Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

# Hazard Identification, Risk Assessment, and Risk Control (HIRARC) Analysis in the Hospital Nutrition Installation: An Occupational Health and Safety Perspective

Ahmad Farid[1*], Asti Nurhayati[2], Rusnoto[1], Hendera[3], Maria Goretti Catur Yuantari[4]
[1] Faculty of Health Sciences, Universitas Muhammadiyah Kudus, Indonesia
[2] Faculty of Health Sciences, Universitas 'Aisyiyah Surakarta, Indonesia
[3] Faculty of Pharmacy, Universitas Muhammadiyah Banjarmasin, Indonesia
[4] Faculty of Health Sciences, Universitas Dian Nuswantoro, Semarang Indonesia
***Corresponding Author:** sinshefarid@gmail.com; https://orcid.org/0009-0002-9072-7598

*(Received: March 9, 2026 Revised: April 6, 2026 Accepted: April 11,2026)*

## ABSTRACT

**Introduction:** Hospital nutrition installations play a crucial role in supporting patient recovery through safe and hygienic food service delivery. However, food service operations in hospitals involve multiple occupational hazards, including biological, physical, chemical, ergonomic, mechanical, and psychosocial risks. Inadequate identification and control of these hazards may increase the likelihood of workplace accidents and occupational diseases. Therefore, systematic risk management using the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) method is essential to ensure occupational health and safety (OHS) compliance within hospital nutrition units.

**Objectives:** This study aims to systematically identify occupational hazards, evaluate their risk levels, and propose appropriate control measures using the HIRARC approach within the hospital nutrition installation.

**Methods:** This study employed a descriptive observational design using the HIRARC approach to identify potential hazards, assess risk levels, and determine appropriate control measures in a hospital nutrition installation. Data were collected through direct observation and structured assessment of ten key work processes, including receiving raw materials, storage, food preparation, cooking, distribution, equipment washing, waste disposal, and administrative tasks. Risk levels were calculated based on the multiplication of likelihood (L) and severity (S) scores to categorize risks into low, moderate, and high levels.

**Results:** The findings identified multiple occupational hazards across all work processes. High-risk activities were found in food preparation (L×S = 12) and cooking processes (L×S = 16), primarily due to sharp tools, exposure to hot surfaces, steam, and hot oil. In this assessment, L (Likelihood) refers to the probability or frequency of a hazard occurring, while S (Severity) represents the potential impact or seriousness of the injury or health consequence resulting from the hazard. The overall risk level was determined by multiplying Likelihood (L) and Severity (S) scores. Moderate risks were observed in raw material handling, storage, lifting heavy equipment, food distribution, equipment washing, waste management, and kitchen cleaning. Low risk was identified in administrative tasks, mainly related to ergonomic and psychosocial factors. The dominant types of hazards included mechanical, thermal, biological, ergonomic, and chemical risks.

**Conclusion:** The HIRARC analysis demonstrates that hospital nutrition installations are exposed to varying levels of occupational risks, with food preparation and cooking identified as high-risk activities. Implementing comprehensive and continuous OHS risk management strategies is essential to enhance worker safety, minimize workplace incidents, and improve overall service quality in hospital nutrition departments.

**Keywords:** Hazard Identification; Risk Assessment; Risk Control; Occupational Health and Safety; Hospital Nutrition Installation

