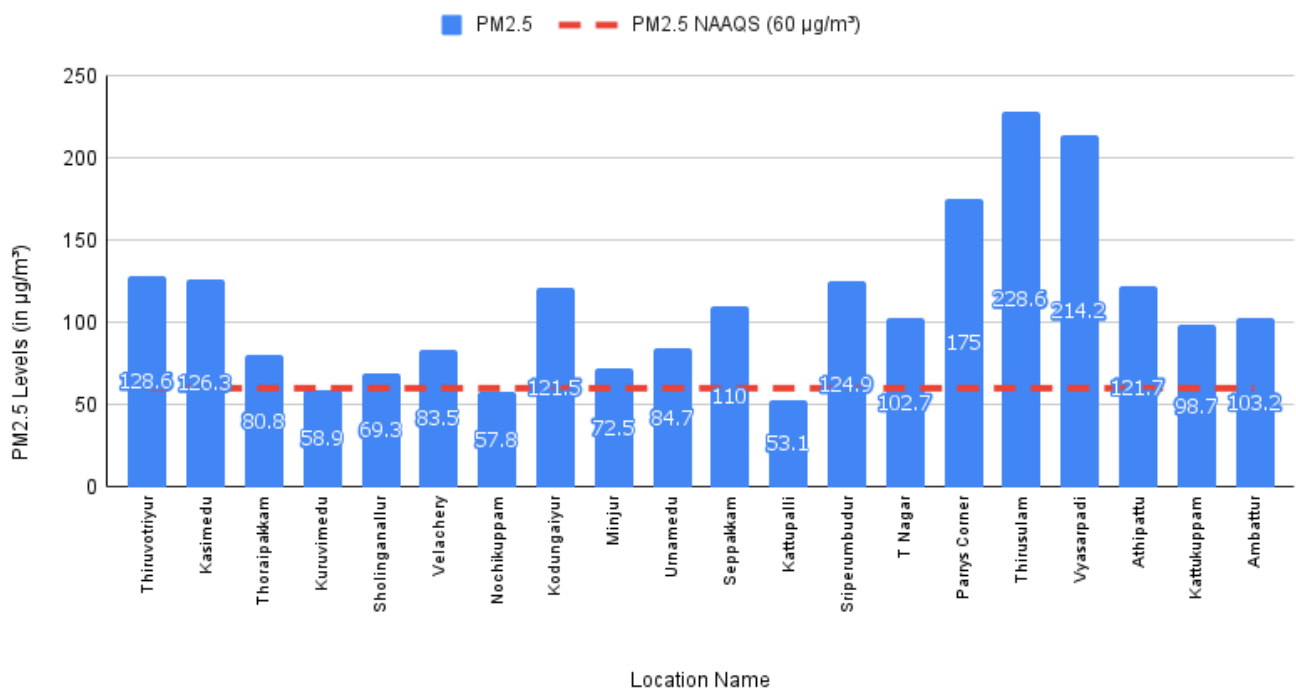
Location Name	Date	PM2.5	Si	Fe	Mn	Ni	Pb	Ca	Al	Na	Cl	(Al+Fe+Ca+Si)/PM2.5	Health Impacts
Thiruvottiyur	19-Feb-21	128.6	10.13	5.42	0.086	0.007	0.049	4.62	4.63	4.80	10.73	19%	Unhealthy
Kasimedu	23-Feb-21	126.3	7.53	3.65	0.054	0.009	0.080	4.68	3.02	1.68	5.09	15%	Unhealthy
Thuraipakkam	25-Feb-21	80.8	5.29	2.24	0.049	0.003	0.045	2.78	2.12	1.01	0.82	15%	Unhealthy
Kuruvedu	1-Mar-21	58.9	3.41	1.63	0.033	0.005	0.067	1.50	1.53	0.77	0.64	14%	Unhealthy
Shollinganallur	4-Mar-21	69.3	5.12	2.04	0.050	0.003	0.039	2.24	2.09	0.95	0.89	17%	Unhealthy
Velacherry	5-Mar-21	83.5	7.33	3.02	0.070	0.005	0.039	3.70	3.09	1.17	1.07	21%	Unhealthy
Nochikuppam	8-Mar-21	57.8	3.13	1.26	0.021	0.004	0.008	2.88	1.28	2.59	5.45	15%	Unhealthy
Kodungaiyur	10-Mar-21	121.5	8.34	4.11	0.062	0.007	0.044	7.46	3.37	1.94	2.41	19%	Unhealthy
Minjur	11-Mar-21	72.5	4.84	2.25	0.037	0.005	0.047	2.90	2.25	1.13	2.45	17%	Unhealthy
Urnamedu	11-Mar-21	84.7	7.49	2.15	0.035	0.006	0.032	1.62	4.09	1.38	1.56	18%	Unhealthy
Seppakkam	12-Mar-21	110.0	8.29	3.49	0.042	0.008	0.059	2.68	4.55	1.35	2.95	17%	Unhealthy
Kattupalli Kuppam	12-Mar-21	53.1	2.61	1.42	0.037	0.002	0.120	1.26	1.15	1.17	1.38	12%	Unhealthy
Sriperambattur	18-Mar-21	124.9	9.37	4.31	0.084	0.006	0.043	4.25	3.79	1.36	1.64	17%	Unhealthy for sensitive groups
T Nagar	22-Mar-21	102.7	8.81	3.01	0.065	0.006	0.042	4.35	3.66	0.97	0.96	19%	Unhealthy
Parrys Corner	22-Mar-21	175.0	13.82	5.40	0.112	0.009	0.054	12.38	5.78	1.69	2.56	21%	Very Unhealthy
Thirusulam	24-Mar-21	228.6	25.83	10.00	0.198	0.016	0.063	11.16	9.80	2.49	4.45	25%	Very Unhealthy
Vyasaripadi	24-Mar-21	214.2	18.00	7.36	0.162	0.015	0.090	8.44	7.57	2.59	8.00	19%	Very Unhealthy
