INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:
A METHOD FOR ANALYSING EPISODIC AIR QUALITY AND HEALTH RISKS TO SEDENTARY WORKERS IN AN URBAN TRAFFIC CORRIDOR

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SHORT ABSTRACT

This research is aimed at developing a methodology to identify episodic conditions caused by air pollutants (Carbon Monoxide (CO), $PM_{2.5}$ and Black Carbon (BC)) released from the traffic in an urban traffic corridor, to determine the most episodic prone locations, and to estimate chronic obstructive pulmonary disease (COPD) health risks to the sedentary workers in the traffic corridor due to $PM_{2.5}$. This research has been carried out in an urban traffic corridor of the downtown of Guwahati, the fastest developing city of North-Eastern India situated in the Brahmaputra River Valley. It involves the development of indicators – one pertaining to the real CO emission scenario in the traffic corridor and second pertaining to the threshold CO emission scenario adopted from the national ambient air quality standards – which incorporate hourly average emission, population, pollutant toxicity and dimension of the corridor, and determine the time of occurrences of episodic conditions over the day. The factors which are most influencing the episodic conditions have been identified using statistical correlation analysis. The air dispersion model, AERMOD has been used to determine the episodic prone locations. The method has been applied further to BC to validate the time and spatial location of the episodic condition caused by CO. Subsequently, health risks due to $PM_{2.5}$ in the episode-prone areas have been found out in terms of the risks of ischemic heart disease (IHD), stroke, COPD, and lung cancer (LC) expected upon exposure to $PM_{2.5}$. The health risk estimates have been further supported with the help of a social questionnaire survey carried out in the traffic corridor on the participants who are sedentary workers in the shops located along the roadside. The results of the health relative risks show that the salesmen of air-conditioned shops[1] and open shops[2] are prone to risk due to exposure to $PM_{2.5}$. The level of exposure of both groups to $PM_{2.5}$ is different, which also resulted in different COPD symptoms for the workers of open shops having a direct exposure than the workers of air-conditioned shops having indirect exposure. The methodology developed in this research may be useful in carrying out such research in the roadside microenvironments.

[1] The shops are closed due to air conditioning system and hence are not openly exposed to traffic emissions.

[2] The shops are open and facing to the road and hence the salesmen are exposed openly to traffic emissions.