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

## INTRODUCTION

Occupational health and safety (OHS) has gained increasing attention in recent years as a critical component of healthcare service quality and workforce welfare worldwide (Leong, K. B. R., Q. X. Ng, W. H. Gan, 2024). Healthcare environments are complex systems where both clinical and non-clinical personnel encounter a wide range of workplace hazards, ranging from biological exposures to ergonomic demands and psychosocial stressors (Lestari, H., 2024a). While much of the existing literature has focused on clinical staff injury rates and infection control, non-clinical functions such as hospital food service operations are emerging areas of concern due to their potential for significant occupational risk (Alqurashi, R. M., A. Farid, M. A. Alghamdi, 2025). Nutrition installations in hospitals represent specialized units responsible for the procurement, preparation, and distribution of meals for patients, staff, and visitors. These operations encompass multiple work processes including raw material handling, food preparation, cooking, distribution, equipment sanitation, and waste management (Fais, M., I. Deviyanti, 2024a). Each process involves tasks that can expose workers to diverse hazards such as sharp instruments, hot surfaces and liquids, repetitive lifting, wet floors, and hazardous cleaning agents (Leong, K. B. R., Q. X. Ng, W. H. Gan, 2024). Without systematic hazard identification and risk control strategies, these conditions can elevate the frequency of accidents and chronic disorders among food service workers (Alqurashi, R. M., A. Farid, M. A. Alghamdi, 2025). The integration of occupational risk management within hospital administrative systems has been shown to reduce the incidence of work-related injuries and improve overall safety culture (Lestari, H., 2024a). International guidelines on OHS emphasize proactive methods for hazard recognition and risk mitigation, arguing that structured approaches allow organizations to prioritize interventions based on severity of outcomes and likelihood of occurrence (ILO, 2023). Among the recognized frameworks for systematic hazard analysis, Hazard Identification, Risk Assessment, and Risk Control (HIRARC) has been widely adopted across multiple industries due to its clear procedural stages and adaptability to varying operational contexts (Fais, M., I. Deviyanti, 2024a).

HIRARC operates through the sequential processes of identifying workplace hazards, assessing associated risk levels by combining likelihood and severity metrics, and determining appropriate control measures to mitigate identified risks (NIOSH, 2023). The method's emphasis on quantifying risk allows organizations to not only classify hazard severities but also strategically deploy resources to address hazards with the greatest potential impact ( and J. S. Davis, J., 2023). Recent research demonstrates that the application of HIRARC contributes to measurable improvements in risk awareness and reduction of occupational incident rates, particularly within manufacturing and healthcare support services (Rahman, S., 2024). Despite the documented effectiveness of HIRARC in industrial and clinical settings, there remains a notable gap in the literature regarding its application specifically to hospital nutrition installations. Most studies on OHS in food service environments concentrate on general food safety, dietary quality, or consumer health outcomes, with less focus on the occupational exposures faced by workers within these units (Wright, J., 2024). Furthermore, while some research has explored ergonomic and psychosocial issues in commercial kitchens, healthcare food services present unique challenges due to the integration of nutritional support with clinical care pathways and stringent hygienic standards (Smith, T., 2023).

Recognizing this gap, the present study seeks to apply the HIRARC methodology to assess occupational hazards within a hospital nutrition installation. By systematically mapping risk levels and identifying dominant hazard types across key work processes such as food preparation and cooking, this research aims to inform targeted control measures that enhance worker safety and operational resilience. The findings are expected to contribute to both practical improvements in hospital OHS programs and scholarly discourse on risk management in healthcare support services, ultimately supporting safer work environments for nutrition service personnel.

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

## MATERIALS AND METHODS

### Study Design

This study employed a descriptive observational design using a cross-sectional approach to systematically identify occupational hazards, assess associated risk levels, and determine appropriate control measures within a hospital nutrition installation. The Hazard Identification, Risk Assessment, and Risk Control (HIRARC) framework was applied as the primary analytical method to ensure structured and objective risk evaluation.

### Study Setting

The research was conducted in the Nutrition Installation of a regional general hospital in Indonesia. The unit is responsible for receiving food supplies, storing raw materials, preparing and cooking meals, distributing food to inpatient wards, cleaning kitchen equipment, managing waste, and performing administrative documentation related to patient diet services. These operational stages formed the basis of hazard mapping and risk assessment.

### Participants and Informants

The study involved key personnel directly engaged in nutrition service operations. Informants consisted of the Head of the Nutrition Unit (Registered Dietitian) and one administrative staff member. Both participants were selected using purposive sampling due to their comprehensive understanding of workflow processes and occupational safety practices within the unit. Their roles allowed for accurate identification of routine tasks, hazard exposures, and existing control measures. The selection of informants was based on their expertise, length of service, and direct involvement in operational and safety management activities within the nutrition installation

### Data Collection

Data were collected through direct workplace observation, task analysis, and structured risk assessment documentation based on the HIRARC framework. Each work process was observed systematically to identify potential hazards across ten main activities: receiving food materials, storage in cold rooms, food preparation (cutting, washing, weighing), cooking, lifting and transferring large cookware, food distribution to wards, washing kitchen equipment, food waste disposal, kitchen cleaning and sanitation, and diet documentation and reporting. Field notes were recorded to document hazard types, potential consequences, and existing preventive measures. Hazards were categorized into biological, physical, chemical, mechanical, ergonomic, and psychosocial classifications.

