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Occupational And Non-Occupational Exposures To PM2.5 Among Outdoor And Indoor Workers In Two Mexican Cities

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Background: Daily concentrations of ambient airborne particulate matter (PM) in a range of sizes - including TSP, PM10, and PM2.5 - have been associated with adverse cardiopulmonary outcomes in multiple cities. There is limited information on outdoor worker exposures to PM, who could be at increased risk, especially in highly polluted urban areas.

The objectives of this study were to measure PM2.5 personal exposures for a group of bus drivers, taxi drivers and street vendors and to compare these measurements to those of indoor office workers residing in Mexico City, a high pollution urban area, and in Puebla, a lower pollution city.

Methods: The study population consisted of 16 outdoor workers in Mexico City and 9 in Puebla, 15 indoor workers in Mexico City and 6 in Puebla. Two consecutive (one during the work-shift and the other off-work) PM2.5 personal samples were collected at a flow rate of 4 l/min on Teflon filters fitted to SKC personal impactors. Workers also completed a daily time-activity log. All filter samples were weighed at the Centro Nacional de Investigación y Capacitación Ambiental, following USEPA protocols. PM10 concentrations measured at central monitoring sites close to each study area were used with the time-activity information to estimate personal exposures to PM10.

Results: Outdoor worker shifts ranged from 10 to 14 hours in Mexico City and 11 to 18 hours in Puebla; indoor office worker shifts were 8 hours. Occupational exposures to PM2.5 were highest for taxi drivers in the northwest (NW) area of Mexico City (mean±SD: 244.60±242.92 mg/m3, n=5) and lowest for taxi drivers in the southeast (SE) (141.30±88.92mg/m3, n=9). NW indoor office workers had higher occupational exposures (145.37±35.73mg/m3, n=9) than those in Puebla (74.26±24.32/m3, n=6). Street vendors in Mexico City had mean PM2.5 exposures of 210.42±63.82/m3 (n=4).

Average non-occupational exposures to PM2.5 were higher for taxi drivers in Mexico City-NW (130.26±70.62mg/m3) and lower for SE taxi drivers (107.11±69.15 mg/m3). Indoor workers? non-occupational exposures were relatively similar for both cities (NW: 57.42±11.10mg/m3; SE: 60.15±21.29mg/m3; Puebla: 65.30±14.98mg/m3) . Total mean PM2.5 exposures were highest for Mexico City-NW taxi drivers (150.20±13.32mg/m3), intermediate for Puebla bus drivers (133.67±24.79mg/m3) and Mexico City street vendors (129.71±20.97mg/m3), and lowest for Mexico City-SE taxi drivers (115.08±55.96mg/m3). Among indoor workers, total mean PM2.5 exposures were higher in Mexico City (81.73 to 89.88 mg/m3) than in Puebla (67.08mg/m3).

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