Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 63 2026

Colloquium on Applied Sciences 1 2026
7-12 January 2026, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Evaluation of Chemical Health Risks and Control Measure Efficiency in Food Manufacturing Industry

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Structured Abstract

Background: The food manufacturing industry relies heavily on the use of chemicals for cleaning, sanitation, plant treatment, and maintenance activities to ensure food safety and operational efficiency. However, frequent handling of Chemicals Hazardous to Health (CHTH) may expose workers to chemical health risks through inhalation and dermal contact. Inadequate control measures and routine wet work may lead to acute and chronic health effects. In Malaysia, Chemical Health Risk Assessment (CHRA) is a systematic tool used to evaluate chemical-related health risks. This study aimed to evaluate chemical health risks and the effectiveness of existing control measures among workers in a food manufacturing industry.

Methods: A descriptive cross-sectional study was conducted at a food manufacturing facility in Kuala Lumpur using the Chemical Health Risk Assessment (CHRA) Manual (3rd Edition). Workers were divided into three work units: Process Area Cleaning, IETS Plant Treatment, and Maintenance Workshop. Chemical hazard identification was carried out through walkthrough inspections, interviews, and review of Chemical Registers and Safety Data Sheets. Exposure assessment focused on inhalation and dermal exposure by evaluating frequency, duration, intensity, and extent of contact. Risk ratings were determined by combining hazard ratings and exposure ratings. Existing control measures were assessed based on the hierarchy of control to determine their adequacy and effectiveness.

Results: A total of 43 workers and 21 chemicals were assessed across the three work units. Most chemicals used in Process Area Cleaning and IETS Plant Treatment were classified as Chemicals Hazardous to Health. Inhalation exposure assessment showed that the majority of chemicals presented moderate risk levels, while selected chemicals used in wastewater treatment exhibited high inhalation risk due to frequent handling and hazardous properties. Dermal exposure risks were also identified, particularly during cleaning and sanitation activities involving direct chemical contact. Control measures were mainly administrative controls and personal protective equipment, with limited engineering controls, resulting in residual moderate to high risk levels.

Conclusion: Workers in the food manufacturing industry are exposed to multiple CHTH, mainly through inhalation and dermal routes. Existing control measures were insufficient to fully mitigate exposure, indicating the need for improved engineering controls, strengthened administrative measures, and enhanced compliance with personal protective equipment usage.

Keywords: Chemical Health Risk Assessment, Food Manufacturing Industry, Chemicals Hazardous to Health, Occupational Chemical Exposure, Control Measures

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