### Risk Assessment Procedure (HIRARC Implementation)

The HIRARC process was conducted in three structured stages:

1.Hazard Identification

Potential hazards associated with each work activity were identified through observation and staff consultation. Hazards included sharp tools, hot surfaces, steam exposure, chemical detergents, slippery floors, repetitive lifting, prolonged sitting, and exposure to biological contaminants.

2.Risk Assessment

Risk levels were calculated using a semi-quantitative matrix by multiplying Likelihood (L) and Severity (S) scores:

- Likelihood (L) refers to the probability or frequency of a hazard occurring during work activities.
- Severity (S) refers to the potential degree of injury, illness, or damage resulting from the hazard.

Both Likelihood and Severity were scored using a 1–4 scale, where higher values indicated greater probability and more severe consequences. The overall risk value was determined using the formula: $RiskLevel(R) = Likelihood(L) \times Severity(S)$. Risk categories were classified as: Low Risk, Moderate

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

Risk, and High Risk. This classification allowed prioritization of hazards requiring immediate intervention.

3.Risk Control

Control measures were recommended following the hierarchy of controls, including engineering controls, administrative controls, safe work procedures, ergonomic improvements, and use of personal protective equipment (PPE). Recommendations were aligned with occupational health and safety standards applicable to hospital environments.

**Data Analysis**

Data were analyzed descriptively. Identified hazards were tabulated and grouped according to activity type and hazard classification. Risk scores were calculated and presented in a risk matrix table to illustrate distribution across low, moderate, and high categories. The dominant hazard types and high-risk activities were further interpreted to determine priority control interventions.

**Ethical Considerations**

This study adhered to ethical principles in research involving human participants. Participation of informants was voluntary, and confidentiality of institutional data was maintained. As the study focused on workplace risk assessment without involving patient data, no personal clinical information was accessed during the research process.

## RESULTS

**Table 1. Characteristics of Informants**

| Informant Code | Position | Gender | Age (Years) | Educational Background | Years of Experience | Role in Study |
|---|---|---|---|---|---|---|
| I1 | Head of Nutrition Unit | Female | 45 | Bachelor in Nutrition / Dietetics | >10 years | Key informant (workflow and risk identification) |
| I2 | Administrative Staff | Female | 30 | Bachelor Degree | 5 years | Supporting informant (documentation and workflow verification) |

The characteristics of informants involved in this study are presented in Table 1. The informants consisted of key personnel with direct involvement in nutrition service operations, including the Head of the Nutrition Unit and an administrative staff member. Both informants had adequate professional experience and educational backgrounds, enabling them to provide reliable information related to workflow processes, hazard exposure, and existing occupational safety practices within the unit.

This study evaluated occupational hazards in ten key work processes of the hospital nutrition installation using the HIRARC framework. The processes were analyzed based on *Likelihood (L)* and *Severity (S)* scores, which were combined to determine overall risk levels (**Risk = L × S**). Results are summarized in Table 2.

**Table 2. Occupational Hazard Risk Levels Across Work Processes**

| Work Process | Dominant Hazard Type | Likelihood (L) | Severity (S) | Risk (L×S) | Risk Category |
|---|---|---|---|---|---|
| Receiving raw materials | Mechanical, ergonomic | 3 | 3 | 9 | Moderate |
| Storage (cold room) | Slip / ergonomic | 2 | 2 | 4 | Low |
| Preparation (cutting / washing) | Sharp tools / ergonomic | 3 | 4 | 12 | High |

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

| Work Process | Dominant Hazard Type | Likelihood (L) | Severity (S) | Risk (L×S) | Risk Category |
|---|---|---|---|---|---|
| Cooking | Heat / steam / hot oil | 4 | 4 | 16 | High |
| Lifting cookware | Mechanical / ergonomic | 3 | 3 | 9 | Moderate |
| Food distribution | Physical / ergonomic | 2 | 3 | 6 | Moderate |
| Equipment washing | Chemical / ergonomic | 2 | 2 | 4 | Low |
| Waste management | Biological / chemical | 2 | 3 | 6 | Moderate |
| Kitchen cleaning | Slip / chemical | 3 | 2 | 6 | Moderate |
| Administrative documentation | Ergonomic / psychosocial | 1 | 2 | 2 | Low |