Athipattu	30-Mar-21	121.7	10.36	5.19	0.071	0.007	0.067	4.16	4.64	2.06	5.55	20%	Unhealthy
Kattukuppam	30-Mar-21	98.7	6.77	4.35	0.100	0.007	0.055	3.14	3.10	2.36	2.89	18%	Unhealthy
Ambattur	31-Mar-21	103.2	7.59	5.37	0.074	0.017	0.038	4.08	3.16	2.09	2.01	20%	Unhealthy
	AVERAGE	110.8	8.70	3.88	0.072	0.007	0.054	4.51	3.73	1.78	3.17	18%	
Health-based stand	EPA Air Quality Index, 24-hour	>250.5	Hazardous - This would trigger a health warnings of emergency conditions. The entire population is more likely to be affected.										
	EPA Air Quality Index, 24-hour	150.5-250.4	Very Unhealthy - People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.										
	EPA Air Quality Index, 24-hour	55.5-150.4	Unhealthy - People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.										
	EPA Air Quality Index, 24-hour	35-55.4	Unhealthy for Sensitive Groups - People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.										
	WHO 24-hour	25	None	None	None	None	None						
	WHO annual	10	None	None	0.15	0.0025	0.50						
	EPA 24-hour	35	None	None	None	None	None						
	EPA 3-month	None	None	None	None	None	0.15						
	EPA annual	12	None	None	None	None	None						
	India NAAQS 24-hour	60	None	None	None	None	None	1.00					
	India NAAQS Annual	40	None	None	None	0.02	0.50						
	California OEHHA 24-hour	None	None	None	None	0.2	None						
	California OEHHA annual*	None	3	None	0.09	0.014	None						
	EPA RfC	None	None	None	0.05	None	None						
	Comparative Background Urban Levels (Wilmington, USA)	18.5	0.08	0.11	0.004	0.004	0.006	0.035		0.23	0.035	1%	
	* Standard for crystalline silica												
	<i>Italic = conc < 3 times uncertainty</i>												
	<u>underline = conc < 2 times uncertainty</u>												
	0.0 = conc < uncertainty = non-detect												

