

RELATIONSHIP BETWEEN FOOD HANDLERS' ATTITUDES AND HANDWASHING IN CATERING FOOD SAFETY

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Abstract

Food safety plays a crucial role in preventing foodborne diseases, particularly within the catering sector, which is highly susceptible to cross-contamination. Food handlers are key agents in maintaining hygiene and food safety through appropriate hand hygiene practices. This study aims to examine the relationship between food handlers' attitudes and handwashing habits toward food safety through a literature review of 25 national and international studies published between 2015 and 2025. A narrative synthesis analysis was conducted to identify the relationship between attitudes, hand hygiene behaviors, and supporting factors such as training and facility availability. The findings revealed that most reported a significant relationship between positive attitudes and proper handwashing practices. Positive attitudes were identified as a key determinant in improving hygienic behavior among food handlers. However, several studies also highlighted a gap between attitudes and actual practices due to limited facilities, insufficient supervision, and weak hygiene culture. These findings emphasize that fostering positive attitudes must be accompanied by continuous education, adequate infrastructure, and managerial support to ensure consistent and sustainable handwashing behavior, thereby enhancing overall food safety in catering services.

Keyword: Food Handlers, Hand Hygiene, Attitude, Food Safety, Catering Services.

INTRODUCTION

Food safety is a critical component of public health protection, particularly amid the growing consumption of ready-to-eat meals and catering services. In Indonesia, foodborne illness cases remain frequent, with most outbreaks linked to poor hygiene and sanitation practice during food processing (1), (2). According to the National Agency of Drug and Food Control (BPOM), the catering industry is among the primary contributors to food poisoning outbreaks, mainly caused by pathogenic bacteria such as *Staphylococcus* sp., *Escherichia coli*, and *Salmonella* (1).

Food handlers play a pivotal role in ensuring food safety, as they can serve as vectors for disease transmission if hygienic practices are neglected. Handwashing with soap and running water represents one of the most effective personal hygiene measures to prevent cross-contamination (3), (4). However, several studies have found that proper handwashing practices are still inconsistently implemented, even in workplaces equipped with adequate facilities (5), (6).

Behavioral factors—particularly attitudes toward hygiene—strongly influence the consistency of hand hygiene practices among food handlers. Research by Hartini (7) and Desandri (8) identified a significant correlation between positive attitudes and good hygiene practices. Nevertheless, international studies also revealed a gap between attitudes and actual practices, often due to insufficient facilities, limited training, and lack of supervision (9), (10).

Given these findings, this study aims to examine the relationship between food handlers' attitudes and handwashing habits in maintaining food safety within the catering sector through a literature review approach. This review is expected to provide a comprehensive understanding of behavioral determinants influencing hygiene practices and to inform future strategies for strengthening food safety policies in the food service industry

RESEARCH METHODS

This study employed a Systematic Literature Review (SLR) approach to identify and analyze research findings related to the relationship between food handlers' attitudes toward food safety and their handwashing practices in catering settings. SLR is a systematic, explicit, and reproducible method used to identify, evaluate, and synthesize relevant scientific evidence on a specific topic (11).

The literature search was conducted across five major databases—Google Scholar, Portal Garuda, PubMed, ScienceDirect, and OpenAlex covering publications from 2015 to 2025. The search utilized a combination of Indonesian and English keywords, including “food handler,” “handwashing,” “attitude,” and “food safety in catering.”

Articles were selected based on inclusion and exclusion criteria that considered topic relevance, methodological quality, publication language (Indonesian or English), and the availability of full-text access. From an initial total of approximately 80 articles, 25 studies met the eligibility criteria and were included for in-depth review.

Data were analyzed using a narrative synthesis method, which allows the integration and interpretation of findings from studies with diverse designs and contexts to achieve a more comprehensive understanding (12). The analysis process involved thematic grouping, pattern identification, and interpretation of factors influencing food handlers' hand hygiene behaviors.

RESEARCH RESULTS

| No | Author Name, Year, and Title of Article | Research Purposes | Research Methods | Research Results |
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| 1 | Shelviana Mathofani, Desta Dwi Lestari dan Khuliyah Candraning Diyanah. (2022). "Description of Catering Hygiene and Sanitation at 'K' Catering in Banyuwangi Regency" (1) | To describe the hygiene and sanitation conditions of the catering service at 'K' Catering in Banyuwangi Regency. | Descriptive observational study Data collection involved interviews with the owner/ marketing party of 'K' Catering and direct observation of the catering premises. | 'K' Catering did not meet the overall hygiene sanitation requirements (score 72.68% or $\leq 74\%$). Although facilities for hand washing and soap for food handlers were available, employee behavior such as not using aprons, hairnets, and gloves, and frequently forgetting to trim nails and hair— remains a critical aspect that needs attention. |
| 2 | Nur Falah Setyawati. (2020). "Analysis of Food" | To analyze the safety of food products at Nikmat Catering | Qualitative with a descriptive approach. | Nikmat Catering had implemented the entire scope of GMP and met |

