

FOOD CONTAMINATION RISKS IN FOOD SERVICE ESTABLISHMENTS IN BANJARBARU USING A RISK-BASED SANITATION HYGIENE INSPECTION APPROACH

Isnawati¹, Rahmawati¹, Noraida¹, Fatmi Indah Hati¹, Ermina Syainah²

¹Ministry Of Health Polytechnic Banjarmasin Environmental Health Department

²Ministry Of Health Polytechnic Banjarmasin Department of Nutrition

Jl. H. Mistar Cokrokusumo No. 1A, Sungai Besar Subdistrict, Banjarbaru, South Kalimantan, Indonesia

E-mail: isna.husaini1@gmail.com

Article Info

Article history:

Received January 20, 2025

Revised August 11, 2025

Accepted August 31, 2025

Keywords:

Food Contamination Risks

Risk Analysis

Food Management Places

Inspection

Public Health Protection

ABSTRACT

Food Contamination Risks in Food Service Establishments in Banjarbaru Using a Risk-Based Sanitation Hygiene Inspection Approach. The widespread and large number of Food Management Facilities and the limited number of environmental health officers as supervisors pose a unique challenge to the current inspection system in implementing field supervision. Effective monitoring efforts are essential to ensure food safety at TPP. The research aims to examine how risk-based sanitation and hygiene inspections are applied at the Banjarbaru City TPP. This research method is observational with a cross-sectional approach using the Environmental Health Inspection Instrument. Samples were taken based on five TPP categories: restaurants, catering services, food stalls, DAMIU, and IRTTP. A risk-based analysis was conducted based on the cumulative value of food risks, including food profiles and mitigation of these food hazards. Business risks assessed business size and the risk of non-compliance during inspection. The research results show that 60% of TPPs are in the medium-risk category with an inspection frequency of once a year, 20% are in the high-risk category with an inspection frequency of twice a year, and 20% are in the low-risk category with an inspection frequency of once every two years. It is recommended that consistent supervision and periodic monitoring be implemented so that every food management facility can guaranty food safety and quality for consumers, thus protecting public health from hazardous food risks. Regular inspections not only increase consumer confidence but also strengthen businesses' commitment to providing high-quality and safe food.

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



INTRODUCTION

A healthy environment must be free from elements that cause health problems, including disease-carrying animals, hazardous chemicals, contaminated water, polluted air, and contaminated food^[1]. Contaminated food is one of the major issues related to food safety, particularly ready-to-eat food, including those produced by food service establishments (FSEs), such as restaurants, catering services, food stalls, refill drinking water depots (DAMIU), and home-based food industries (IRTP)^[2-6].

Food safety is a crucial public health issue, especially in developing regions such as Banjarbaru City. FSEs play an essential role in maintaining the quality and safety of food consumed by the community. However, the risk of food contamination in FSEs is often

overlooked or receives insufficient attention. Food contamination can occur due to various factors, ranging from environmental cleanliness, unhygienic food processing, to inadequate supervision and monitoring of hygiene and sanitation standards^[7-9]. The profile of foodborne disease outbreaks (Extraordinary Events/KLB) in Indonesia continues to fluctuate and has not shown a significant decline over the years. The Ministry of Health of the Republic of Indonesia reported that from 2016 to 2023, the Case Fatality Rate (CFR) was recorded at 0.48%, 0.1%, 0.1%, and 0.43%, and by 2023 it stood at 0.1%, 0.48%, 0.26%, with October 2023 reaching 0.31%^[10]. Although South Kalimantan is not included among the top 20 provinces with the highest foodborne outbreaks, continuous supervision of food producers, including FSEs, remains necessary ^[10].