ANALYSIS

PM2.5

The pollutants present in the air are a mixture of particulate matter and gaseous particles. Particulate Matter (PM) mainly comprises dust, pollen, ash, soot, heavy metals and carbon. The particulate matter is generally classified as coarse particles (particles size that is 10 microns and below) and fine particles (particles size less than 2.5 micrometres). The levels of PM2.5 in the seventeen samples were 1.1 to 3.8 times above the prescribed limits of the Government of India (60 µg/m³).

PM2.5 Levels in Sampled Locations, Chennai City



The three samples (at S15 Parry's Corner, S16 Thirusulam and S17 Vyasarpadi) with the highest levels of PM2.5 are within congested areas of Chennai. Parrys Corner is a commercial and residential area with heavy vehicular movement. Thirusulam is a residential area situated in a stone quarry and M-sand production site and Vyasarpadi is a commercial area located near an electroplating industry.

Because of the fine nature of the particles, PM2.5 are easily inhalable; penetrate deep into the alveoli of the lungs; enter the circulatory systems and pose a wide range of health impacts in human beings. Previous studies have proven that PM2.5 causes respiratory illness, cardiovascular diseases, stroke and psychological impacts among the individuals who are exposed. Researches have also proven that PM2.5 crosses the placental barriers and results in birth defects among newborn babies. PM induces inflammation in lung cells and exposure to PM could increase the susceptibility and severity of the COVID-19 patient symptoms.

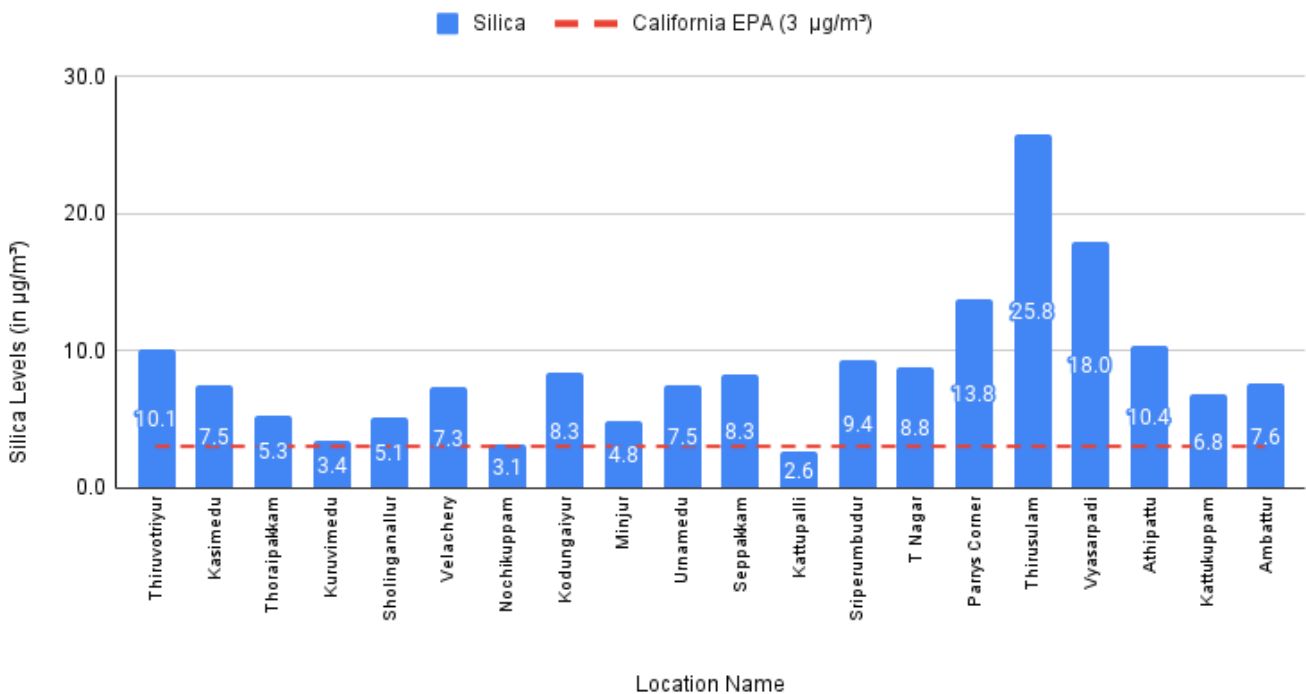
Table 3: PM2.5 levels in the sampling locations and its health implications

