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# Occupational Exposure to Airborne Contaminants and Associated Health Risk in a University-Based Cafe

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**Structured Abstract**

**Background:** Indoor Air Quality (IAQ) is an essential component of workplace safety, especially in enclosed food service settings where cooking operations, maintenance activities, and high customer density lead to increased exposure to airborne contaminants. These pollutants, including particulate matter (PM), volatile organic compounds (VOCs), and carbon oxides, can cause serious respiratory illnesses or chronic diseases. This study evaluates IAQ and associated health risks among staff at two university-based cafes, Mvnchbites Cafe and Dani's Tea & Coffee at UiTM Shah Alam. The primary objectives were to measure contaminant concentrations, identify worker health symptoms, and assess potential health risks associated with long-term exposure.

**Methods:** The research utilised a multi-faceted methodology comprising walkthrough inspections, occupant questionnaires, and on-site monitoring of physical, chemical, and biological parameters. Assessment tools were aligned with the Malaysian Industry Code of Practice (ICOP) 2010. Low-cost real-time sensors and bioaerosol impactors were used to measure temperature, relative humidity, CO2, PM2.5, PM10, TVOCs, formaldehyde, and microbial counts. Data collection occurred during peak and off-peak hours at specific sampling points, such as kitchen areas and cashier counters, to reflect actual exposure conditions.

**Results:** Findings revealed that both establishments failed to comply with ICOP 2010 standards for indoor air temperature (>26°C) and carbon dioxide (CO2) levels (>1000 ppm). Dani's Tea & Coffee recorded significantly higher CO2 levels (1501.65 ppm), indicating inadequate ventilation. The HRA indicated low carcinogenic risk from formaldehyde, but the elevated CO2 and temperature posed significant non-carcinogenic health risks. Workers frequently reported high prevalence of work-related symptoms, including headaches, fatigue, and sensory irritation such as dry throat and eye discomfort.

**Conclusion**: The study concludes that while chemical and biological pollutants are adequately managed, significant deficiencies in ventilation efficiency and thermal comfort pose major occupational health challenges. Immediate corrective measures are recommended, including enhanced mechanical ventilation maintenance, improved airflow distribution to eliminate "warm pockets," and the implementation of a formal IAQ Management Plan to ensure a safe working environment for cafe employees.

**Keywords:** Indoor air quality, occupational exposure, university-based café, ventilation, health risk assessment

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