

Indoor Air Quality and Health Risk Assessment at Cafeteria Engineering Level 4 Tower 1, UiTM Shah Alam

Anis Shafiqah Kamarudin, Nurazima Mohamad Pakharuddin, Khalisah Abdul Razak, Chia Chay Tay*

Structured Abstract

Background: Indoor air quality (IAQ) is a growing public health priority due to the health risks posed by indoor pollutants. High occupancy, fuel-burning appliances, and poor ventilation in cafés and cafeterias produce carbon monoxide, nitrogen dioxide, particulate matter, and carbon dioxide, which affect comfort and health. Recent concerns about IAQ highlight the need for careful assessment and mitigation. This study focuses on the Level 4 Tower 1 Faculty of Engineering cafeteria at UiTM Shah Alam to investigate pollutant levels, assess health risks, and propose measures to improve indoor air quality for the well-being of its occupants.

Methods: The research process involved a series of procedures such as the selection of the sampling location, granting and acquisition of permission, and location of sampling points. Site conditions were evaluated with the use of surveys and walkthrough inspections, with feedback from occupants being gathered. Standard methods were used to assess IAQ and questionnaires were used to gather information about the participants. The data was analysed in order to define potential health risks, and the strategies on mitigation were developed.

Results: This study shows that several IAQ parameters in the cafeteria, including temperature, humidity, PM_{2.5}, formaldehyde, and fungi, exceeded recommended limits by ICOP IAQ 2010, ANSI/ASHRAE Standard 55 2020 and Standard 62.1 2022, WHO and EU-OSHA 2010. Occupancy behavior, cooking, moisture, and material emissions were identified as pollutant sources. Questionnaire responses confirmed stuffy or bad air, dust, dryness, and bad smells, along with health symptoms such as drowsiness, dizziness, cough, and a stuffy nose. The results indicate that cancer risks for formaldehyde and PM_{2.5} exceeded safety limits, while hazard quotient values showed high hazard for formaldehyde and moderate hazard for PM_{2.5}. These findings highlight the need for short-term and long-term mitigation strategies to improve air quality and protect occupant health.

Conclusion: In conclusion, this study identified elevated levels of PM_{2.5}, formaldehyde, and fungi exceeding recommended limits ICOP IAQ 2010 in the cafeteria. Reported symptoms such as dizziness, cough, and nasal congestion were consistent with these environmental conditions. Health risk assessment results indicated moderate to high non-carcinogenic and carcinogenic risks. These findings underscore the vital for targeted mitigation strategies to reduce exposure and improve indoor air quality in food service settings.

Keywords: Indoor Air Quality, Health Risk Assessment, Occupant Symptoms, Mitigation Strategies

*Correspondence: taychiay@uitm.edu.my

School of Chemistry & Environment, Faculty of Applied Sciences, 40450 Universiti Teknologi MARA, Shah Alam.