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| | Product Safety at Nikmat Catering Based on Good Manufacturing Practice" (13). | based on the implementation of Good Manufacturing Practice (GMP) scope. | | food safety assurance standards. Employee hygiene, which included the availability of hand and foot washing facilities with soap/disinfectant and a dryer, was part of the GMP. Employees were required to wash their hands before entering the processing area and consistently wash hands before work, after using the toilet, taking a break, coughing, sneezing, touching hair, eating, and drinking. |
| 3 | Windi Wulandari, Zulia Setyaningrum, Sunarto, Acintya Wedaning Agni Janametri dan Shesa Ratna Suryaning Putri. (2023). "Escherichia coli in Food and Hands of Handlers in Catering service Group A1 and A2" (14). | To analyze the relationship between personal hygiene, sanitation facilities, and the content of <i>E. coli</i> in food and on handlers' hands in catering services. | Cross-sectional, accidental sampling; n=25 handlers; microbiological examination of food and hand swabs. | 52% of personal hygiene was "good," yet <i>E. coli</i> was found on hands (84%) and in food (56%). No significant relationship was found between Personal hygiene (p=0.096 for the relationship with <i>E. coli</i> on hands). This suggests that while hygiene attitude/ statements may seem good, hand contamination remains high, highlighting that attitude/knowledge alone does not always guarantee effective handwashing practice (facility and implementation factors are influential). |
| 4 | Supri Hartini. (2022). "The Level of Knowledge, Attitude and Practice of | To determine the relationship between the level of hygiene sanitation knowledge and food handler attitude with hygiene | Analytical observational with a cross-sectional study. | No relationship was found between the level of hygiene sanitation knowledge and hygiene sanitation practices (p=0.053). However, a |

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| | Hygiene d Sanitation among Food Handler" (7). | sanitation practices. | | significant relationship was found between food handler attitude and hygiene sanitation practices (p=0.004), with a positive and strong correlation (rs =0.732). This indicates that the more positive the food handler's attitude, the better the hygiene sanitation practices implemented. |
| 5 | Ika Ratna Palupi, Fikri Aulia Khoirunnisa, Alifah Sharfina Hanifi. (2022). "Increasing Knowledge and Application of Hygiene Behavior among Food Handlers Receiving Food Safety Education at Factory Employee Catering in DIY" (2). | To increase food safety knowledge and hygiene behavior among food handlers at a catering service providing food for factory employees in DIY. | Education or knowledge refreshment. | After the education, 55.6% of participants had good knowledge related to food safety. However, evaluation of hygiene behavior one month later showed that the use of aprons and correct handwashing practices had not been implemented by the food handlers. Good knowledge about the use of PPE and handwashing did not translate into behavior. The catering service also lacked a separate handwashing area for workers. |
| 6 | Dewi Marfuah, Agung Setya Wardana dan Faiza Naresti. (2023). "Food Sanitation Hygiene Education in Increasing Knowledge and Behavior of Food Handlers at Alhikmah Catering Surakarta" (15). | To assess the influence of hygiene sanitation education on the knowledge and hygiene behavior of food handlers at Alhikmah Catering. | Quasi-experimental one-group pretest-posttest; n=18; purposive sampling. | A significant increase was found in knowledge (p=0.046) and hygiene behavior (p=0.000) after education. The authors affirmed that hygiene behavior (including handwashing practice) is related to attitude & knowledge; following education (which targets attitude/ knowledge), an |

