

Assessment of Indoor Air Quality and Associated Health Risks at Uni-Spa MASMED, UiTM Shah Alam

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Structured Abstract

Background: Indoor air quality (IAQ) is a crucial aspect of environmental health, particularly in enclosed environments such as spa and wellness centres where chemical products and aromatherapy are heavily used. Poor IAQ may contribute to discomfort, respiratory symptoms, and long-term exposure risks. Despite increasing global awareness, studies on IAQ within institutional spa settings in Malaysia remain limited. This study investigates IAQ at Uni-Spa MASMED, Universiti Teknologi MARA (UiTM) Shah Alam, and evaluates compliance with the Industry Code of Practice (ICOP) 2010 as well as associated health risks to occupants.

Methods: The study employed walkthrough inspections, questionnaire-based surveys, and on-site IAQ monitoring. Parameters measured include temperature, relative humidity (RH), carbon dioxide (CO₂), particulate matter (PM₁₀), total volatile organic compounds (TVOC), formaldehyde (HCHO), total bacterial count (TBC), and total fungal count (TFC). Statistical analysis using one-sample t-tests was conducted to determine significant deviations from ICOP standards. A health risk assessment (HRA) was also performed for PM₁₀ exposure.

Results: CO₂ levels (Mean = 2147.41 ppm) significantly exceeded the ICOP limit (1000 ppm), indicating inadequate ventilation. Formaldehyde slightly exceeded the limit (Mean = 0.1109 ppm) but did not differ statistically. TBC slightly surpassed the acceptable level (544.64 CFU/m³) but was within statistical tolerance. Other parameters such as PM₁₀, TVOC, and TFC were within acceptable limits. HRA showed extremely low carcinogenic and non-carcinogenic risks, far below critical thresholds. Reported health symptoms included fatigue, eye irritation, headaches, and breathing difficulties.

Conclusion: The study concludes that inadequate ventilation is the primary IAQ concern at Uni-Spa MASMED. Improved ventilation, use of low-emission products, and regular IAQ monitoring are recommended to safeguard health and ensure compliance with IAQ standards.

Keywords: Indoor air quality, spa, health risk assessment, ventilation, VOCs

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