ABSTRACT

Clean air has so far been considered as limitless and free natural resource. But, now a days clean air can no longer be taken for granted. Excessive consumption of fossil fuels for development activities gave rise to toxic pollutants resulting in deterioration of ambient air quality. The World Health Organization (WHO) has identified ambient air pollution as one of the major stressors linked with 6.7 % of the global deaths as reported in Global Burden of Disease Initiative. In the recent years, the impact of anthropogenic emissions from mega cities on regional and global climate has received increased attention. The coarse particulate matter (PM$_{10}$: particles with aerodynamic diameter between 2.5–10 µm) and fine particulate matter (PM$_{2.5}$: particles with aerodynamic diameter lesser than 2.5 µm) are hazardous to climate and health. The particulate air pollutants were recently designated as Group I carcinogen by the International Agency for Research on Cancer. It is prominent that the aerosols have significant influence on climate variability throughout the world.

The aim of this study was to understand the nexus between the temperature variability and health impacts due to particulate pollution in urban Chennai. In this study, it was established that there exists a significant trend of 0.30 °C/ decade at the surface air temperature levels. Moreover, the temperature variability at the lower troposphere indicated a significant trend at 10 °C/ decade. It was found from the aerosol optical depth that there is a strong correlation with temperature variability at surface and standard pressure levels.
The concentration of particulate matter at study locations in Chennai city were in the range of 126 to 188 µg/m³ for PM$_{10}$ and 64 to 150 µg/m³ for PM$_{2.5}$. Moreover, the results from the factor based receptor model revealed that out of 12 sampling locations, four locations had prominent contribution from vehicular emissions and four locations had dominance of re suspended dust followed by refuse burning. Whereas vehicle based emissions contributed more to fine particulate matter in seven sampling locations followed by industries and refuse burning.

The population exposure assessment revealed that 28% of the population resides at vulnerable locations where coarse particulate matter exceeds the prescribed standards. Alarmingly, 94% of the inhabitants live in critical areas which were vulnerable to fine particulate matter. Among the vulnerable groups, people who were more exposed to particulate matter showed significant reduction in their lung function. This strongly warrants the importance of mitigating the particulate pollution by framing strict management policies and regulatory systems. This could be achieved by periodical monitoring and enhancing stringent supervision by the environmental authorities.