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**Field study on indoor health risk factors in households with schoolchildren in south-central China**

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**Abstract:** A field study on indoor thermal environment and pollutants was conducted in 10 households with 10-12 years old children in Changsha, a south-central city in China. The aim is to identify and examine the main indoor pollutants which affect schoolchildren's health. The households were divided into two groups: 1) Group A, households with apparently unhealthy children, 2) Group B, households with healthy children. The findings for autumn and winter indicated that the differences in temperature and relative humidity (RH) between Groups A and B were not significant. The average concentrations of CO<sub>2</sub>, HCHO and acetaldehyde of Group A were lower than those of Group B. However, the average concentrations of PM<sub>2.5</sub> and TVOCs of Group A were higher than those of Group B. In addition, the indoor PM<sub>2.5</sub> concentrations in ten households, exceeded the upper limit of the Chinese national standard (75 µg/m<sup>3</sup>) and the TVOCs concentration in two households exceeded the upper limit (600 µg/m<sup>3</sup>) in winter. The average concentrations of Di(2-ethylhexyl) Phthalate (DEHP) and Dibutyl Phthalate (DBP) which could harm children's health were significantly higher in the Group A household than those in that of Group B. Cladosporium, Aspergillus and Penicillium in indoor air and house dust which could have lead to children's allergy and respiratory diseases correlated with the seasonal climate variation. It was found that high-level indoor PM<sub>2.5</sub>, TVOCs, DEHP and DBP in house dust were possibly the main risk factors for children's health, with Cladosporium, Aspergillus and Penicillium possibly providing associated health risks.

**Keywords:** Indoor pollutants; Schoolchildren's health; Field measurement; PM<sub>2.5</sub>; SVOCs; Fungi;

## 1 Introduction

The indoor environment is an important consideration regarding people's health as almost 90% of time is spent in buildings [1]. In modern society, however, some people are under great risk of indoor air pollution due to poor ventilation and building materials which diffuse toxic or harmful gases and/or dust [2]. Such pollutant by-products are more serious for children in that they are more sensitive to the ambient environment [3]. Given this situation, many researchers have focused strongly on the relationship between the indoor environment and children's well-being. Deng et al. [4, 5] found that both the prenatal and early postnatal

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