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| | | | | improvement in handwashing behavior and general hygiene habits occurred. |
| 7 | Susiana Desandri, Ade Rahmawati, Tayong Siti Nurbaeti. (2024). "Relationship between Knowledge and Attitude of Food Handlers and the Implementation of Food Hygiene Sanitation in Restaurants in Anjatan Area in 2024" (8). | To understand the general overview of the Relationship between Knowledge and Attitude of Food Handlers and the Implementation of Food Hygiene Sanitation in Restaurants in Anjatan Area. | Analytical Quantitative with a cross-sectional design. | A significant relationship was found between food handler attitude and the implementation of food hygiene sanitation (p-value 0.000). 56.7% of food handlers had a positive attitude, and 100% of them implemented good hygiene sanitation. However, 43.3% had a negative attitude, and 12 out of 13 of those handlers implemented poor hygiene sanitation. Observation showed many food handlers did not wash their hands during the processing, did not use masks or gloves, and spoke while working. |
| 8 | Puteri Dwi Andita, Ratih Kurniasari. (2025). "The Effectiveness of Nutrition Education Media on Food Safety in Terms of Food Handlers' Hygiene, Sanitation Behavior, and Knowledge: A Literature Review" (16). | To determine the Effectiveness of Nutrition Education Media on Food Safety reviewed from the Hygiene Sanitation Behavior and Knowledge of Catering Business Food Handlers. | Literature review | Knowledge of nutrition increased effectively after education, but the change in hygiene practice behavior remained minimal. This was attributed to the lack of catering facilities and the food handlers' assumption that using PPE was cumbersome while working. |
| 9 | Ayu Rahmawati Dewi, Niken Purwidiani, Asrul Bahar, Ita Fatkhur | To describe the implementation of hygiene, sanitation, and catering at | Qualitative with a descriptive approach. | The implementation of hygiene and sanitation at Yulfia Catering was not entirely |

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| | Romadhoni. (2024). “Implementation of Hygiene and Sanitation at Yulfia Catering in Mojokerto” (5). | Yulfia Catering in Mojokerto. | | satisfactory. Food handlers did not wear complete PPE, did not wash hands correctly, and neglected hygiene when orders were busy. The attitude and knowledge of food handlers play an important role, but handlers with poor attitudes such as long nails, scratching the body while cooking, and chatting can be a source of contamination. |
| 10 | Anggun Istiva Rahayu, Munifa, Juni Ramadhani. (2022). “Determine The Effect Of Providing Nutritional Counseling Using Video Media About Sanitary Hygiene In Food Processing On The Level Of Knowledge And Attitudes Of Food Handlers At Aulia Catering Service In Palangka Raya City” (17). | To determine the effect of providing nutrition education using video media about hygiene sanitation in food processing on the knowledge and attitude level of food handlers at Aulia Catering Service in Palangka Raya City. | Pre Experimental Design with One Group Pre Test Post Test Design. Sample of 20 people. | A significant effect was found from providing nutrition education using video media on the attitude of food handlers (p- value 0.003). The food handlers' attitude improved from 55% good to 100% good after the education. Attitude is a reaction or response to a stimulus, which can be interpreted from behavior. |
| 11 | Dewi Milla Taqia, Sri Handajani, Luthfiyah Nurlaela dan Ita Fatkhur Romadhoni. (2021). “A Study on Hygiene Sanitation Training to | To review the literature evidence on the effectiveness of hygiene sanitation training on the knowledge and behavior of food handlers in catering. | Literature review (synthesis of relevant studies). | Training (PowerPoint, posters, practice, mentoring) often improves knowledge and corrects hygiene behavior—including handwashing practices—especially with continuous reinforcement and supervision. The |

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| | Improve Knowledge and Behavior of Catering Food Handlers” (18). | | | review affirmed the relationship: increased attitude/knowledge post-training is followed by increased behavior (including handwashing) in many studies. However, effectiveness depends on facilities & follow- up. |
| 12 | Ika Ratna Palupi, R. Dwi Budiningsari, Fikri Aulia Khoirunnisa, Alifah Sharfina Hanifi.(20 04). "Food safety knowledge, hygiene practices among food handlers, and microbiological quality of animal side dishes in contract catering" (19). | To assess the level of food safety knowledge, personal hygiene practices, and the microbiological quality of chicken and egg dishes at three catering companies. | Cross-sectional study conducted from March to July 2019 at three catering companies in the Special Region of Yogyakarta, Indonesia, with 20 food handlers as participants. | 75% of subjects had limited food safety knowledge, and 95% had not received food safety training, leading to poor hygiene practices. Food handlers had a personal hygiene practice score of 50%, With "good handwashing practice" being the lowest scoring aspect. No significant correlation was found between food safety knowledge and hygiene practices (p>0.05). Age Correlated with handwashing technique (p=0.023), where older individuals had better handwashing habits. |
| 13 | Hui Lee, Hishamuddin Abdul Halim, Kwai Thong, Lay Chai. (2017). "Assessment of Food Safet Knowledge, Attitude, Self-Reported Practices, and Microbiological Hand Hygiene of Food Handlers” (9). | To assess food safety knowledge, attitude, self-reported practices, and microbiological hand hygiene (actual indicator) among food handlers to test the relationship of attitude/practice with hand contamination. | Cross-sectional observational (n=85 food handlers at a university, Malaysia). Included microbiological sampling of hands. | Found a discrepancy between self-reported attitude/knowledge and microbiological evidence:although most reported a positive attitude towards handwashing, hand samples showed contamination indicating actual practices were inadequate. Positive attitude correlated with self-reported practice (moderate), but was not |

