



**Air pollution and  
Respiratory Health of  
Traffic Police Personnel,  
Chennai City**

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# Introduction

Vehicular emissions and road dust are major contributors to the air pollution crisis in almost every major city worldwide. Among the most affected, traffic police personnel, responsible for managing more than 5 million vehicles in Chennai city alone are among one of the most exposed populations. Pollution in the workplace of traffic police personnel - the public streets is further aggravated by other point sources of pollution like residential and commercial construction, industries, dump yards etc. in the vicinity of their postings. Long term, continuous exposure to pollutants puts them in the first line of fire of contracting respiratory illnesses.

Their health status, especially lung health, would speak volumes about the air quality and the levels of exposure in the local area. Given their high exposure situation, it is important to regularly monitor lung health of traffic police personnel so that an early diagnosis is possible. This will be useful for them to seek adequate treatment in the initial stages and curb any chronic illness. Additionally, this study also implies the impact of pollution on the individuals involved in the street-based occupations by considering the traffic police personnel as proxy indicator.



In this context, Huma Lung Foundation (HLF), a member of 'Doctors For Clean Air', conducted chest radiographic screening for the traffic police personnel in Chennai city using mobile x-ray units.

This study aims at identifying any respiratory abnormalities among the traffic police personnel using chest radiography.

## Objective of the study:

To estimate the respiratory abnormalities among the traffic police personnel, Chennai city, Tamil Nadu and to frame policy recommendations to reduce pollution exposure for the people including traffic police personnel.

## Methodology:

For conducting radiographic screening, permission was sought from the Commissioner of Police for Chennai City. Following that, line listing of the 83 police stations in the city were made and 27 police stations were chosen as Place of Screening (PoS). A range of two to seven police stations were clubbed under one PoS based on their geographical proximity. Suitable dates were allocated for each PoS in consultation with officer in-charge for the stations. A mobile x-ray unit along with five radiographic technicians went to each PoS on the pre-assigned dates. All the traffic police personnel present in the PoS at the time of screening were subjected to radiographic examination. The data collection was carried for a period of 2 months in February 2019 to April 2019.

## Results:

In the span of 2 months, a total of 1686 traffic police personnel were subjected to chest radiograph examination. Out of the total screening participants, 96.5% were men with mean (SD) age of 45 (8) years and 3.5% were women with



mean (SD) age of 37 (7) years. A sum of 114 (6.8%) of them were found to have one or more minor radiographic abnormalities such as prominent aortic knuckle, parenchymal infiltrations, Costophrenic angle blunting/obliteration, increased bronchovascular markings and calcifications. According to previous studies, prevalence of minor radiographic abnormalities is at about 2.5% among the apparently normal population (1). The overall prevalence of minor radiographic abnormalities among the traffic police personnel is at 6.8%, which suggests increased health problems among them.

## **Quick look at the data:**

1. 21 out of 28 PoS show prevalence of minor radiographic abnormalities above the previously established researches of 2.5% (Table 1).
2. PoS S2 Airport Station had the highest prevalence of minor radiographic abnormalities among the traffic police personnel at 17.4%.
3. PoS Manali Station was second in prevalence of minor radiographic abnormalities among the Traffic police personnel at 17.1%.
4. Traffic police personnel screened at PoS Tondiarpet H3 station showed 12.4% prevalence of minor radiographic abnormalities.
5. Among the traffic police personnel screened at PoS K10 Koyambedu and G3 Kilpauk 11.3% and 10.1% respectively were identified to have minor radiographic abnormalities.
6. The prevalence of minor radiographic abnormalities among the traffic police personnel screened at PoS R1 Mambalam, T6 Avadi, T15 SRMC, J1 Saidapet, J9 Thoraipakkam, S11 Tambaram, K4 Anna Nagar, D5 Marina, V5 Thirumangalam, J4 Kotturpuram, C1 Flower Bazaar, S1 Mount, F3 Nungambakkam, M1 Madhavaram, and G1 Vepery ranged between 2.8% and 9.5%.

