

## **School indoor air pollutants: In relation to allergy and respiratory symptoms among school children in urban areas**

### **ABSTRACT**

Indoor air pollutants affect children's health and previous research mostly focuses on respiratory and allergic diseases. However, little is known about the risks among school children in East Malaysia. Therefore, we studied associations between school children's respiratory and allergic symptoms and indoor air pollutants in schools in Sabah, Malaysia. We randomly selected 332 school children (14 years old) from 24 classrooms in 6 secondary schools in Kota Kinabalu, Sabah. Information on personal characteristics, respiratory and allergic symptoms were gathered by using a standard questionnaire. The skin prick test was used to characterize their atopy. In each classroom, the indoor concentrations of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), formaldehyde, total volatile organic compounds (TVOC), carbon dioxide (CO<sub>2</sub>) temperature and relative humidity were monitored. Overall, 11.7% reported doctor-diagnosed asthma, 14.8% wheezing, 17.5% day-time breathlessness, 37.0% breathlessness after exercise, 13.0% breathlessness at night-time, 55.1% rhinitis and 10.8% skin allergic in the last 12 months. Regression analysis showed that the onset of wheezing was common in doctordiagnosed asthma (OR= 8.29, 95% CI= 3.70-16.10) and with parental asthma/allergy (OR= 2.13, 95% CI= 1.10-4.15), and associated with concentrations of NO<sub>2</sub> (OR= 1.03, 95% CI= 1.01-1.21) and CO<sub>2</sub> (OR= 1.01, 95% CI= 1.01-1.11). Day-time breathlessness was associated with indoor NO<sub>2</sub> (OR=1.02, 95% CI= 1.02-1.35) and TVOC (OR= 1.30, 95% CI= 1.10-1.52). The indoor concentrations of NO<sub>2</sub>, CO<sub>2</sub>, TVOC and PM<sub>2.5</sub> as well as parental asthma/allergy, and parental smoking were risk factors to the health outcome of respiratory and allergic symptoms.