Sample ID	Sample Location	PM2.5 level	Health Implication (As Per US EPA Categorization)
S16	Thirusulam	228.6	Very unhealthy
S17	Vyasarpadi	214.2	Very unhealthy
S15	Parrys Corner	175	Very unhealthy
S1	Thiruvottiyur	128.6	Unhealthy
S2	Kasimedu	126.3	Unhealthy
S13	Sriperumbudur	124.9	Unhealthy
S18	Athipattu	121.7	Unhealthy
S8	Kodungaiyur	121.5	Unhealthy
S11	Seppakkam	110	Unhealthy
S20	Ambattur	103.2	Unhealthy
S14	T Nagar	102.7	Unhealthy
S19	Kattukuppam	98.7	Unhealthy
S10	Urnamedu	84.7	Unhealthy
S6	Velachery	83.5	Unhealthy
S3	Thoraipakkam	80.8	Unhealthy
S9	Minjur	72.5	Unhealthy
S5	Sholinganallur	69.3	Unhealthy
S4	Kuruvimedu	58.9	Unhealthy
S7	Nochikuppam	57.8	Unhealthy
S12	Kattupalli Kuppam	53.1	Unhealthy for Sensitive Groups

SILICA

The naturally occurring element Silicon when combined with oxygen gives rise to Silicon dioxide widely known as Silica. The crystalline Silica compound is fine in nature and enters the human body through inhalation. Construction and demolition sites, rock crushing units, mining and excavation sites, coal ash, etc., contribute to silica dust. Permissible Exposure Limits (PEL) for silica for the general public is not provided by US EPA, WHO AQ standards or India NAAQS. 19 samples had silica levels higher than that of California OEHHA annual average for exposure of $3 \mu\text{g}/\text{m}^3$ except for S12 Kattupalli Kuppam, which shows the lowest value of $2.61 \mu\text{g}/\text{m}^3$. S16 Thirusulam showed the highest level of Silica. This could be attributed to the presence of stone quarries and M-sand production sites in this residential area. Dust is produced in the quarrying process while it is being blasted, crushed, screened, transported and stored. All these processes can result in the presence of Silica in the atmosphere.