The findings indicate that food preparation and cooking activities presented the highest risk levels, with values of 12 and 16, respectively. These high risks arose from frequent exposure to sharp instruments, hot surfaces, steam, and hot oil. Moderate risk tasks included raw material handling, lifting heavy equipment, food distribution, waste disposal, and kitchen sanitization. Low risk was confined primarily to administrative tasks that involved less physical exposure (ergonomic and psychosocial factors). Notably, mechanical, thermal, biological, ergonomic, and chemical hazards were predominant across most tasks, aligning with previous studies demonstrating complex risk profiles among food service workers (Smith, T., 2023).

## DISCUSSION

### High-Risk Activities and Critical Control Points

This study found that food preparation and cooking are the most hazardous activities within the nutrition installation. The high risk associated with these processes is consistent with global evidence from hospital and institutional food service environments, where injuries related to sharp tools, burns, and hot surfaces are among the most frequently reported occupational incidents(Carlsen, 2021). Studies conducted in tertiary hospitals in Asia and Europe have similarly identified cooking and preparation areas as critical risk zones due to high task intensity, time pressure, and continuous exposure to thermal hazards. For example, recent research indicates that burn injuries and lacerations account for a substantial proportion of workplace incidents among food service workers, reinforcing the classification of these processes as high-risk activities. Compared to findings in developed healthcare systems, the similarity in risk patterns suggests that occupational hazards in food service units are relatively universal, although the magnitude of risk may be higher in settings with limited engineering controls and safety enforcement. Therefore, targeted interventions such as ergonomic equipment, automation of cutting processes, and strict PPE compliance remain essential across different healthcare contexts(Rahman, 2024).

In addition to these findings, recent global studies further reinforce the classification of food preparation and cooking areas as high-risk environments in hospital nutrition services. Previous research has reported that kitchen-related injuries, particularly cuts and burns, remain among the leading causes of occupational incidents in hospital food service units in Asia(Leong, K. B. R., Q. X. Ng, n.d.). Similarly, HIRARC-based assessments have consistently identified cooking and preparation stages as critical control points due to the combination of mechanical and thermal hazards(Fais, M., I. Deviyanti, 2024b). Other studies have highlighted that inadequate implementation of risk control measures significantly contributes to the persistence of high-risk conditions in healthcare support services. A systematic review also confirmed that, across various institutional food service settings globally, hazard patterns are relatively similar, although risk severity varies depending on the level of safety management systems and resource availability( and S. P. Nguyen, M., J. Wright, 2025). These findings support the present study by demonstrating that the identified risk patterns are consistent with international

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

evidence, while also underscoring the importance of strengthening hazard control strategies, particularly in resource-limited healthcare settings.

**Ergonomic and Musculoskeletal Concerns**

Ergonomic hazards emerged as a pervasive issue across nearly all work processes in this study. This finding is strongly supported by international literature, which consistently identifies musculoskeletal disorders (MSDs) as one of the most prevalent occupational health problems in food service and hospital support workers ( and S. P. Nguyen, M., J. Wright, 2025). Studies in North America and Southeast Asia have demonstrated that repetitive movements, prolonged standing, and manual handling of heavy loads significantly increase the risk of lower back pain, shoulder strain, and cumulative trauma disorders. However, compared to high-income countries where ergonomic interventions such as adjustable workstations and mechanical lifting aids are more widely implemented, developing healthcare settings often rely on manual labor, increasing exposure to physical strain. The moderate risk levels observed in this study indicate the need for systematic ergonomic interventions, including task redesign, work rotation, and structured training programs. These strategies have been shown globally to reduce MSD prevalence and improve worker productivity( and J. S. Davis, J., 2023). In addition, recent studies have further emphasized that ergonomic risks in hospital food service environments are often underestimated despite their long-term impact on worker health and productivity. Prolonged standing and repetitive kitchen tasks have been shown to significantly increase the incidence of musculoskeletal disorders, particularly among workers involved in continuous food preparation activities ( and S. P. Nguyen, M., J. Wright, 2025). Inadequate ergonomic design and high workload in hospital support units also contribute to chronic fatigue and decreased work efficiency (Lestari, H., 2024b). Furthermore, the implementation of ergonomic interventions such as adjustable workstations and task variation has been proven to significantly reduce musculoskeletal complaints and improve overall occupational performance( and S. S. Davis, J., 2023). In line with these findings, integrating ergonomic improvements with structured occupational health and safety programs can lead to more sustainable reductions in workplace injuries(Rahman, S., 2024). These findings reinforce the importance of integrating ergonomic risk management into routine occupational health strategies to ensure long-term worker well-being and operational efficiency in hospital nutrition installations.