Banjarbaru City, as one of the economic centers in South Kalimantan, accommodates a wide variety of FSEs, ranging from small- to large-scale operations. Routine inspections are conducted by relevant authorities; however, the challenge lies in the large number of FSEs, making it difficult to conduct inspections regularly due to the limited number of sanitarians. Meanwhile, the number of FSEs continues to increase annually, driven by growing community demands and consumer expectations for food safety assurance. Various efforts have been undertaken, such as conducting risk analysis of existing FSEs to enable more effective inspection planning, rather than relying on conventional approaches that apply uniform inspection frequencies. Up to the present, supervision of FSEs still employs conventional inspection systems. However, following the enactment of the Ministry of Health Regulation No. 14 of 2021 and No. 17 of 2024, the implementation of risk-based sanitation hygiene inspections for FSEs is required. This approach is highly relevant in Banjarbaru, considering the high number of FSEs and the limited supervisory resources. By adopting a risk-based inspection approach^[11], it is expected that the quality of supervision will improve, thereby strengthening efforts to prevent food contamination in FSEs. Overall, the findings of this study will provide a foundation for decision-making by the government and relevant stakeholders in enhancing food safety, ultimately protecting public health and promoting economic welfare in Banjarbaru. Therefore, the objective of this study is to apply a risk-based sanitation hygiene inspection approach in FSEs to improve food safety in Banjarbaru City.

The urgency of this study is highly significant, given that the impacts of food contamination not only harm individual health but also undermine public trust in food products. In addition, preventive measures against foodborne illnesses resulting from poor hygiene and sanitation practices in FSEs are essential, as such incidents could affect Banjarbaru's image as an economic hub and culinary tourism destination in South Kalimantan. The proposed research scheme in 2024 will be conducted as an independent study.

MATERIALS AND RESEARCH METHODS

Research Design

This study employed an observational design with a cross-sectional approach using the Environmental Health Inspection Instrument for food service establishments, based on the Ministry of Health Regulation No. 14 of 2021 and No. 14 of 2024. The research instrument consisted of an Environmental Health inspection form for food service establishments (FSEs).

Research Variables

The research variables included: (1) Food risk, which consisted of the combined scores of food profile and food hazard mitigation, and (2) Business risk, which assessed business size and non-compliance risks during inspections.

The food profile refers to food conditions that may promote the growth or emergence of microbiological and/or chemical hazards, determined using the FATTOM concept (Food, Acidity, Temperature, Time, Oxygen, and Moisture). Categories were classified as high risk (score 15), moderate risk (score 10), and low risk (score 5). Hazard mitigation refers to

actions taken to control, reduce, or eliminate potential hazards in food products to ensure they do not cause poisoning or illness, categorized into low, moderate, and high risk.

The business risk of FSEs was determined by assessing business size and non-compliance history. Business risk could be estimated based on the number of employees and the volume of food products produced by the FSE. The larger the business size, the greater the number of products produced, and the larger the customer base, the higher the potential risk for foodborne illnesses. Business sizes were classified into micro, small, medium, and large enterprises. Non-compliance history was determined by the results of previous inspections conducted at the FSE, the history of foodborne disease outbreaks (KLB) involving the FSE, and the implementation of food safety management systems. These were also categorized into low, moderate, and high risk based on the obtained score.

Population and Sample

The study population comprised all FSEs in Banjarbaru City, including restaurants, catering services, refill drinking water depots (DAMIU), food stalls, and home-based food industries (IRTP). The sample consisted of a subset of FSEs selected using quota sampling to represent each category, totaling five FSEs.

Inspection Procedures

The sampling process began with inspections of facilities within FSEs, including restaurants, catering services, DAMIU, food stalls, and IRTPs. The inspections focused on food products and registered establishments that may pose risks to consumer health.

Inspection criteria varied depending on the type of FSE (10). For catering services, inspections covered the external environment, including location, building and facilities, food handling practices, employee facilities, raw material reception areas, and raw material requirements. Internal areas inspected included general storage areas, food storage (packaging areas and non-pathogenic chemical storage), and processing sections such as washing, preparation, cooking, and packaging areas (both general and specific). Overall, inspections covered 18 points, with specific sections addressing personal hygiene and sanitation facilities, equipment, storage of cooked food, packaging of cooked food, and transportation of cooked food. Administratively, FSEs were also required to maintain personnel documentation and occupational health and safety (OHS) records. Following the inspection, the total inspection score of each FSE was determined, forming the basis for identifying non-compliance history and subsequently assigning food risk and business risk scores.

