

INDOOR AIR QUALITY AND HEALTH RISK ASSESSMENT AMONG PRESCHOOL CHILDREN IN DENAI ALAM, SELANGOR

Nur Farrah Damia Rosle^{ab}, Tay Chia Chay^{a*}

Structured Abstract

Background: Indoor air quality (IAQ) refers to the cleanliness and healthiness of the air within and around buildings, crucial for the well-being of occupants. Factors such as occupancy, complaints, and renovation activities increased the risks of the occupants exposed to poor IAQ. The preschool was found to have a high occupancy rate. The objectives of this research are to investigate the biological, chemical and physical IAQ parameters, examine health implications based on lung function tests, and evaluate health risk assessments.

Methods: Methods consisted of obtaining ethics approval, conducting a walkthrough inspection, administering questionnaire surveys, monitoring IAQ for biological, chemical, and physical parameters, assessing lung function in preschool children, and evaluating associated health risks.

Results: The findings showed that the IAQ in the preschool was poor. Levels of bacteria, fungi, CO₂, formaldehyde, and TVOCs exceeded the permissible limits by ICOP IAQ 2010 and ANSI/ASHRAE Standard 62.1-2022. The lung function test showed that most preschoolers experienced mild lung impairment due to prolonged exposure to pollutants that affected their respiratory health. The health risk assessment found that the calculated HQ for PM_{2.5} was HQ < 1, confirming no significant non-carcinogenic health risks for preschool children. Similarly, PM₁₀ levels under ICOP IAQ 2010 were HQ < 1 and showed no risk. However, results from ANSI/ASHRAE Standard 62.1-2022 were HQ > 1 suggesting a potential non-carcinogenic health risk over a lifetime. The calculated CR for PM_{2.5} exceeded the acceptable risk threshold range by the US EPA 2024. Elevated CR showed an increased likelihood of children developing cancer-related health issues over their lifetime due to prolonged exposure.

Conclusion: In conclusion, the findings of this study indicated that the IAQ in the preschool was poor. The lung function of the children showed a decline due to exposure to pollutants. The potential non-carcinogenic and carcinogenic health risks posed to the children were verified by the health risk assessment conducted on the children.

Keywords: Indoor Air Quality, Lung Function Test, Health Risk Assessment, Preschool, Children

*Correspondence: 2023149793@isiswa.uitm.edu.my

^a School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia