

A Strategic Research Initiative for Extended Research on Pollutant Exposure in China



The Combined Influence of Outdoor and Indoor Pollutants on Acute Respiratory Response of School Children in China

Introduction

Many industrialized regions of China suffer from air quality that exceeds documented health standards set by the World Health Organization (WHO). This is particularly true for both ambient fine particulate matter (PM_{2.5}) as well as ozone. Human exposure to both of these pollutants occurs not only outdoors, but also indoors given that pollutants infiltrate into indoor environments. In addition to outdoor pollutants that find their way indoors, there are also indoor sources of particulate matter and volatile organic compounds (VOCs) that influence human health. The primary sources include cooking related activities, cleaning product use, and emissions from building materials and furniture. The extent to which outdoor and indoor exposures to pollutants influence human health is not well understood. This is particularly important for children, who are extremely sensitive to air pollutant exposures. In China, the interplay between indoor and outdoor exposures, and the contributions of indoor emissions and outdoor pollutants to indoor air quality are relatively unknown. More importantly, the key components of air pollution that impact human health may be dominated by outdoor or indoor pollutants, or a combination of both.

Study Objectives

- Measure oxidative potentials of PM_{2.5} exposure.
- Evaluate the applicability of chemical sensors and other monitoring techniques for the identification of particle and chemical pollution including PM_{2.5} and VOCs.
- Perform source apportionment studies on indoor and outdoor air and personal PM_{2.5}.
- Determine the sources of indoor and outdoor air pollutant exposures and their relative contributions to acute respiratory response in children.
- Evaluate biomarkers in children in relation to pollution exposure and predictability of health outcomes.
- Assess the effectiveness of using indoor air cleaning to reduce acute effects of air pollution on children.

Science Outcomes

Results of this study will yield information on the impacts of both PM_{2.5} components and specific VOC exposures on the health of children, and will determine the extent to which indoor emissions, as well as outdoor pollutants that penetrate indoors can influence acute respiratory response in children.

The work will provide important information on whether using indoor air filtration in homes reduces acute respiratory response in a sensitive population of children.

Experimental processes developed along with measured data and observations will contribute to solutions for reducing children's exposure to indoor and outdoor air pollution, leading to improved health outcomes.

Research Partners

- Duke University
- Shanghai General Hospital, Pediatrics Department, China
- Tsinghua University
- University of Wisconsin