Risk Analysis

Risk analysis for FSEs followed the steps outlined in the Risk-Based Inspection Diagram^[12]. The process began with the determination of food risk, assessed through the scores of food profile and hazard mitigation at each FSE. The next step was to determine the business risk score, which comprised business size and non-compliance history.

The final risk score of each FSE was calculated by summing the food risk and business risk scores, using the following formula:

$$\text{FSE Risk} = \text{Food Risk (Food Profile + Hazard Mitigation)} + \text{Business Risk (Business Size + Non-Compliance History)}$$

Once the total risk score was obtained, the FSE was categorized into high, moderate, or low risk based on scoring criteria. This classification determined the inspection frequency for each FSE, with options of once per year, twice per year, or once every two years, as illustrated in the following figure.

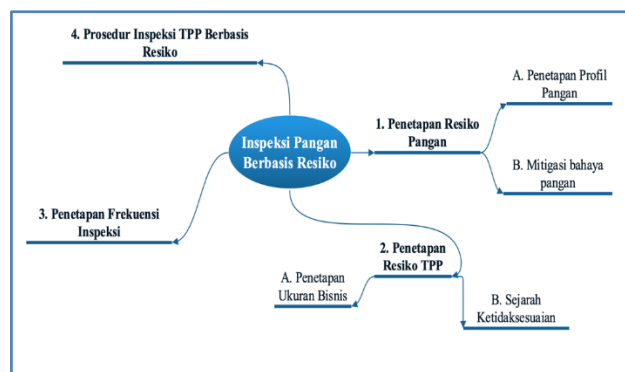


Figure 1. Risk-Based Food Inspection

Source: [10]

RESEARCH RESULTS AND DISCUSSION

Environmental Health Inspection in Food Processing Premises (FPPs)

The study on food contamination risks in food service establishments (FSEs), applying a risk-based sanitation hygiene inspection approach, was conducted in restaurants, catering services, food stalls, refill drinking water depots (DAMIU), and selected establishments such as home-based food industries (IRTP). The research began with Environmental Health Inspections (EHI) using the Environmental Health Inspection Form in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 14 of 2021 concerning Standards for Business Activities and Products in the Implementation of Risk-Based Licensing in the Health Sector^[11], as well as Regulation No. 17 of 2024 regarding its amendment. The results of the FSE inspections are presented as follows:

Table 1. Results of Environmental Health Inspection of Food Service Establishments (FSEs)

No	Food Processing Establishment (FPE)	EHI Score	Risk Category
1.	Restaurant	67,36%	Moderate
2.	Catering Service	55,75%	High
3.	Food Stall	91,1%	low
4.	Refill Drinking Water Depot (DAMIU)	86,67%	low
5.	Home-Based Food Industry (IRTP)	52%	High

Environmental Health Inspections (EHI) of food service establishments (FSEs) focused on both the external and internal environmental conditions of the buildings. Internal areas included food processing or kitchen facilities, such as the construction of buildings, cleanliness of floors, walls, doors, and windows, which were used for food preparation, food storage, cooking, processing equipment, serving, packaging, food handlers, as well as vector and pest control. Among the five inspected FSEs, two were still categorized as high-risk, with scores below 60%. This condition was partly due to non-compliance found in food processing areas, such as home-based food industries (IRTP) with damaged building structures that were difficult to clean, potentially causing contamination of the products produced. In addition, pests, insects, and uncovered trash bins were still observed. Similar conditions were also found in the inspected catering services, particularly in internal areas such as food preparation, processing, and packaging sections.

The assessment of environmental sanitation focused on food service establishments, including building layout, drainage systems, ventilation, and the availability of clean water. Environmental cleanliness is essential to prevent contamination from dust, air pollution, vectors, pests, and other sources of contamination^[10,13].