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| | | | | always reflected by swab results—showing a gap between attitude → practice → outcome. |
| 14 | Muharnis Supriyani Putri dan Dewi Susanna. (2021). “Food safety knowledge, attitudes and practices of food handlers at kitchen premises in Port ‘X’, Jakarta” (20). | To assess the relationship between knowledge, attitude, and food hygiene practices (including handwashing habits). | Cross-sectional (n=72 food handlers). | Findings: A significant correlation was found between knowledge and attitude (p=0.01). However, no significant relationship was found between attitude or knowledge and actual food hygiene practices (including handwashing). This indicates that a good attitude does not always lead to good practices. |
| 15 | Yujuan Chen, Jiangen Song, Jiajia Dai, Wei Shi. (2025). “Factors related to good food-handling practices: a cross-sectional study based on male food handlers in catering establishments” (21). | To identify factors related to good food-handling practices, including handwashing habits, among male food handlers working in catering establishments. | Cross-sectional design, survey of 648 male food handlers in various catering establishments. | Most handlers reported washing hands with soap before handling food (approx. 91.2%)—indicating good attitude/practice according to self-report. However, there was a large variation in adherence to other practices; factors such as food safety training, education, work experience, and type of catering establishment correlated positively with compliance with food safety practices, including handwashing. |
| 16 | Willma Fauzzia, Yuliana Pinaringsih Kristiutami, Rin Handayani, Ramdani Setiyariski dan Kartika Dewi. (2021). “Training on | To provide training to Kuswini Catering management so they are able to implement food processing hygiene and sanitation standards, including correct | Used lecture, Q&A, and discussion methods (participatory training in community service activities). | Before the training, most workers did not yet have SOPs for hygiene and sanitation. After the training, the management successfully formulated |

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| | Hygiene and Sanitation in Food Processing for Kuswini Catering During the Covid-19 Pandemic” (22). | handwashing behavior. | | SOPs regulating the obligation to wash hands before and after processing food, after handling money, and before touching cooked food. Workers' attitudes toward the importance of cleanliness increased after understanding the risk of disease and health standards. |
| 17 | Helmi, Ajeng Tias Endarti, Brian Sri Prahastuti. (2025). “Factors Influencing the Hygiene Behavior of Food Handlers in Cikarang Bekasi Catering Services” (23). | To determine the factors influencing the hygiene behavior of food handlers in catering services in Cikarang (2024). | Analytical cross-sectional; n=100 food handlers; univariate, bivariate (Chi-square), multivariate (logistic regression) analysis. | 65% of hygiene behavior was poor. Bivariate analysis showed a relationship between attitude and hygiene behavior (P<0.05). However, in multivariate analysis, the dominant variable was the use of PPE (OR 174), and education was also significant. Summary: Attitude correlated with hygiene behavior (including handwashing practice as part of behavior), but its influence decreased when controlled for other factors (facilities, PPE). |
| 18 | Lis Sari Nurhayati, Elis Endang Nikmawati dan Tati Setiawati. (2020). “Implementation of Personal Hygiene of Food Handlers in a Catering Service in Bandung City” (3). | To describe the application of personal hygiene behavior and attitude of food handlers in a catering in Bandung City. | Quantitative descriptive; observation and questionnaire; subjects: kitchen area handlers (n≈13). | Overall, personal hygiene behavior was mostly in the "applying" category (≈70.6%) and personal hygiene attitude was rated "good" (≈78.4%). Handwashing practice ("always Washing hands during work, after work, and after leaving the toilet") was mentioned as part of the behavior assessment; the |

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| | | | | report showed a gap in some PPE items (apron, etc.). The study is descriptive — noting that a good attitude is associated with reasonably good practice, but did not perform a statistical test of the specific relationship between attitude toward handwashing and handwashing frequency. |
| 19 | Karina Septea Asie Sawong, Dini Ririn Andrias, and Lailatul Muniroh. (2016). “Implementation of Food Service Hygiene and Sanitation in Class A2 and A3 Catering Services in Palangka Raya City, Central Kalimantan Province” (24). | The primary objective of this study was to analyze the implementation of hygiene and sanitation in A2 and A3 class catering services in Palangka Raya City, including the physical eligibility of the building, equipment, sanitation facilities, personnel (food handlers), and the microbiological quality of the food. | A non-hypothesis, descriptive observational design was used. The population included all catering services in Palangka Raya City. The sample consisted of 10 catering services (3 Class A2 and 7 Class A3), selected using a purposive sampling technique. | Food handlers' hygiene behavior, such as washing hands before work and after using the toilet, was found to have a significant relationship with the microbial count on equipment and food. Laboratory tests on three Class A2 caterings showed an E. coli count of 0/g, indicating good personal hygiene among food handlers and clean processing procedures. This suggests that the clean behavior of food handlers is directly linked to safe food microbiological quality. (Note: The overall physical infrastructure was reported as not fully meeting requirements, although the principles of hygiene and sanitation were generally met). |
| 20 | Brutu, H. N. (2021). Hubungan | To analyze the relationship knowledge | Quantitative cross sectional | There was no significant relationship |