# Location of Police Stations screened in the Respiratory Health study, Chennai City

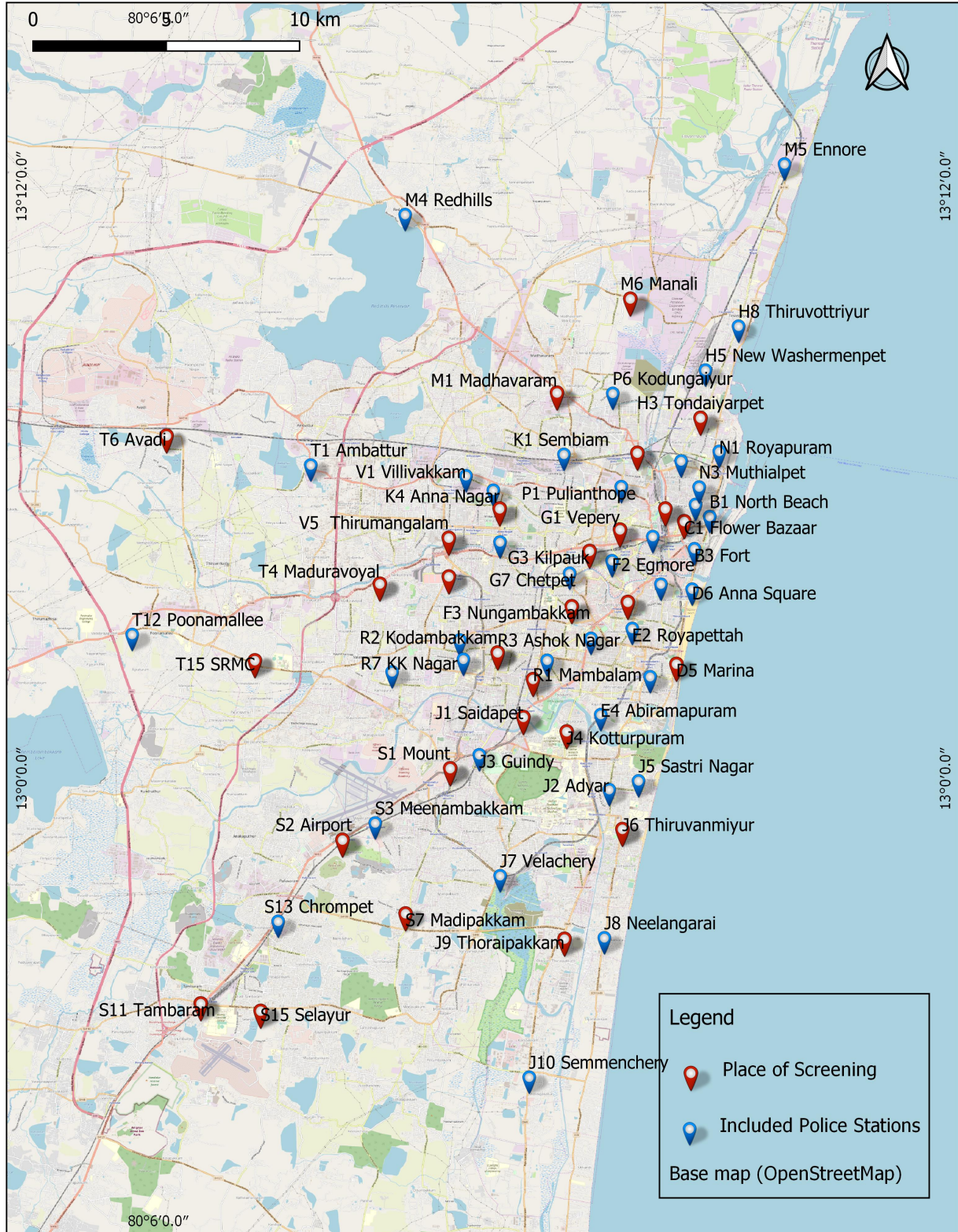


Figure 1: Map showing the Police Stations included in the study, Chennai City, Tamil Nadu Table

**Table 1: Prevalence of minor radiographic abnormalities among the Traffic Police Personnel, Chennai city.**

Place of Screening	No. Screened	Abnormality	
		n	(%)
S2 Airport	23	4	(17.4)
M6 Manali	41	7	(17.1)
H3 Tondiarpet	145	18	(12.4)
K10 Koyambedu	44	5	(11.3)
G3 Kilpauk	69	7	(10.1)
T6 Avadi	21	2	(9.5)
R1 Mambalam	85	8	(9.4)
T15 SRMC	58	5	(8.6)
J1 Saidapet	139	12	(8.6)
J9 Thoraipakkam	62	5	(8.1)
S11 Tambaram	52	4	(7.7)
K4 Anna Nagar	43	3	(7.0)
V5 Thirumangalam	45	3	(6.7)
J4 Kotturpuram	33	2	(6.1)
C1 Flower Bazaar	84	5	(5.9)
T4 Maduravoyal	75	4	(5.3)
F3 Nungambakkam	77	4	(5.2)
S1 Mount	87	4	(4.5)
M1 Madhavaram	69	3	(4.3)
D5 Marina	50	2	(4.0)
G1 Vepery	36	1	(2.8)
D.2 Anna Salai	79	2	(2.5)
P3 Vyasarpadi	41	1	(2.4)
C2 Elephant Gate	50	1	(2.0)
R2 Kodambakkam	70	1	(1.4)
J6 Thiruvanmiyur	94	1	(1.1)
S15 Selayur	14	0	0.0
<b>Total</b>	<b>1686</b>	<b>114</b>	<b>(6.8)</b>