Silica Levels in Sampled Locations, Chennai City

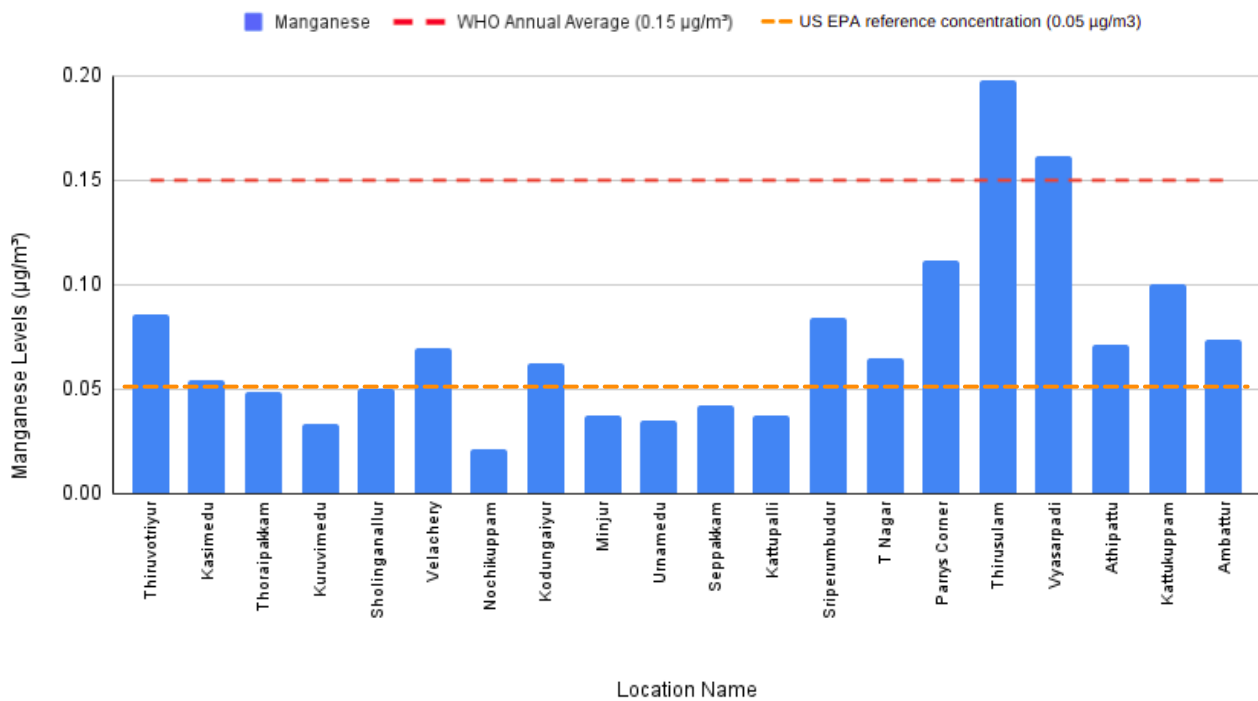


US EPA has provided an 8-hour average of PEL for Silica as $50 \mu\text{g}/\text{m}^3$ for the individuals who are working in industries related to Silica (eg: Construction workers). Generally, workers and local populations who are chronically exposed to Silica develop silica-related respiratory illnesses. The fine silica particle can easily enter the lungs and causes incurable scarring of lung tissues known as silicosis which is fatal. Exposure to Silica is also associated with lung cancer, kidney diseases and musculoskeletal problems.

MANGANESE

Samples from 12 locations out of 20 had Manganese exceeding the US EPA reference concentration ($0.05 \mu\text{g}/\text{m}^3$). Out of these 12 samples, two samples (S16 Thirusulam, S17 Vyasarpadi) showed Manganese levels above the WHO annual health-based guidelines value of $0.15 \mu\text{g}/\text{m}^3$. Manganese is commonly used as a melting agent in ferrous foundries. Owing to the small particle size, manganese tends to remain suspended in the air for long periods of time.