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| | Pengetahuan dan Sikap Penjamah Makanan Dengan Penerapan Hygiene Sanitasi Makanan Pada Rumah Makan di Desa Sukasari Kecamatan Pegajahan Kabupaten Serdang Bedagai. <i>Universitas Islam Negeri Sumatera Utara.</i> | and attitude of food handlers with the application of hygiene sanitation in restaurants that provide catering | | between knowledge and hygiene practices (p=0.202), but there was a significant relationship between attitude and the application of hygiene sanitation (p=0.041). |
| 21 | Suryaningtyas, N. M. (2019). <i>Kajian Kebiasaan Cuci Tangan Pakai Sabun Pada Penjamah Makanan Di Warung Makan Komplek Wisata Candi Prambanan Pada Tahun 2019</i> (Doctoral dissertation, Poltekkes kemenkes Yogyakarta). | to see the relationship between the knowledge and attitudes of food handlers and the implementation of food sanitation hygiene in restaurants in Sukasari Village, Pegajahan District, Serdang Bedagai Regency. | This was a survey descriptive research | The results showed that there was still a low level of knowledge of food handlers at 34.5%. The practice of food handlers on the daily habit of washing hands with soap is included in the unfavorable category of 61.8%. The availability of hand-washing facilities using soap is also included in the unfavorable category of 85.5%. |
| 22 | Almansouri, M., Verkerk, R., Ab Karim, S., Raji, M. N. A., Ismail, N., Nugrahedhi, P. Y., & Luning, P. A. (2025). Safety and authenticity practices in heritage food production in home-based and commercial catering: A multiple country case study. <i>International Journal of Gastronomy and Food Science</i> , 39, 101136. | For authenticity practices, similar findings were observed among all countries, and both catering types checked the availability of essential ingredients in advance as well as taste, flavour and texture to ensure the quality of the recipe | Multi-country qualitative approach (multi- case study), with 60 culinary | In terms of differences, compared with the culinary professionals in Indonesia and Malaysia, those in Saudi Arabia emphasised the importance of authenticity practices, including having an experienced cook, following specific written recipes, supervising new cooks, providing advice to use the original recipe and presenting authentic dishes without modifications. In terms of similarities in food |

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| | | | | safety practices, most culinary professionals in the three countries suggested the importance of checking colour and freshness; cleaning equipment with water and chemicals (soap); and wearing protective cooking uniforms (aprons). |
| 23 | Amaiach, R., Lalami, A. E. O., Fadil, M., Bouslamti, R., & Lairini, S. (2024). Food safety knowledge, attitudes, and practices among food handlers in collective catering in central Morocco. <i>Heliyon</i> , 10(23). | This pioneering study in central Morocco aimed to assess food safety knowledge, attitudes, and practices (KAPs) among food handlers and to identify key factors influencing adequate knowledge, positive attitudes, and effective practices | A cross-sectional study was conducted among food handlers in restaurants in Fez prefecture in central Morocco between July 2021 and January 2022 using a questionnaire survey. | The results revealed that the 282 food handlers included in this study exhibited moderate levels of knowledge (65.31 %) and practices (62.91 %), and a high level of attitudes (75.61 %) towards food safety. A moderate positive correlation was observed between knowledge and practices ($r = 0.291$, $p < 0.05$), as well as between attitudes and practices ($r = 0.327$, $p < 0.05$). The most significant positive correlation was between knowledge and attitudes ($r = 0.907$, $p < 0.05$). Moreover, professional experience and age significantly influenced the level of knowledge; the nature of job and work experience influenced attitudes; gender, education level, nature of work, and marital status influenced the level of practices; and training impacted them |