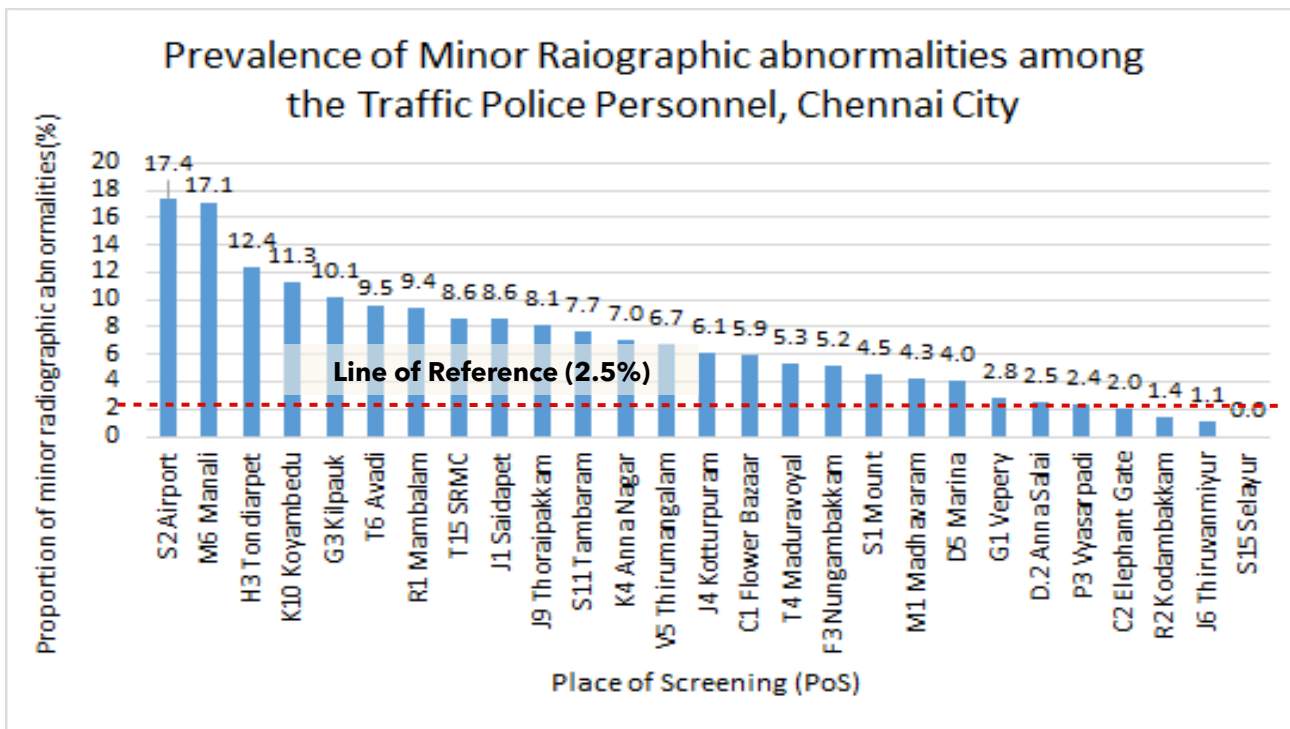


Figure 2: Bar diagram showing the prevalence of minor radiographic abnormalities among the Traffic Police Personnel, Chennai city.

