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Development and in-home testing of the Pretoddler Inhalable Particulate Environmental Robotic (PIPER Mk IV) sampler.

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Abstract

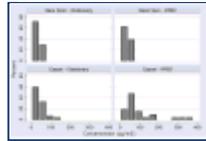
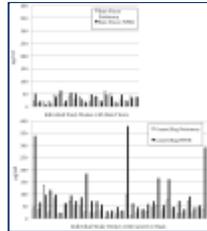
Exposure and dose estimation are essential to understanding the etiology of environmentally linked childhood diseases. The behavior of resuspended particulate matter (PM) suggests that stationary measurements may underestimate household exposures in young children (ages 6-36 months). Because of the size and weight of the sampling equipment, use of personal samplers in this age group is either difficult or impossible. The Pretoddler Inhalable Particulate Environmental Robotic (PIPER Mk IV) sampler has been developed to provide a surrogate method to ascertain personal exposures to PM for this age group. As part of a study of childhood asthma, 55 homes in central New Jersey were tested. Simultaneous sampling for inhalable PM using stationary (110 cm height) and PIPER mobile sampler were carried out. In homes with bare floors (N=21), the absolute difference was 3.9 $\mu\text{g}/\text{m}^3$ (SE=3.01; $p=0.217$) and relative difference (PIPER/Stationary) was 1.12 (linearized SE=0.11). On carpets (N=34), the absolute difference was 54.1 $\mu\text{g}/\text{m}^3$ (SE=13.50; $p=0.0003$), and the relative difference was 2.30 (linearized SE=0.34). The results confirm the importance of understanding the personal dust cloud caused by children's activity in a room, particularly when rugs or carpets are present.

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