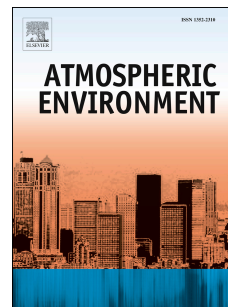


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1 On-road PM_{2.5} Pollution Exposure in Multiple Transport 2 Microenvironments in Delhi

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14 15 **ABSTRACT**

16
17 PM_{2.5} pollution in Delhi averaged 150 µg/m³ from 2012 through 2014, which is 15 times higher
18 than the World Health Organization's annual-average guideline. For this setting, we present on-
19 road exposure of PM_{2.5} concentrations for 11 transport microenvironments along a fixed 8.3-km
20 arterial route, during morning rush hour. The data collection was carried out using a portable TSI
21 DustTrak DRX 8433 aerosol monitor, between January and May (2014). The monthly-average
22 measured ambient concentrations varied from 130 µg/m³ to 250 µg/m³. The on-road PM_{2.5}
23 concentrations exceeded the ambient measurements by an average of 40% for walking, 10% for
24 cycle, 30% for motorised two wheeler (2W), 30% for open-windowed (OW) car, 30% for auto
25 rickshaw, 20% for air-conditioned as well as for OW bus, 20% for bus stop, and 30% for
26 underground metro station. On the other hand, concentrations were lower by 50% inside air-
27 conditioned (AC) car and 20% inside the metro rail carriage. We find that the percent
28 exceedance for open modes (cycle, auto rickshaw, 2W, OW car, and OW bus) reduces non-
29 linearly with increasing ambient concentration. The reduction is steeper at concentrations lower
30 than 150 µg/m³ than at higher concentrations. After accounting for air inhalation rate and speed
31 of travel, PM_{2.5} mass uptake per kilometer during cycling is 9 times of AC car, the mode with the
32 lowest exposure. At current level of concentrations, an hour of cycling in Delhi during morning
33 rush-hour period results in PM_{2.5} dose which is 40% higher than an entire-day dose in cities like
34 Tokyo, London, and New York, where ambient concentrations range from 10 to 20 µg/m³.

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