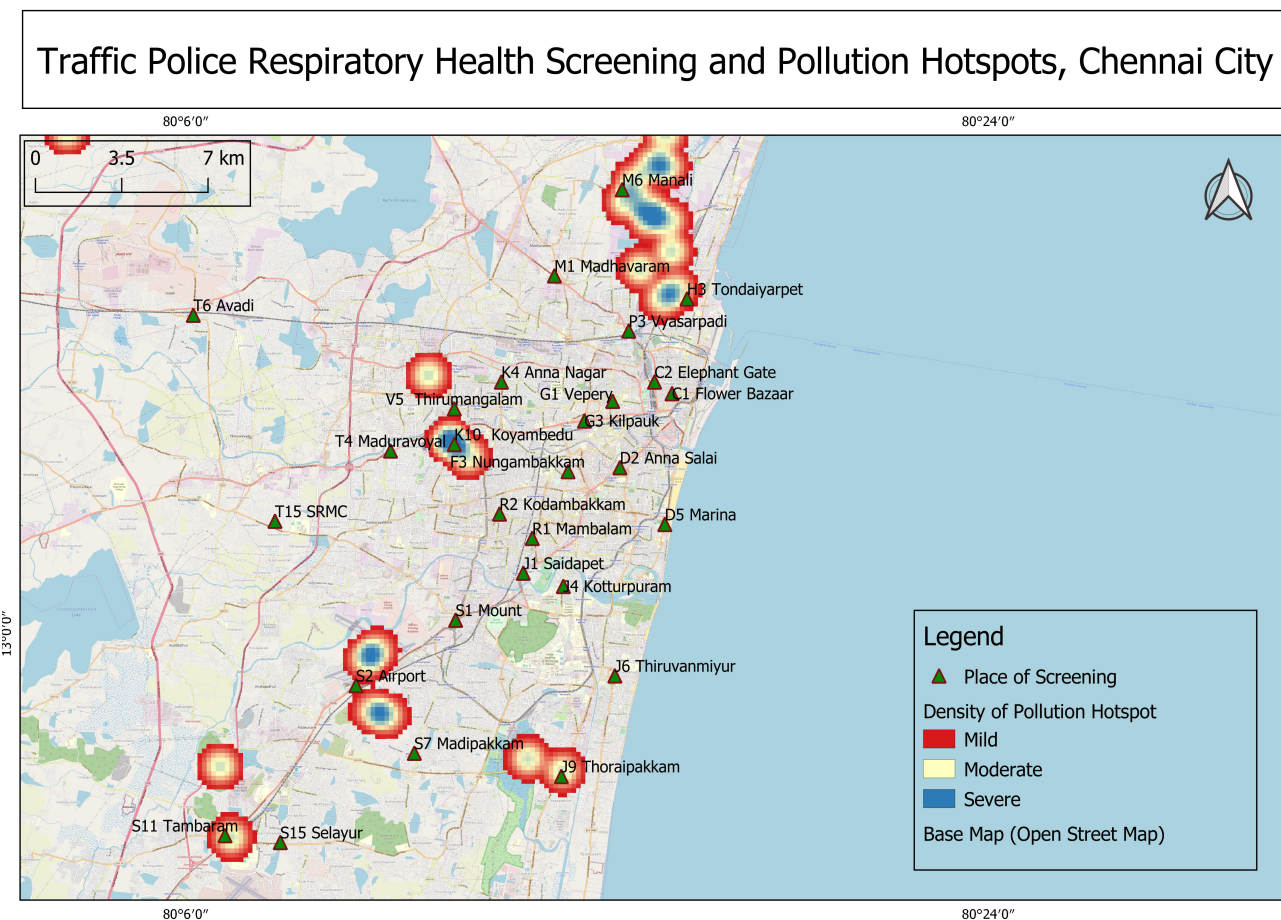


Figure 3: Map showing the air pollution hotspots and Place of Screening (PoS) of the study, Chennai City, Tamil Nadu



## **A Brief overview of geographic setting of PoS with high prevalence of minor abnormalities:**

**Airport:** The Police stations screened at Airport station includes S1 Mount Indigo-18 station, S2 Airport station and S3 Meenambakkam station. The geographic setting of these three stations are almost identical. High incidence of minor radiographic abnormalities among traffic personnel screened at this PoS could be attributed to the heavy traffic flow in and around the international airport terminal and the emissions from the thousands of aircrafts which land and take off at the airport. A recent study published in Nature Communications Biology has shown that primary soot particles from kerosene combustion in aircraft turbine engines also cause direct damage to lung cells and can trigger an inflammatory reaction if the solid particles – as simulated in the experiment are inhaled in the direct vicinity of the engine. The researchers demonstrated for the first time that the damaging effects also depend on the operating conditions of turbine engines, the composition of the fuel, and the structure of the generated particles (2). In addition to the traffic and emissions from the aircrafts, neighbourhoods around the airport are also home to large-scale sand crushing units that contribute to the excess particulate matter in the region.

## Industries and Major Roadways around the Place of Screening (PoS), Airport Police Station

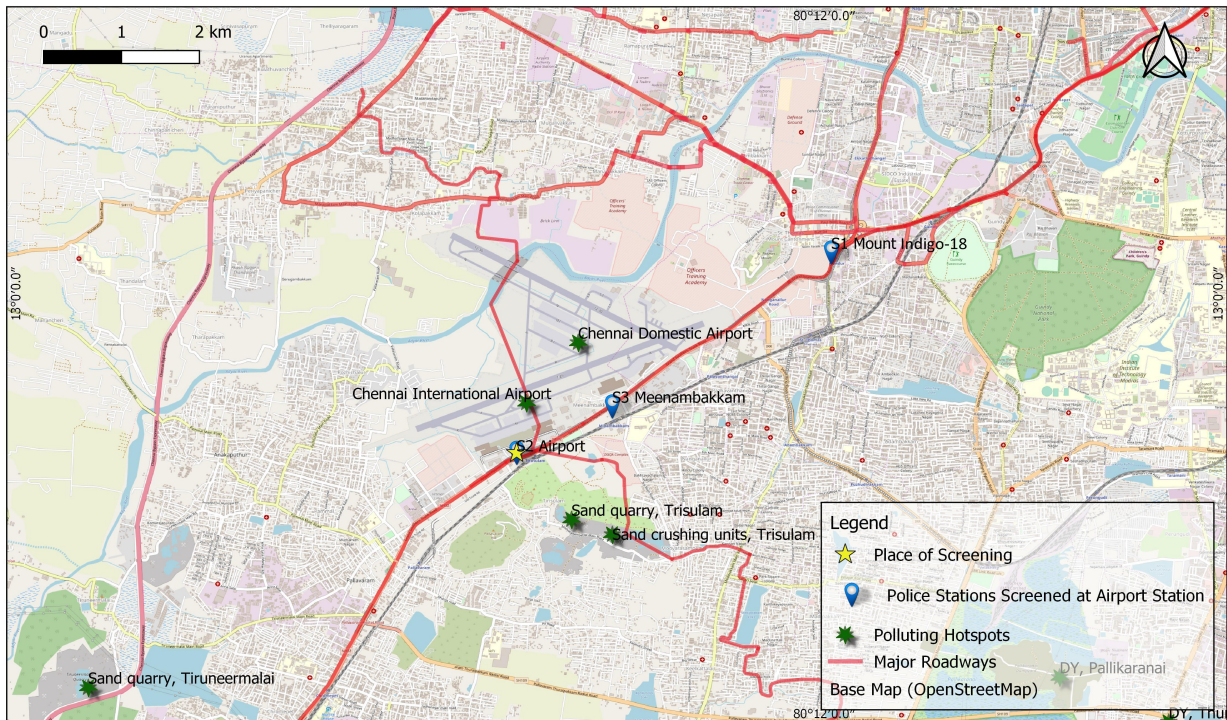


Figure 4: Map showing the Industries and Major Roadways around Place of Screening (PoS), Airport Police Station