Manganese Levels in Sampled Locations, Chennai City

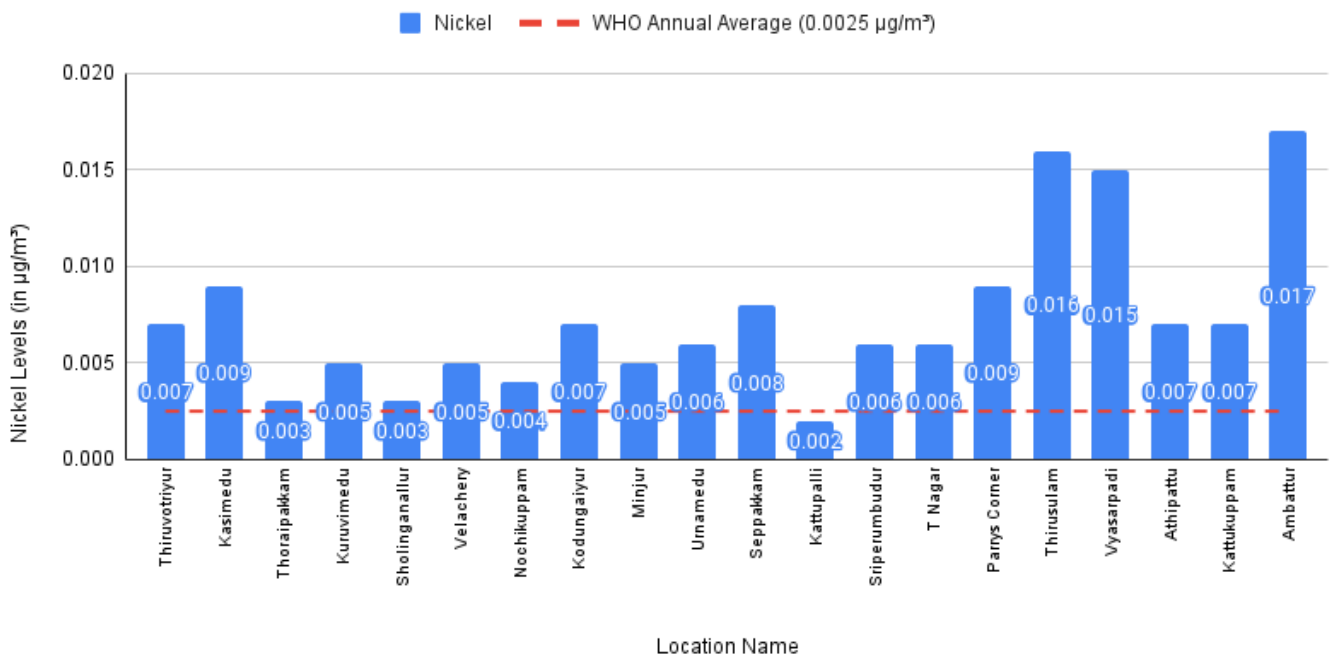


Manganese level was high in S16 Thirusulam (residential area), attributed to the presence of stone quarries and M-sand production sites in the locality. Manganese is used in sand production sites for Manganese oxide coating of sands. S17 Vyasarpadi is a commercial area with an electroplating industry, which can have manganese-electroplating or manganese-alloy-electroplating and heavy vehicular emission to the release of Manganese. Long term, as well as acute high-level exposure to Manganese, is proven to cause neurological damages and resulting in a condition known as manganism. Manganism in the advanced stage is characterised by a mask-like face, altered gait, fine tremors and other psychological disturbances. As the particle size of Manganese is less than $6 \mu\text{m}$, it is easily inhalable and results in the inflammatory response in the lungs. Though there is conclusive evidence on Manganese and its impact on human health, there are no standards recommended for Manganese in ambient air by India NAAQS.

NICKEL

Nickel levels in all samples except in S12 Kattupalli Kuppam exceed the WHO annual health-based guidelines value of 0.0025 $\mu\text{g}/\text{m}^3$, which is based on the risk of cancer associated with long-term exposure to nickel. The WHO air quality guidelines state the following: "Nickel compounds are human carcinogens by inhalation exposure. The present data are derived from studies in occupationally exposed human populations. Assuming a linear dose-response, no safe level for nickel compounds can be recommended. On the basis of the most recent information of exposure and risk estimated in industrial populations, an incremental risk of 3.8×10^{-4} can be given for a concentration of nickel in the air of $1 \mu\text{g}/\text{m}^3$. The concentrations corresponding to an excess lifetime risk of 1:10 000, 1:100 000 and 1: 1 000 000 are about 250, 25 and 2.5 ng/m^3 , respectively."

Nickel Levels in Sampled Locations, Chennai City (0.0025 $\mu\text{g}/\text{m}^3$)