Proper and safe food management is a crucial aspect of protecting public health, ensuring that consumed food meets health and hygiene standards. Environmental Health Inspections (EHI) in FSEs are therefore essential, encompassing aspects assessed during inspections, inspection procedures, and challenges faced throughout the process^[14-16]. This responsibility

lies with sanitarians working in primary health care centers (Puskesmas)^[17]. Inspections target four main factors—eating and cooking utensils, food handlers, food processing facilities, and the food itself—which may directly or indirectly affect human health.

EHI is defined as an activity involving direct examination and observation of environmental media for monitoring purposes, based on standards, norms, and quality thresholds in order to improve the quality of a healthy environment, specifically in FSEs^[18]. This activity also ensures that every food service establishment complies with government-mandated sanitation and hygiene standards. By conducting such inspections, the risks of food contamination—whether biological, chemical, or physical—can be minimized, while also raising awareness among food business operators about the importance of maintaining food cleanliness and safety^[13].

Food Risks in Food Processing Establishments

Food risks are assessed based on the food profile and hazard mitigation practices implemented within the respective food processing establishments. The following outlines the identified food risks in several FPEs:

Table 2. Food Risks in Food Processing Establishments (FPEs)

No	Food Processing Establishment (FPE)	Food Profile		Food Mitigation		Total skore Food Safety Risk
		Score	Risk Category	Score	Risk Category	
1.	Restaurant	15	High	10	Moderate	25
2.	Catering Service	15	High	10	Moderate	25
3.	Food Stall	5	Low	5	Low	10
4.	Refill Drinking Water Depot (DAMIU)	5	Low	5	Low	10
5.	Home-Based Food Industry (IRTP)	5	Low	5	Low	10

The risk category of food safety remains high at 40%, while food safety mitigation results fall into medium and low-risk categories. Food safety risk assessment includes the following considerations: Does the food have a pH < 4.6 or water activity (Aw) < 0.85? Does the food contain high sugar levels? Is the food classified as PHF (Potentially Hazardous Food)? Or does the product have a combination of pH > 4.6 and Aw > 0.85?^[10].

The determination of food risk categories—high, medium, or low—can be based on the FATTOM concept (Food, Acidity, Temperature, Time, Oxygen, and Moisture)^[19,20]. This concept is a simple mnemonic used to define food safety profiles that may lead to the growth or emergence of microbiological and/or chemical hazards^[10]. FATTOM explains that under favorable food conditions and inadequate mitigation, microorganisms, particularly bacteria, can easily grow, produce toxins, and cause foodborne illnesses^[11,21,22].

Food safety is a top priority in food establishments. Food safety risks encompass hazards that may harm consumer health if not properly managed. These hazards can originate from various factors, including raw materials, processing, storage, and serving. Therefore, understanding food profiles and implementing hazard mitigation are essential steps to ensure both quality and safety^[2]. A food profile refers to the characteristics of each food type, including composition, nutritional value, and potential hazards associated with the ingredient. Each food type carries a different risk, depending on its source, processing methods, and storage practices^[15].

In risk-based food inspection, the first step for regulatory authorities or environmental health officers is to identify the risk level of the food establishment. Food safety risks in establishments can be minimized through well-defined food profiles and appropriate mitigation measures^[10,23]. Biological, chemical, and physical hazards can be prevented by applying proper raw material selection, maintaining environmental and equipment hygiene, and training employees on the importance of food safety^[7,24]. Through consistent supervision and regular monitoring, every food establishment can provide assurance of food quality and safety for consumers, thereby protecting public health from harmful food safety risks.

Business Risk in Food Establishments

Business risks in food establishments are determined by considering the number of employees and the volume of food products produced. Thus, the size of a food establishment can be classified as follows:

Table 3. Business Risk of Food Management Establishments (TPP) in Banjarbaru

No	Food Processing Establishment (FPE)	Business Risk Score
1.	Restaurant	15
2.	Catering Service	10
3.	Food Stall	15
4.	Refill Drinking Water Depot (DAMIU)	20
5.	Home-Based Food Industry (IRTP)	15

The results of inspection and risk analysis indicate that 60% of businesses fall into the medium-sized category, while the remainder are classified as small and large enterprises. Non-compliance was assessed based on the findings of environmental health inspections presented in Table 3, which show that there remains one Food Processing Premises (FPP) categorized as high risk.