**Manali:** Traffic police personnel from M5 Ennore station and M6 Manali station were screened at Manali station. Ennore region is an industrial cluster with two functional thermal power plants, major roadways connecting the Kamarajar port & L&T port and thousands of trucks carrying industrial raw materials to and from the port and industries, cement factories, coal storage yards and coal ash ponds. Manali town is a combination of densely populated residential and industrial areas. Manali industrial region houses large numbers of highly polluting petrochemical industries, oil refineries, chemical industries and fertilizers industries. The Ministry of Environment, Forest and Climate Change listed Manali industrial area as a critically polluted region in a study in 2009. The emissions from the industries and the automobile exhausts

from the heavy vehicular traffic in and out of industries too add to problem of air pollution in the area. This could be concluded to be the reason for higher prevalence of minor radiographic abnormalities.

**Industries and Major Roadways around the Place of Screening (Pos),  
Manali Police Station**

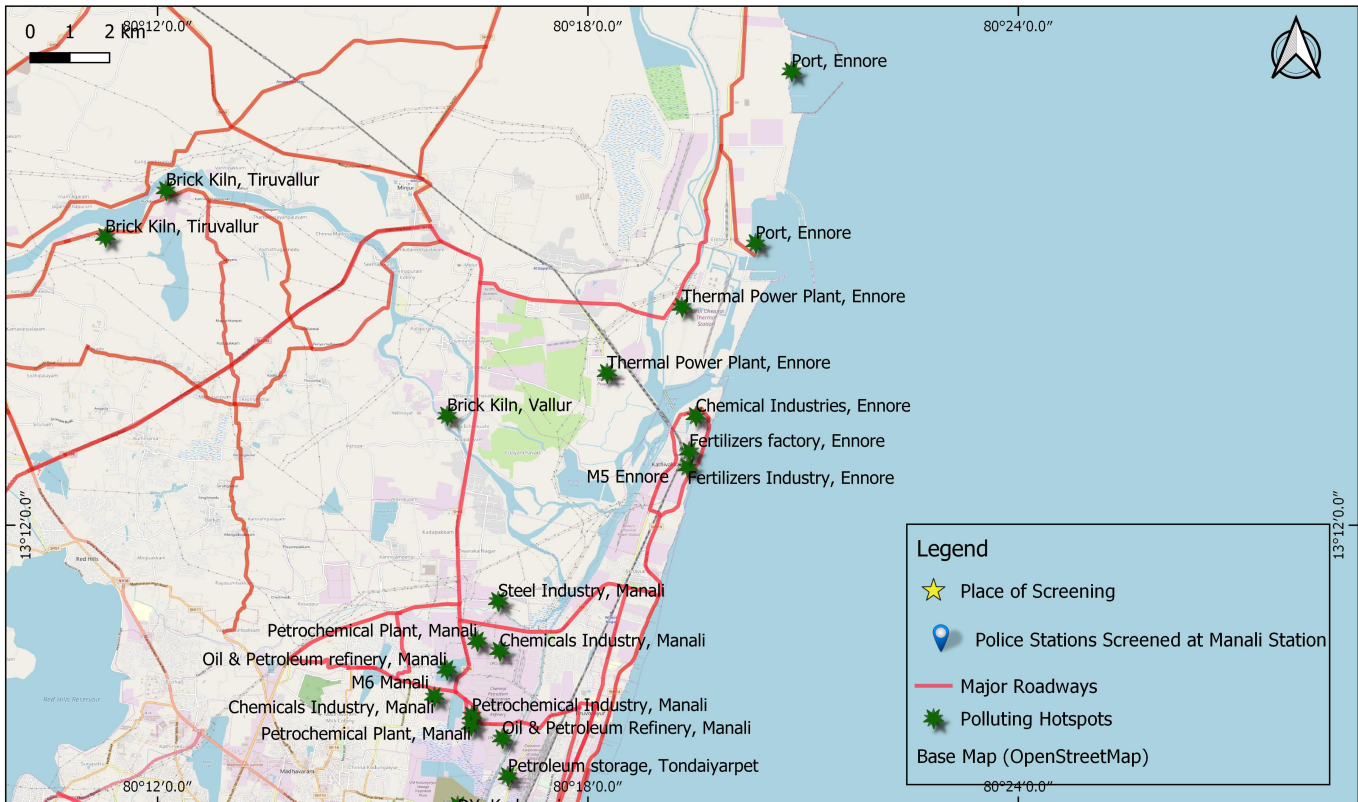


Figure 5: Map showing the Industries and Major Roadways around Place of Screening (PoS), Manali Police Station

**Tondaiyarpet:** The traffic police personnel from H1 Old Washermanpet, H3 Tondaiyarpet, H5 New Washermanpet, H8 Thiruvottriyur and N1 Royapuram. Located in the northern part of Chennai, Tondaiyarpet and its surrounding are densely populated area that also houses the fishing harbor, port, small scale & household industries like metal polishing industries, plastic recycling, scrap processing, etc. and Kodungaiyur dump yard - the largest municipal garbage

dumping ground for the city of Chennai. Numerous heavy vehicles ply through the lanes of this region ferrying cargo from the port and the harbor, and garbage from the rest of the city to the dump yard. Tondaiyarpet region also borders the Manali industrial area and is a recipient of pollution from the refineries and industries in the area.