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| 24 | Castro, M., Soares, K., Ribeiro, C., & Esteves, A. (2024). Evaluation of the effects of food safety training on the microbiological load present in equipment, surfaces, utensils, and food manipulator's hands in restaurants. <i>Microorganisms</i> , 12(4), 825. | This study aimed to assess the impact of food safety training based on theoretical and on-the-job training on the microbiological counts of equipment, surfaces, utensils, and food handler (FH) hands. | The hygiene and food safety conditions of four restaurants were analyzed through facility checklists, employee questionnaires, and microbiological analyses conducted before and after training. Eight sample collection moments were conducted at each restaurant before and after training. | all. The pre-training results indicate that 15% and 26% of analyses for Enterobacteriaceae and total mesophilic aerobic bacteria (TMB), respectively, did not comply with hygiene safety limits. Additionally, 31% and 64% of Enterobacteriaceae and TMB values, respectively, exceeded safety limits on food handler hands. Positive cases of coagulase-positive Staphylococcus (CoPS) resulted from unprotected wounds on some FH hands. The presence of <i>Listeria monocytogenes</i> in drains was also identified as a concern. Following training, significant differences in results were observed. In many cases, there was a reduction of over 80% in microbial load for Enterobacteriaceae and TMB collected from equipment, surfaces, utensils, and food handler hands. |
| 25 | Jevšnik, M., Kirbiš, A., Vadnjal, S., Jamnikar-Ciglencčki, U., Ovca, A., & Kavčič, M. (2023). Food safety knowledge among professional food handlers in Slovenia: Temperature | To assess food safety knowledge among food handlers in both general and specific domains, three indexes (a General Knowledge Index, a Personal Knowledge Index, and a Temperature | An insufficient transfer of food safety knowledge from managers and chefs to assistant chefs and kitchen assistants in establishments where more persons handle | The results suggest a need for improvement in the current system of food safety training courses for professional food handlers in Slovenia. The human factor in the food supply chain still has a |

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| | The results of a nation-wide survey. <i>Foods</i> , 12(14), 2735. | Knowledge Index) were created. | food was evident, while a course titled “Hygiene Minimum” of standardised training from the past still significantly contributes to food safety knowledge. | significant role in ensuring food safety culture, and therefore must become a more important part of the food safety management system. |

DISCUSSION

Following a systematic search and screening process, 25 articles met the inclusion criteria and were analyzed. These studies explored the relationship between food handlers’ attitudes, handwashing behavior, and hygiene practices in catering and food service establishments. The overall findings revealed that most studies identified a significant relationship between positive attitudes and proper handwashing behavior, which plays a critical role in maintaining food safety. However, several studies also highlighted discrepancies between positive attitudes and actual hygienic practices in the workplace.

Food handlers’ attitudes were consistently shown to have a significant influence on handwashing behavior. Studies by Hartini (7) and Desandri et al. (8) demonstrated a strong correlation between positive attitudes and good hygiene practices ($p < 0.05$). Similarly, Sawong et al. (24) reported that proper hygienic behavior, including correct handwashing techniques, was directly associated with microbiologically safe food, free from *E. coli* contamination. These findings emphasize that a positive attitude toward personal hygiene is fundamental to ensuring food safety in catering settings. Similar results were also found by Brutu (4), Helmi et al. (23), and Amaia et al. (26), who highlighted that attitude serves as a key driver of consistent hand hygiene behavior among food handlers.

Education and training have been shown to play a pivotal role in shaping positive attitudes and enhancing hygiene behavior. Rahayu et al. (17) demonstrated that educational interventions significantly improved food handlers’ attitudes, while Marfuah et al. (15) and Taqia et al. (18) found that continuous training strengthened both attitude and compliance with proper handwashing practices. Implementing mandatory handwashing SOPs has proven effective in reducing cross-contamination risks and improving workplace food safety (22), (16). Therefore, sustained educational programs are essential in promoting hygiene behaviors that support overall food safety standards.

Nevertheless, not all studies reported a direct association between positive attitudes and correct practices. Wulandari et al. (14) found that even though most food handlers exhibited good hygiene attitudes, microbiological contamination on hands and food samples was still detected. This indicates a gap between knowledge, attitude, and actual behavior. Factors such as workload, limited facilities, and lack of managerial supervision contribute to inconsistent hygiene practices (20), (2), (28). Therefore, the transformation of positive attitudes into consistent hygienic behavior requires supportive environmental and organizational conditions. Workplace environment and managerial support were also found to be crucial in maintaining good hand hygiene. Adequate handwashing facilities, regular supervision, and a culture of hygiene compliance significantly improved adherence among catering workers (1), (13), (23). International studies further revealed that in countries such as Indonesia and Saudi Arabia, the

combination of regular training and strict management policies serves as a key factor in maintaining food hygiene and safety (25).