In the food business sector, risk management is not uniform but varies according to business size and the history of non-compliance previously experienced^[9]. A deeper understanding of these risks is a critical step in maintaining business quality, safety, and sustainability. There are two main risk aspects: (a) Business size – the larger the business, the greater the volume of products produced and the larger the number of customers served, thereby increasing the likelihood of foodborne illness incidents. Business size has a significant impact on the range of risks faced by FPPs. While micro, small, medium, and large enterprises are all exposed to risks, larger-scale businesses face more complex risks due to the involvement of multiple departments and extensive distribution chains^[15]. (b) Risk scores for non-compliance – these are derived from previous inspection results, outbreak cases, or the implementation of food safety management systems within the assessed FPP. Non-compliance findings from inspections are categorized as critical, major, minor, or compliant. The history of non-compliance in an FPP may serve as an indicator of its current risk level. Businesses with a record of non-compliance are at risk of: (a) increased regulatory oversight, b) declining consumer trust, (c) high recovery costs, and d) adverse impacts on relationships with suppliers and partners^[25].

The business risk of FPPs is therefore strongly influenced by business size and prior instances of non-compliance. A comprehensive understanding of these risks can support businesses in adopting appropriate risk management approaches. Consequently, enterprises of all scales must conduct continuous evaluation and improvement to maintain quality standards, enhance consumer trust^[15], and prevent the negative consequences of non-compliance that could threaten business sustainability.

Frequency of Food Processing Premises (FPP) Inspections

Before determining the frequency of FPP inspections, the total hazard risk for each premise was first established, as follows:

Table 4. Frequency of FPP Inspections in Banjarbaru

No	Food Processing Establishment (FPE)	Overall Hazard Risk	Risk Category	Inspection Frequency
1.	Restaurant	55	High	Biannually (twice a year)
2.	Catering Service	50	Moderate	Annually
3.	Food Stall	30	Loew	Biennially
4.	Refill Drinking Water Depot (DAMIU)	35	Moderate	Annually
5.	Home-Based Food Industry (IRTP)	40	SedModerate ang	Annually

The results of inspections of restaurants, catering services, food outlets, refill drinking water depots (DAMIU), and household-scale food industries (IRTP) in Banjarbaru, based on risk-

based analysis, indicate variations in inspection frequency. Among the five Food Processing Premises (FPPs), three (60%) require inspection once a year, while the others, classified as high-risk, must be inspected twice a year. One food outlet was identified as low risk; therefore, its inspection is conducted once every two years.

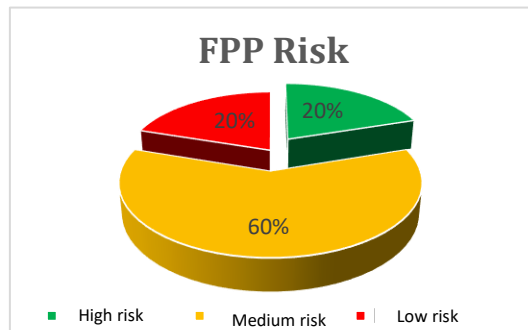


Figure 2. Risk of Food Processing Premises (FPPs) in Banjarbaru City

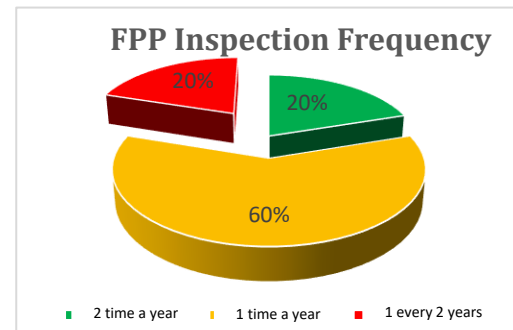


Figure 2. Inspection Frequency of Food Processing Premises (FPPs) in Banjarbaru City

The frequency of inspections in Food Processing Premises (FPPs) is a crucial element in maintaining hygiene standards and food safety. Regular inspections aim to minimize health risks for consumers and ensure that business owners implement food handling practices in accordance with health standards. All FPPs must adhere to inspection frequencies that align with their risk level and operational needs. This underscores the importance of inspection frequency, the factors influencing inspection scheduling, and effective methods for determining inspection frequency in FPPs.