**Polluting Hotspots and Major Roadways around Place of Screening (PoS),  
Tondaiyarpet Police Station**

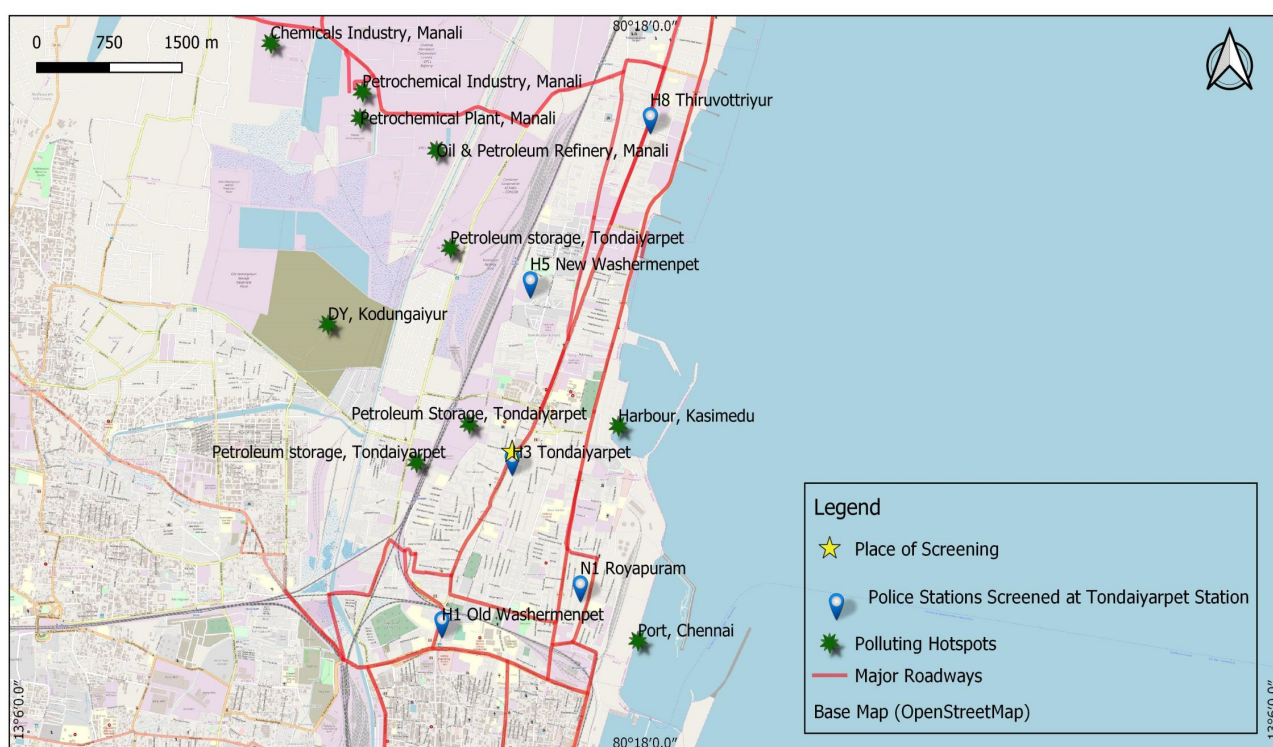


Figure 6: Map showing the Polluting Hotspots and Major Roadways around Place of Screening (PoS), Tondaiyarpet Police Station

**Koyambedu:** Koyambedu has the largest bus terminus in Asia. This area is also easily one of the most congested in the city. Thousands of buses for intra-state as well inter-state travel originate and terminate at Koyambedu. The terminus currently witnesses operation of more than 500 buses simultaneously, amounting to around 3,000 buses and 250,000 passengers a

day. Most of the buses are diesel operated making their emissions noxious. In addition to the bus traffic, the terminus has facilities for two-wheeler, auto rickshaw and car parking and handles thousands of vehicles at a time. It is clear that vehicular exhaust contributes to the higher proportion of pollution in this area thus making the police personnel vulnerable.