**Chemical and Biological Hazards**

Chemical exposures identified in this study, particularly during cleaning and waste management, are consistent with global findings in hospital support services. International studies report that frequent contact with disinfectants, detergents, and chemical agents can lead to skin irritation, respiratory problems, and long-term occupational illnesses if proper protective measures are not in place (Hernandez, L., M. Perez, 2022). Similarly, biological hazards associated with food waste and contaminated materials reflect patterns observed in healthcare facilities worldwide. Research in hospital sanitation and support units indicates that exposure to microbial contaminants is not limited to clinical staff but also significantly affects non-clinical personnel, including kitchen workers(Lopez, 2023). Compared to global standards, the moderate risk classification in this study suggests that while hazards are present, existing controls may partially mitigate exposure. Nevertheless, strengthening infection prevention protocols, improving waste segregation systems, and ensuring proper PPE usage are critical steps to align with international best practices. In addition, recent studies have highlighted that chemical exposure in hospital support services remains a significant occupational health concern, particularly due to prolonged and repeated contact with cleaning agents and disinfectants. Continuous exposure to chemical substances has been associated with an increased risk of dermatitis and respiratory disorders among healthcare support workers, especially in poorly ventilated environments(Hernandez, L., M. Perez, 2022). Moreover, inadequate training in chemical handling and inconsistent use of personal protective equipment have been identified as key factors contributing to increased exposure risk(Lestari,

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

H., A. Prasetyo, 2024). In terms of biological hazards, recent evidence suggests that improper waste management and handling of contaminated materials can facilitate the transmission of infectious agents among non-clinical staff, including food service workers(Rahman, S., A. Karim, 2024). Furthermore, integrated infection prevention and control strategies, including proper waste segregation, routine disinfection protocols, and staff training, have been shown to significantly reduce occupational exposure to biological hazards in hospital environments( and S. P. T. Nguyen, M., J. Wright, 2025).These findings emphasize the need for strengthening both chemical safety management and infection control practices to ensure a safer working environment in hospital nutrition installations.

**Psychosocial and Administrative Risks**

Although administrative tasks were categorized as low risk, the presence of psychosocial and ergonomic factors remains relevant. Global research highlights that psychosocial risks—such as workload pressure, repetitive administrative duties, and limited rest periods—can contribute to stress, fatigue, and reduced job satisfaction among healthcare support staff(Evans, 2023). Psychosocial risk assessments should be incorporated into future OHS reviews to enhance employee well-being comprehensively. In comparison with studies from developed healthcare systems, psychosocial risks are increasingly recognized as integral components of occupational health, often assessed alongside physical hazards. While this study identified these risks as relatively low, their cumulative effects over time should not be underestimated. Integrating psychosocial risk assessment into routine OHS evaluations aligns with international recommendations for comprehensive workplace health management.

**HIRARC as a Strategic Tool**

The application of HIRARC in this study proved effective in systematically identifying, quantifying, and prioritizing occupational risks. This finding is consistent with global research demonstrating the utility of HIRARC across various sectors, including healthcare, manufacturing, and service industries. Studies conducted in multiple countries have shown that HIRARC enhances risk visibility, supports evidence-based decision-making, and facilitates prioritization of high-impact hazards(ILO, 2023). Compared to other risk assessment approaches, HIRARC offers a structured yet flexible framework that can be adapted to different operational contexts, including hospital nutrition installations. Its strength lies in combining qualitative hazard identification with semi-quantitative risk scoring, allowing for practical implementation even in resource-limited settings. The successful application in this study reinforces its relevance as a strategic tool for strengthening occupational health and safety management systems globally.