Inspection frequency planning is generally conducted annually, based on the fiscal year. This ensures continuous assessment of inspection priorities, which can be adjusted over time based on the results of the previous year. It also allows for the allocation of available resources and the identification of any required policy updates or program revisions. In certain cases where local health offices lack sufficient human resources to fully implement the program within a single year^[11], a multi-year schedule may be adopted. For example, under a multi-year program, high-risk FPPs may be inspected biannually, while medium- and low-risk FPPs may be inspected annually. However, in such a multi-year schedule, it is essential that annual inspection plans are developed by taking into account the results of previous inspections and other emerging issues (e.g., availability of environmental health officers, changes in the number of processing units).

Inspection frequency plays a vital role in ensuring the quality of food served in FPPs. Regular inspections contribute to: (a) Ensuring Food Safety – routine inspections enable early detection of deviations from hygiene standards or food contamination risks^[4]; (b) Improving Operational Procedures – periodic assessments encourage business owners to improve operational procedures that are not in compliance, such as inadequate sanitation practices or improper storage; and (c) Enhancing Consumer Trust – consumers are more likely to trust FPPs that undergo frequent inspections, as these are perceived to maintain quality and hygiene. Proper implementation of inspections in FPPs is therefore an essential step in safeguarding food quality and safety^[25].

Inspection scheduling should consider food risk factors, production volume, hygiene track records, and local regulations. With risk-based inspection methods, the integration of technology, and systematic scheduling, every FPP is expected to provide safe services for consumers. Regular inspections not only increase consumer trust but also strengthen business commitment to delivering safe and high-quality food.

CONCLUSIONS AND RECOMMENDATIONS

Most Food Processing Premises (FPPs) (60%) fall into the medium-risk category, requiring annual inspections; 20% are categorized as high risk, requiring biannual inspections; and 20% are categorized as low risk, requiring inspections once every two years.

The results of environmental health inspections using a risk-based analysis approach can be applied in areas with a large number of food processing premises but limited numbers of environmental health officers, such as in Banjarbaru City, to ensure effective and efficient sanitation practices.