Objective assessments using microbiological tests further reinforced the empirical evidence linking positive attitudes with improved food safety outcomes. Chen et al. (21) reported that over 90% of trained food handlers practiced proper handwashing before handling food, while Castro et al. (27) found that food safety training reduced microbial loads on hands by more than 80%. These findings illustrate the direct contribution of positive attitudes to improved hygiene performance and safer food handling practices.

Overall, the analysis of 25 articles revealed reported a significant positive correlation between attitudes and handwashing behavior among food handlers. Positive attitudes enhance compliance with proper hand hygiene, which directly contributes to maintaining food safety in catering environments. However, this relationship's effectiveness depends heavily on continuous training, adequate facilities, managerial policies, and regular supervision. Thus, improving food safety requires not only fostering positive attitudes but also establishing supportive systems that ensure hygienic behaviors are practiced consistently and sustainably.

CONCLUSION

The literature review successfully examined the relationship between food handlers' attitudes and handwashing practices in ensuring food safety in catering services through the analysis of 25 relevant articles. The analysis revealed that a positive attitude among food handlers is significantly associated with the adoption of proper handwashing practices. Most studies emphasize that a positive attitude is fundamental to forming correct hand hygiene behavior. Furthermore, educational interventions and training programs have been shown to significantly improve both attitudes and handwashing practices. Nonetheless, some research highlights a gap between positive attitudes and actual hand hygiene behaviors, underscoring that attitude alone is insufficient without adequate support from facilities, supervision, and a conducive work culture. Therefore, food handlers' attitudes are a crucial factor influencing handwashing habits, but their effectiveness heavily depends on environmental support and catering management systems. Consequently, food safety improvement efforts require a comprehensive approach encompassing education, facility provision, and continuous monitoring.

REFERENCES

1. Mathofani S, Lestari DD, Diyanah KC. Gambaran Higiene dan Sanitasi Jasa Boga di "K" Katering Kabupaten Banyuwangi. 2022;
2. Palupi IR, Khoirunnisa FA, Hanifi AS. PENINGKATAN PENGETAHUAN DAN PENERAPAN PERILAKU HIGIENE PADA PENJAMAH MAKANAN YANG MENDAPAT EDUKASI KEAMANAN PANGAN DI KATERING KARYAWAN PABRIK DI DIY. 2022;5(2).
3. Nurhayati IS, Nikmawati EE, Setiawati T. PENERAPAN PERSONAL HIGIENE PENJAMAH MAKANAN DI SALAH SATU KATERING DI KOTA BANDUNG. 2020;
4. Brutu HN. PROGRAM STUDI ILMU KESEHATAN MASYARAKAT FAKULTAS KESEHATAN MASYARAKAT UNIVERSITAS ISLAM NEGERI SUMATERA UTARA. 2021;
5. Ayu Rahmawati Dewi, Niken Purwidiani, Asrul Bahar, Ita Fatkhur Romadhoni. Penerapan Hygiene dan Sanitasi pada Yulfia Catering di Mojoketo. J Bintang Pendidik Indones. 2024 Aug 18;2(4):174–83.
6. Suryaningtyas NM. KAJIAN KEBIASAAN CUCI TANGAN PAKAI SABUN PADA