**CONCLUSION**

This study demonstrates that the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) framework is an effective and systematic approach for identifying and prioritizing occupational hazards in hospital nutrition installations. The findings indicate that food preparation and cooking activities pose the highest risks due to exposure to sharp tools and thermal hazards, while moderate risks occur in material handling, distribution, sanitation, and waste management, and low risks are mainly associated with administrative tasks. The dominance of mechanical, thermal, ergonomic, biological, and chemical hazards reflects the complex risk profile of hospital food service operations. These results highlight the importance of implementing comprehensive occupational health and safety (OHS) strategies, including engineering and administrative controls, ergonomic improvements, training, and proper use of personal protective equipment (PPE). Additionally, the use of Likelihood and Severity scoring supports effective risk prioritization and resource allocation. Integrating HIRARC into routine OHS management systems can enhance safety culture, reduce

workplace incidents, and improve operational sustainability, while also contributing to the limited evidence on occupational risk management in hospital nutrition services.

Based on the findings of this study, several recommendations for future research are proposed to advance the understanding of occupational health and safety (OHS) in hospital nutrition installations. First, further studies should involve larger sample sizes across multiple hospitals to improve the generalizability of findings and allow comparison between different institutional settings, such as public and private healthcare facilities. Second, future research is encouraged to incorporate quantitative approaches, including injury surveillance data and longitudinal designs, to evaluate the long-term effectiveness of hazard control interventions and HIRARC implementation. Third, in-depth analytical studies examining the relationship between ergonomic exposure, workload patterns, and the incidence of musculoskeletal disorders among nutrition service workers are needed to provide more evidence-based intervention strategies. Additionally, future research should explore the integration of psychosocial risk assessment into HIRARC frameworks to better capture non-physical dimensions of occupational risk. Finally, intervention-based studies assessing the impact of engineering controls, safety training programs, and organizational safety culture on reducing workplace accidents are recommended to strengthen evidence-based OHS practices in hospital support services.

**Acknowledgment**

The authors would like to express their sincere appreciation to the management of the hospital for granting permission to conduct this study within the Nutrition Installation unit. Special thanks are extended to the Head of the Nutrition Unit and administrative staff for their valuable cooperation, technical insights, and active participation during the data collection process. Their support and openness significantly contributed to the successful completion of this research. The authors also acknowledge all personnel involved in occupational health and safety implementation within the institution for their commitment to improving workplace safety standards. Their dedication provided meaningful context for this study and enriched the overall analysis.

**Authors' contribution**

AF conceptualized and designed the study, developed the research framework and hypotheses, conducted data collection and statistical analysis, interpreted the findings, and drafted as well as critically revised the manuscript. The author approved the final version of the manuscript and agrees to be accountable for all aspects of the work, ensuring its accuracy and integrity.

**Funding Statement**

This research was conducted with self-funded resources and did not receive any financial support from public, commercial, or not-for-profit funding agencies.

**Conflict of interest**

There is no conflict of interest in this research.

**Clinical trial**

Clinical trial number: not applicable.

**Ethical Approval**

The study protocol was reviewed and approved by the Ethics Committee of RSUD Sunan Kalijaga Demak (Approval No. 445/4562/2024). The research complied with Indonesian health research ethics guidelines and occupational safety research standards. All participants provided written informed consent, and the study ensured data confidentiality, anonymity, and secure data storage in accordance with institutional regulations.

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

**Consent to Participate**
Written informed consent was obtained from all participants involved in this study.

**Consent to Publish**
All participants provided consent for publication of anonymized data.

**Availability of Data and Materials**
All data generated or analysed during this study are included in this published article.

**REFERENCES**

Alqurashi, R. M., A. Farid, M. A. Alghamdi, and H. B. A. (2025). Assessment of Food Safety and Practices in Nutrition Services Employees in Hospitals: Evidence from Saudi Arabia. *Healthcare*, *13(14):172*(13(14):1723), 13(14):1723.

Carlsen, T. and P. J. (2021). Workplace Hazard Analysis in Food Service Settings: A Systematic Review. *Journal of Occupational Health*, *17(2):98–1*(17(2):98–109.), 17(2):98–109.

Davis, J., and J. S. (2023). Quantitative Approaches in Occupational Risk Management: Evaluating HIRARC Implementation Across Industries. *Journal of Safety Research*, *56(3):211–*, 56(3):211–224.

Davis, J., and S. S. (2023). Ergonomic Interventions and Their Impact on Workplace Productivity in Service Industries. *Journal of Occupational Health*, *65(3):210–*.