REFERENCES

1. Kemenkes RI. UU Kesehatan no 17 Tahun 2023. 2023.
2. KEMENKES RI. PERATURAN MENTERI KESEHATAN REPUBLIK INDONESIA NO 14 TAHUN 2021.
3. Herniwanti H, Sudarto E, Zaman K, Dewi O, Rany N. Sanitary Hygiene of Refilled Drinking Water Depots during the Covid-19 Pandemic. *Jurnal Penelitian Pendidikan IPA*. 2022;8(5).
4. Tasanapak K, Kucharoenphaibul S, Wongwigkarn J, Sitthisak S, Thummeepak R, Chaibenjwong P, et al. Prevalence and virulence genes of *Staphylococcus aureus* from food contact surfaces in Thai restaurants. *PeerJ*. 2023;11.
5. Sharma B, Arora R, Sharma G. Alternative raw material selection and impact of goods and service tax in food industry. In: *Materials Today: Proceedings*. 2023.
6. Brehm-Stecher B, Siragusa GR. Microbiomic Profiling of Food Processing Environments and Foods for Food Safety and Quality. In: *Encyclopedia of Food Safety, Second Edition, Volume 1-4*. 2023.
7. Barnes J, Whiley H, Ross K, Smith J. Defining Food Safety Inspection. Vol. 19, *International Journal of Environmental Research and Public Health*. MDPI; 2022.
8. Kizen A, Arkun G. Investigation of Compliance on Good manufacturing Practices (Gmp) and Hygiene Conditions in Enterprises That Supply mass Catering Services. Vol. 4, *International Journal of Food Engineering Research (IJFER)* Year. 2018.
9. Suprpto Y, Syahrul S, Masditou M, Syahfitri N. The Impact of Empowering Local Communities Through Food and Beverage Businesses at The Palo Naga Tourism Object, Deli Serdang Regency, North Sumatra Province. *International Journal of Economics and Management*. 2024;2(01).
10. Kemenkes RI. BUKU PEDOMAN HSP BERBASIS RISIKO. 2021.
11. Kemenkes RI. Buku Pedoman HSP. 2021.
12. Badun A. The Relationship of Drinking Water Depot Sanitation with the Presence of Coliform and *Eschericia Coli*. *MIRACLE Journal Of Public Health*. 2021;4(2).
13. Bingham G V., Hagstrum DW. Importance of Sanitation for Stored-Product Pest Management. Vol. 15, *Insects*. 2024.
14. Imanuela S. S DR, Noraida N, Erminawati E, Isnawati I. The Relationship of Sanitation Hygiene with The Presence of *Echericia Coli* on Jamu Beras Kencur in The Official Village of Banjarbaru City. *JURNAL KESEHATAN LINGKUNGAN: Jurnal dan Aplikasi Teknik Kesehatan Lingkungan*. 2023 Jul 1;20(2):281–6.
15. Shafieizadeh K, Alotaibi S, Tao CW (Willie). Information processing of food safety messages: what really matters for restaurant customers? *International Journal of Contemporary Hospitality Management*. 2023;35(10).
16. Gričar S, Šugar V. Sustainable consumption using the example of food processing in a restaurant. *Sustainability (Switzerland)*. 2021;13(24).
17. Program K, Lingkungan K, Kesehatan K, Direktorat RI, Lingkungan P. Modul Pengawasan KL. 2021.
18. Program K, Lingkungan K, Kesehatan K, Direktorat RI, Lingkungan P. Modul Pengawasan Kesehatan Lingkungan. 2023.

19. Wongthanate J, Chinnacotpong K, Khumpong M. Impacts of pH, temperature and pretreatment method on biohydrogen production from organic wastes by sewage microflora. *International Journal of Energy and Environmental Engineering*. 2014;5(1).
20. Lee AWT, Ng ICF, Wong EYK, Wong ITF, Sze RPP, Chan KY, et al. Comprehensive identification of pathogenic microbes and antimicrobial resistance genes in food products using nanopore sequencing-based metagenomics. *Food Microbiol*. 2024;121.
21. Arokiyaraj S, Dinakarkumar Y, Shin H. A comprehensive overview on the preservation techniques and packaging of processed meat products: Emphasis on natural derivatives. Vol. 36, *Journal of King Saud University - Science*. 2024.
22. Aigbedion-Atalor PO, Fening KO, Adeyemi AO, Idemudia I, Ojukwu KC, Nwobodo MA, et al. Regenerative edible insects for food, feed, and sustainable livelihoods in Nigeria: Consumption, potential and prospects. *Future Foods*. 2024;9.
23. Moerman F, Rizoulières P, Majoor FA. Cleaning in place (CIP) in food processing. In: *Hygiene in Food Processing: Principles and Practice: Second Edition*. 2013.
24. Jayanti D. HYGIENE SANITATION AND FOOD SAFETY IN EMPLOYEE RESTAURANTS. 2022;II. Available from: <http://e-journal.fkmumj.ac.id/>
25. Read QD, Brown S, Cuéllar AD, Finn SM, Gephart JA, Marston LT, et al. Assessing the environmental impacts of halving food loss and waste along the food supply chain. *Science of the Total Environment*. 2020;712.
26. PERUBAHAN KEMENKES RI. PERATURAN MENTERI KESEHATAN REPUBLIK INDONESIA NO 17 TAHUN 2024.