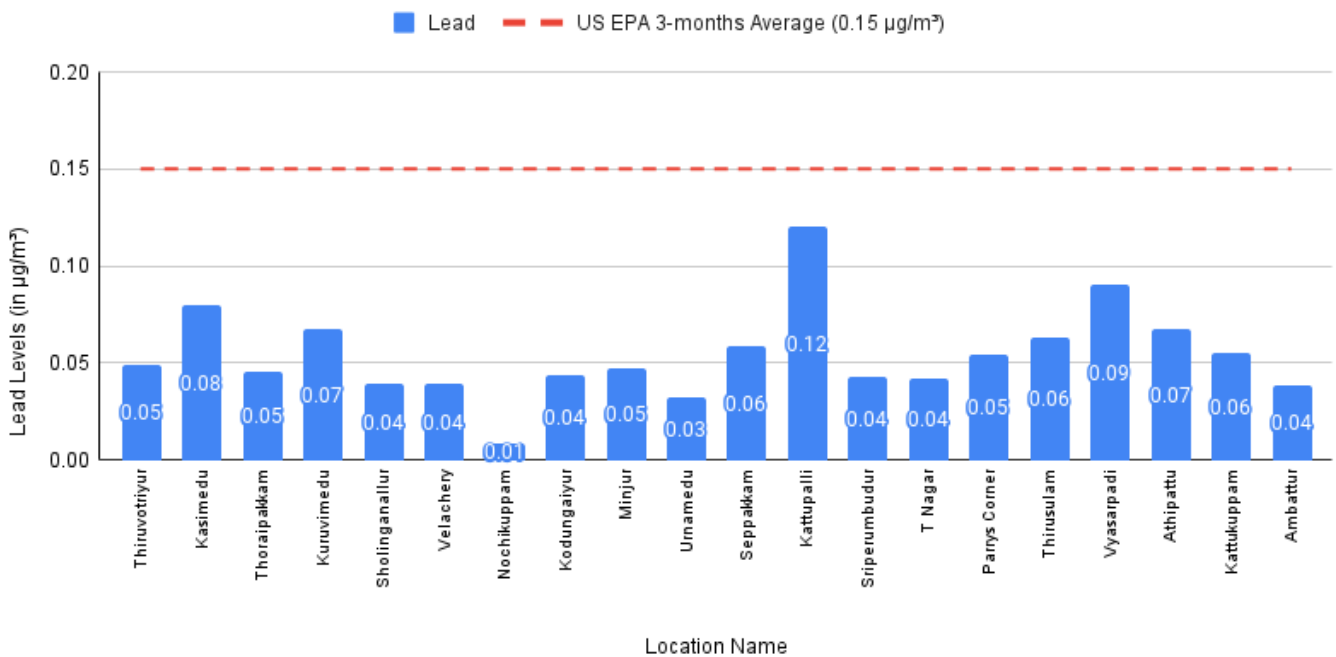


Hence, if nickel levels in the 15 filtered air samples from Chennai in February and March 2021, reflect conditions that generally prevail over the long term, then persons in these areas would suffer an excess lifetime risk of cancer of 4 per 1 million (compared to 1.6 per 1 million for typical levels of nickel in urban air).

LEAD

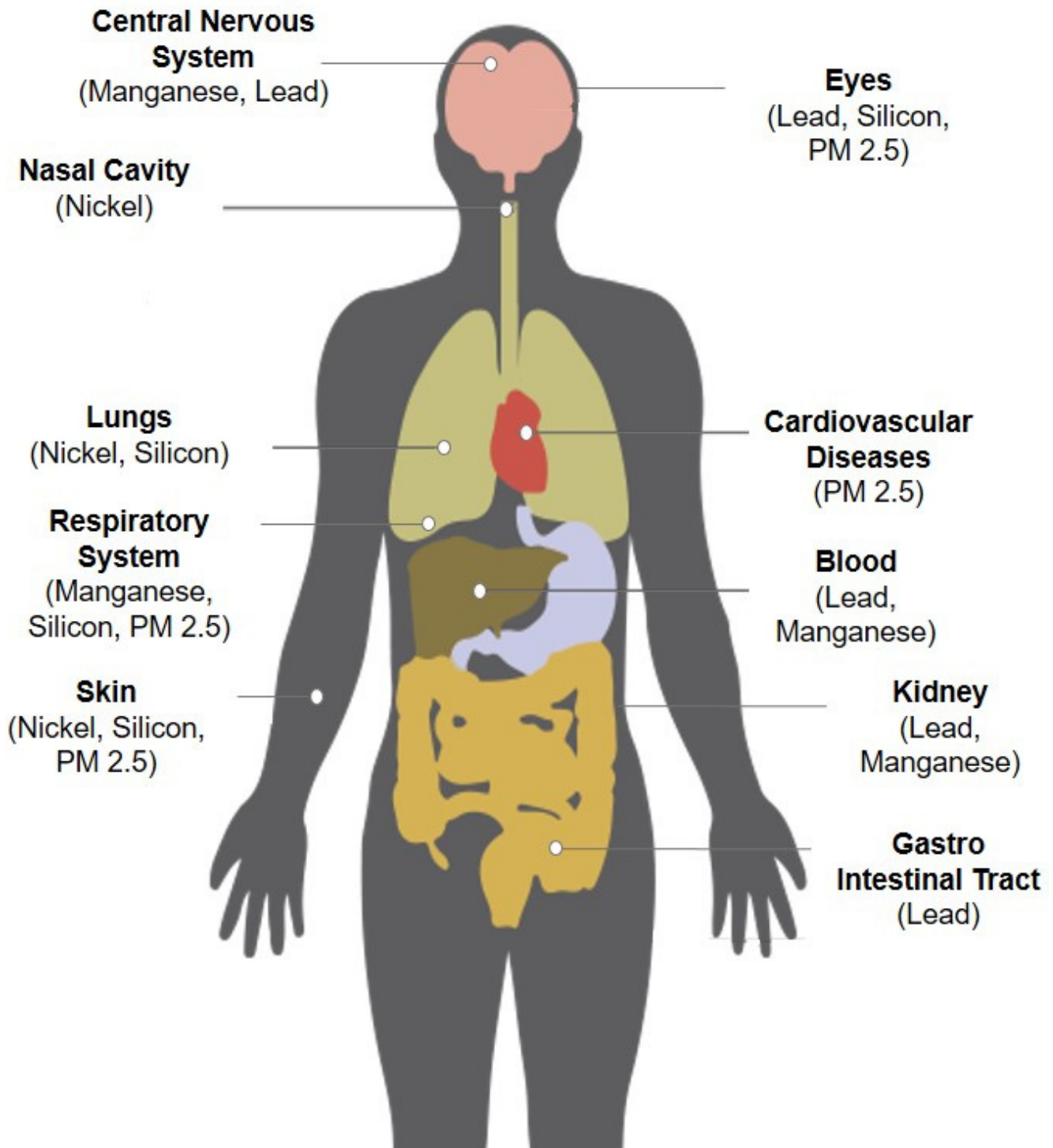
Lead can enter the human body through inhalation, swallowing or absorption. The health effects are almost the same for all the routes of entry. When an individual gets exposed to very high levels of lead over a short period of time, it results in Lead poisoning which is characterized by abdominal pain, constipation, fatigue, headache, irritability, loss of appetite, memory loss, pain or tingling in the hands and/or feet and generalized weakness. As these symptoms are relatively common and may occur due to other conditions, lead poisoning can be easily overlooked. Exposure to very high levels of Lead causes anaemia, kidney and brain damages and can even result in death. Lead can also cross the placental barrier, impact fetal brain development and can cause miscarriage, stillbirths, and infertility.