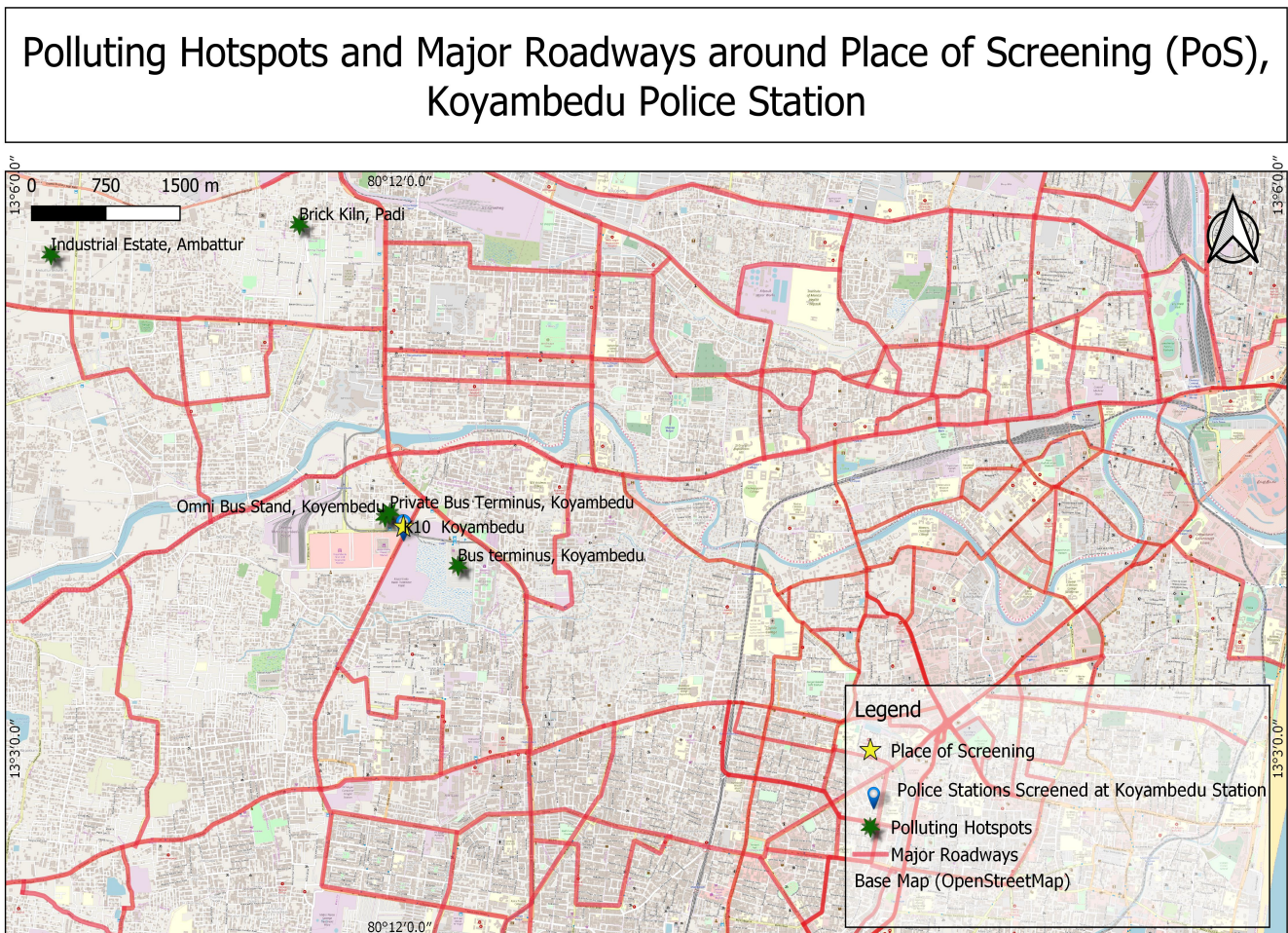


Figure 7: Map showing the Polluting Hotspots and Major Roadways around Place of Screening (PoS), Koyambedu Police Station

**Kilpauk:** The geographic settings of this place is mainly residential cum commercial in nature. The increased prevalence of minor radiographic abnormalities for the screened personnel at Kilpauk could be due to the

uninterrupted and frequent vehicular movements in the locality and construction activities including the construction of metro rail line.

**Mambalam, Avadi, SRMC, Saidapet, Thoraipakkam, Tambaram, Anna Nagar, Thirumangalam, Kotturpuram, Flower Bazaar, Nungambakkam, Mount, Madhavaram, Marina and Vepery:** The location setting of these localities are combination of residential and commercial areas. These locations constitute main transportation routes for the residents of Chennai city and hence have high vehicular flow. Many of these sites are also witnessing large-scale construction activities – residential and metro rail .

## **Interpretation of the findings and discussions:**

Chennai's vehicle population has been accelerating steadily from 600,000 in 1992, to 1.3 million in 2001 and 4.94 million in 2016. Each day, about 1,500 new vehicles hit the roads, with two-wheelers constituting more than 75 percent of them. Vehicles in Chennai city alone constitute one-fourth of the 17.5 million vehicles across the state of Tamil Nadu. According to a survey conducted by the city traffic police in 2012, there is one vehicle on the road for every two Chennaiites. Given the growth rate, it is predicted that Chennai will soon have twice as many vehicles as Mumbai (3).

Vehicular emissions though, are not the only source of exposure to the traffic police personnel. Data from the screenings reveal that there are certain hotspots in the city, which result in higher exposure and vulnerability to the traffic personnel. The traffic personnel screened at PoS at Airport, Manali,

Tondiarpet, Koyambedu, Kilpauk and Madipakkam, indicate that they are at higher risk of respiratory related illness than their counterparts in other localities. It is interesting to see that in addition to vehicular traffic, these regions also have industries, higher cargo traffic, construction sites, garbage dump yards etc.