- PENJAMAH MAKANAN DI WARUNG MAKAN KOMPLEK WISATA CANDI PRAMBANAN PADA TAHUN 2019. 2019;
7. Hartini S. HUBUNGAN TINGKAT PENGETAHUAN HYGIENE SANITASI DAN SIKAP PENJAMAH MAKANAN DENGAN PRAKTIK HYGIENE SANITASI. 2022;2(2).
 8. Desandri S, Rahmawati A, Nurbaeti TS. Hubungan Pengetahuan dan Sikap Penjamah Makanan dengan Penerapan Hygiene Sanitasi Makanan pada Rumah Makan di Wilayah Anjatan Tahun 2024. 2024;6(01).
 9. Lee H, Abdul Halim H, Thong K, Chai L. Assessment of Food Safety Knowledge, Attitude, Self-Reported Practices, and Microbiological Hand Hygiene of Food Handlers. *Int J Environ Res Public Health*. 2017 Jan 10;14(1):55.
 10. Jevšnik M, Kirbiš A, Vadnjal S, Jamnikar-Ciglenečki U, Ovca A, Kavčič M. Food Safety Knowledge among Professional Food Handlers in Slovenia: The Results of a Nation-Wide Survey. 2023;
 11. Nursalam T, Nursalam D, Nurs M, Kusnanto D, Kp S, Kes M, et al. PEDOMAN PENYUSUNAN LITERATURE DAN SYSTEMATIC REVIEW. 2020;
 12. Snyder H. Literature review as a research methodology: An overview and guidelines. *J Bus Res*. 2019 Nov;104:333–9.
 13. Setyawati NF. ANALISIS KEAMANAN PRODUK MAKANAN DI NIKMAT CATERING BERDASARKAN GOOD MANUFACTURING PRACTICE. 2020;
 14. Wulandari W, Setyaningrum Z, Sunarto S, Janametri AWA, Putri SRS. Escherichia coli in Food and Hands of Handlers in Catering service Group A1 and A2. *Contag Sci Period J Public Health Coast Health*. 2023 Dec 20;5(4):1296.
 15. Marfuah D, Wardana AS, Naresti F. Food Sanitation Hygiene Education in Increasing Knowledge and Behavior of Food Handlers at Alhikmah Catering Surakarta. 2023;
 16. Andita, P. D., & Kurniasari, R. (2025). Efektivitas Media Edukasi Gizi Terhadap Keamanan Makanan Ditinjau dari Perilaku dan Pengetahuan Higiene dan Sanitasi Penjamah Makanan Usaha Katering: Literatur Review. *Jurnal Riset Gizi*
- Rahayu AI, Munifa M, Ramadhani J. Pengaruh Pemberian Penyuluhan Gizi Menggunakan Media Video tentang Higiene Sanitasi dalam Pengolahan Makanan terhadap Tingkat Pengetahuan dan Sikap Penjamah Makanan pada Aulia Catering Service di Kota Palangka Raya: Determine the Effect of Providing Nutritional Counseling Using Video Media about Sanitary Hygiene in Food Processing on the Level of Knowledge and Attitudes of Food Handlers at Aulia Catering Service in Palangka Raya City. *J Surya Med*. 2022 Dec 27;8(3):210–7.
17. Taqia DM, Handajani S, Nurlaela L, Romadhoni IF. KAJIAN TENTANG PELATIHAN HIGIENE SANITASI UNTUK MENINGKATKAN PENGETAHUAN DAN PERILAKU PENJAMAH MAKANAN KATERING. 2021;10(2).
 18. Palupi IR, Budiningsari RD, Khoirunnisa FA, Hanifi AS. Food safety knowledge, hygiene practices among food handlers, and microbiological quality of animal side dishes in contract catering. *Ital J Food Saf [Internet]*. 2024 May 21 [cited 2025 Oct 12]; Available from: <https://www.pagepressjournals.org/ijfs/article/view/12554>
 19. Putri MS, Susanna D. Food safety knowledge, attitudes, and practices of food handlers at kitchen premises in the Port ‘X’ area, North Jakarta, Indonesia 2018. 2021;
 20. Chen Y, Song J, Dai J, Shi W. Factors related to good food-handling practices: a cross-sectional study based on male food handlers in catering establishments. *BMC Public Health*. 2025 Aug 22;25(1):2902.
 21. Willma Fauzzia, Kristiutami YP, Handayani RD, Setiyariski R, Dewi K. Pelatihan

- Penerapan Higiene dan Sanitasi dalam Pengolahan Makanan bagi Kuswini Catering di Masa Pandemi Covid-19. *J Sos Abdimas*. 2022 Feb 3;4(1):8–14.
22. Helmi, Endarti AT, Prahastuti BS. Factors Influencing the Hygiene Behavior of Food Handlers in Cikarang Bekasi Catering Services. *J Kesehat Masy Perkota*. 2025 Mar 26;5(1):12–26.
 23. Sawong KSA, Andrias DR, Muniroh L. PENERAPAN HIGIENE SANITASI JASA BOGA PADA KATERING GOLONGAN A2 DAN GOLONGAN A3 DI KOTA PALANGKA RAYA PROVINSI KALIMANTAN TENGAH. *Media Gizi Indones*. 2016 May 15;11(1):1.
 24. Almansouri M, Verkerk R, Karim SA, Abdul Raji MN, Ismail N, Nugrahedi PY, et al. Safety and authenticity practices in heritage food production in home-based and commercial catering: A multiple country case study. *Int J Gastron Food Sci*. 2025 Mar;39:101136.
 25. Amaich R. Food safety knowledge, attitudes, and practices among food handlers in collective catering in central Morocco. 2024;
 26. Castro M, Soares K, Ribeiro C, Esteves A. Evaluation of the Effects of Food Safety Training on the Microbiological Load Present in Equipment, Surfaces, Utensils, and Food Manipulator's Hands in Restaurants. *Microorganisms*. 2024 Apr 19;12(4):825.
 27. Dewi AR, Purwidiani N, Bahar A, Romadhoni IF. Penerapan Hygiene dan Sanitasi pada Yulfia Catering di Mojoketo. 2024;