Lead Levels in Sampled Locations, Chennai City



HEALTH EFFECTS OF THE CHEMICALS FOUND IN CHENNAI'S AIR

Health Effects due to the Chemicals Found



CONCLUSION & RECOMMENDATIONS

Since 2016, HEI India and CRC have been taking air samples at various locations in Chennai during different months of the year. The present air quality sampling exercise is the fourth of such exercises. In almost all results that we have collected since 2016, we have found PM2.5 levels in excess of MoEF standards consistently we have also found high levels of toxic heavy metals like manganese, silica, nickel, lead and arsenic.

The results of the current sampling exercise are consistent with all our previous findings. These results, as well as the previous results clearly bust the myth that Chennai, being a coastal city has good quality air. The findings are of particular concern from a public health perspective and especially for children, the elderly and pregnant women who are more vulnerable to the effects of polluted air.

Air pollution also has a direct link with COVID-19 vulnerability as it is being demonstrated in several emerging academic research and scientific studies. The fact that Chennai has such polluted air would also mean that its residents are more vulnerable to the current COVID-19 pandemic.

There is hardly any statutory attention or political will in remedying the issue of poor air quality in the city of Chennai. Chennai has not been included in the list of 122 non-attainment cities under the National Clean Air Program. Despite such dangerous levels of prevailing air quality, there are plans for further expansion of some of the most polluting industries in the North Chennai industrial cluster. There is no commitment from the government on the adherence to the revised emission norms of the Thermal Power Plants in the North Chennai-Ennore region.

Though the city of Chennai has received INR 181 crores under the million-plus cities program by the Government of India for air quality mitigation, we are yet to see any concrete and meaningful action on air quality mitigation from the Greater Chennai Corporation.

It is a matter of serious concern that there is no improvement in the air quality within the city of Chennai over four monitoring years (2016, 2017, 2018 and 2019). Air sampling results indicate that industrial emissions as well as other vehicular and garbage burning emissions are uncontrolled and the regulatory agencies have failed to bring the situation under control and take steps to improve the ambient air quality in the city.

Further, the health system needs to take note of the presence of these levels of heavy metals and commission a health survey to put in place measures for follow up of the population indicating long term exposure. Until public health and air quality has been restored, a complete moratorium on the expansion of industries within the city is recommended.

Recommendations to the Tamil Nadu government bodies concerned with air pollution control:

1. Include Chennai city as one of the non-attainment cities in the National Clean Air Programme and initiate a time-bound Clean Air Action Plan.
2. Set up a robust pan-city, citizen-friendly air quality monitoring network to capture air quality trends in Chennai City.
3. Rely on monitoring data and trends to develop a short term and long term action plan to control air pollution and protect public health.
4. Carry out vulnerability mapping to identify sensitive areas like schools, hospitals and carry out effective communication, issue advisories about air pollution and health while taking steps to reduce pollution levels around sensitive locations.
5. Conduct health impact assessment studies to explore the health status of the individuals residing in the highly polluted areas to establish the impacts of pollution on human health and provide adequate accessible health infrastructure to address the issue.
6. A complete moratorium on expansion or setting up of new polluting units in North Chennai, Ennore region till the air quality is restored.
7. Conduct regular monitoring of industrial emissions and impose stringent regulations on the industries violating the emission norms.
8. Plan and Implement the vehicular emission norms; establish Pollution Under Control points and impose fines on the violators.