## **Conclusion:**

Even though air pollution have adverse effects on all the organ systems of human being, the early diagnosable impacts are the respiratory abnormalities due to the acute signs and symptoms developed post exposure to any pollutants (4). Therefore, this study focuses to find the respiratory abnormalities among the traffic police personnel.

The finding of the study suggests that long-term exposure to air pollution among the traffic police personnel from both vehicular and other sources could cause chronic respiratory tract irritation and increased mucus production. These can be manifested as radiolucent findings in the radiographic examination. Health effects from exposure to air pollution should be addressed in the initial stages in order to avoid chronic disabilities and deprived quality of life among the traffic police personnel.

## **Strength and limitation of the study:**

The strength of the study is the inclusion of all the traffic police personnel present in the city during the time screening and use of radiographic examination as a tool for screening.

The limitation of the study is that it though includes all the traffic police personnel and does not delineate them based on their smoking habits and place of residence.

## **Recommendations:**

Following are the few recommendations that can be adopted to reduce the adverse health effects among the traffic police personnel:

- 1) Police personnel should be provided with N-95 masks that they must use during the duty hours.
- 2) There should be duty rotation of their postings in regular frequency to avoid continuous high exposures in heavily polluted areas by the same individuals.
- 3) Traffic personnel should be provided with regular medical screening facilities and appropriate subsidized treatment and medical assistance.
- 4) Regular advisories on air pollution and health, including daily air quality levels in various regions of the city should be provided to everyone so that people can take adequate precautions in case of bad air days.
- 5) The government should work towards the implementation of vehicular emission norms, regular monitoring of vehicles for pollution checks and impose fines upon the violators.
- 6) The city administration should encourage use of public transport over private vehicles.
- 7) Sources of industrial pollution should be regularly monitored and preventive action should be taken if they are found violating the air pollution norms.
- 8) The pollution levels must be brought below the permissible limits before any further industrial/vehicular activities expansion.



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## Annexure I

(Station wise minor radiographic abnormalities among the Traffic Police Personnel,  
Chennai City)

Station	Place of Screening	Frequency (%)
B1 North Beach		2 (1.8)
B3 Fort	C1 Flower Bazaar	2 (1.8)
C1 Flower Bazaar		1 (0.9)
C5 Kothavalchavadi	C2 Elephant Gate	1 (0.9)
D2 Anna Salai		1 (0.9)
D6 Anna Square	D2 Anna Salai	1 (0.9)
D5 Marina		1 (0.9)
E1 Mylapore	D5 Marina	1 (0.9)
F2 Egmore		2 (1.8)
F3 Nungambakkam	F3 Nungambakkam	2 (1.8)
G1 Veppery	G1 Veppery	1 (0.9)
G3 Kilpauk		4 (3.5)
G7 Chetpet	G3 Kilpauk	2 (1.8)
H1 Old Washermentpet		4 (3.5)
H3 Tondaiyarpeta		4 (3.5)
H5 New Washermentpet		5 (4.4)
H8 Thiruvottriyur	H3 Tondaiyarpeta	2 (1.8)
N1 Royapuram		2 (1.8)
N2 Kasimedu		1 (0.9)
J1 Saidapeta		5 (4.4)
J2 Adyar		4 (3.5)
J3 Guindy	J1 Saidapeta	1 (0.9)
W19 Adyar		1 (0.9)
J4 Kotturpuram	J4 Kotturpuram	2 (1.8)
J7 Velachery	J6 Thiruvanmiyur	1 (0.9)
J8 Neelangarai		3 (2.6)
J9 Thoraipakkam	J9 Thoraipakkam	1 (0.9)
J10 Semmancherry		1 (0.9)

Station	Place of Screening	Frequency (%)
K10 Koyambedu	K10 Koyambedu	5 (4.4)
K3 Aminjikarai	K4 Anna Nagar	1 (0.9)
K4 Anna Nagar		2 (1.8)
K7 ICF	G3 Kilpauk	1 (0.9)
M1 Madhavaram	M1 Madhavaram	1 (0.9)
M4 Redhills		2 (1.8)
M5 Ennore	M6 Manali	2 (1.8)
M6 Manali		5 (4.4)
P1 Pulianthope	P3 Vyasarpadi	1 (0.9)
R1 Mambalam	R1 Mambalam	8 (7.0)
R7 K.K. Nagar	R2 Kodambakkam	1 (0.9)
R9 Valsaravakkam		1 (0.9)
S1 Mount Road	S1 Mount	4 (3.5)
S11 Tambaram	S11 Tambaram	2 (1.8)
S13 Chrompet		2 (1.8)
S2 Airport	S2 Airport	1 (0.9)
S3 Meenambakkam		3 (2.6)
T1 Ambattur	T4 Maduravoyal	2 (1.8)
T4 Maduravoyal		1 (0.9)
T12 Poonamalle	T15 SRMC	1 (0.9)
T15 SRMC		4 (3.5)
T6 Avadi	T6 Avadi	3 (2.6)
V1 Villivakkam	V5 Thirumangalam	3 (2.6)
<b>TOTAL</b>		<b>114 (100)</b>