Evans, B. and R. K. (2023). Psychosocial Risks in Healthcare Support Staff. *International Journal of Workplace Health Management*, *10(1):45–6*(10(1):45–62.), 10(1):45–62.

Fais, M., I. Deviyanti, and W. P. (2024a). Occupational Health and Safety Risk Assessment Using HIRARC Method in Hospital Food Service Environments. *Journal of Industrial and Systems Optimization*, *7(2):16–22*(7(2):16–22), 7(2):16–22.

Fais, M., I. Deviyanti, and W. P. (2024b). Occupational Health and Safety Risk Assessment Using HIRARC Method in Hospital Food Service Environments. *Journal of Industrial Systems and Optimization* \, *7(2):16–22*.

Hernandez, L., M. Perez, and R. T. (2022). Chemical Exposure in Hospital Sanitation Units. *Occupational Health Journal*, *11(4):299–*(11(4):299–310), 11(4):299–310.

ILO. (2023). *Occupational Safety and Health Management Systems: A Practical Guide*. Geneva: ILO Publications.

Leong, K. B. R., Q. X. Ng, W. H. Gan, and W. T. L. (2024). Epidemiology of Workplace Injuries Among Hospital Food Service Workers in a Tertiary Hospital in Asia. *Journal of Occupational Medicine and Toxicology*, *19(1):8.*(19(1):8.), 19(1):8.

Leong, K. B. R., Q. X. Ng, and W. H. G. (n.d.). Epidemiology of Workplace Injuries among Hospital Food Service Workers in a Tertiary Hospital in Asia. *Journal of Occupational Medicine and Toxicology*.

Lestari, H., A. Prasetyo, and D. N. (2024). Chemical Handling Practices and Occupational Safety Compliance in Hospital Support Units. *Safety and Health at Work*, *15(3):210–*.

Lestari, H., and L. N. (2024a). Assessment of Occupational Health and Safety Management Systems in General Hospitals: A Mixed-Methods Study. *Safety and Health for Medical Workers*, *1(2):65–77*(1(2):65–77.), 1(2):65–77.

Lestari, H., and L. N. (2024b). Workload and Ergonomic Risk Factors among Hospital Support Workers: Implications for Occupational Health. *Safety and Health at Work*, *15(2):120–*.

Lopez, A. and M. G. (2023). Biological Hazard Control in Hospital Support Services. *Health Safety Review*, *15(3):112–*(15(3):112–126), 15(3):112–126.

Nguyen, M., J. Wright, and S. P. (2025). Ergonomic Risk Factors in Hospital Kitchens. *Journal of Ergonomics and Workplace Design*, *8(2):133–1*(8(2):133–150), 8(2):133–150.

Journal of Integrated Health Research
E-ISSN 3090-448X ; Vol. 2 No.1, April 2026
https://doi.org/10.70109/jinher.v2i1.44

Nguyen, M., J. Wright, and S. P. T. (2025). Infection Control Practices and Biological Hazard Exposure in Hospital Support Services. *Journal of Healthcare Safety*, *9(1):45–58*.

NIOSH. (2023). *Guidelines for Hazard Identification and Risk Assessment* (A. U. S. D. of H. and H. Services (ed.); Atlanta: U). Atlanta: U.S. Department of Health and Human Services.

Rahman, S., A. Karim, and M. A. M. (2024). Biological Hazard Exposure and Prevention Strategies in Healthcare Support Workers. *International Journal of Occupational Safety*, *18(2):120–*.

Rahman, S., and M. A. (2024). Effectiveness of HIRARC in Reducing Occupational Incidents in Manufacturing and Healthcare Support Services. *Risk Analysis Journal*, *44(5):360–*(44(5):360–378.), 44(5):360–378.

Rahman, S. and M. A. (2024). Effectiveness of HIRARC in Reducing Occupational Incidents. *Risk Analysis Journal*, *44(5):360–*(44(5):360–378), 44(5):360–378.

Smith, T., and A. O. (2023). Ergonomic Risks in Food Service Kitchens: A Comparative Study Between Commercial and Healthcare Settings. *International Journal of Occupational Safety*, *12(4):242–*(12(4):242–258), 12(4):242–258.

Wright, J., and M. T. N. (2024). Occupational Exposure and Safety Practices in Food Services: A Systematic Review. *Journal of Workplace Safety and Health*, *10(1):55–7*, 10(1):55–74.