

Relationship Between Food Handlers' Knowledge and Attitudes with Food Hygiene and Sanitation Practices at Nutrition Provision Service Unit (SPPG) Sepinggan 4 Balikpapan

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Abstract

Introduction: Food safety is essential to public health because food may transmit biological, chemical, and physical hazards. Despite a national target of zero incidents, food safety cases were still reported in Indonesia from October 2025 to January 2026. **Objective:** This study analyzed the relationship between food handlers' knowledge and attitudes and hygiene-sanitation practices at the Sepinggan 4 Nutrition Service Unit, South Balikpapan. **Method:** An observational analytic study with a cross-sectional design involved all 45 personnel working in food processing, portioning, and tray washing using total sampling. **Results and Discussion:** Most respondents had moderate knowledge, totaling 44 people (97.8%), while 31 respondents (68.9%) had good attitudes. Statistical analysis showed a significant relationship between knowledge and hygiene-sanitation practices ($p = 0.007$) and between attitudes and hygiene-sanitation practices ($p = 0.028$). **Conclusion:** Food handlers' knowledge and attitudes were significantly associated with hygiene-sanitation practices, highlighting the importance of strengthening food safety competence and behavior

Introduction

Food safety is a crucial component of public health, as food can serve as a vehicle for the transmission of biological, chemical, and physical hazards. Unsafe food can cause over 200 types of illnesses, ranging from gastrointestinal disorders to chronic diseases. Recent World Health Organization estimates indicate that approximately 866 million people nearly one in nine of the global population fall ill annually due to contaminated food, resulting in around 1.52 million deaths and the loss of 57.1 million healthy life-years. Global productivity losses and medical costs attributable to unsafe food are estimated at USD 310 billion per year. This burden is not evenly distributed; the African and Southeast Asian regions continue to bear a disproportionately high burden of foodborne diseases compared to other regions (WHO, 2026). The level of knowledge food handlers possess regarding hygiene and sanitation during food processing significantly influences the quality of the food served and the incidence of food poisoning. Food handlers' attitudes also impact health risks; poor attitudes can compromise the hygiene of the food being served, whereas positive attitudes can prevent contamination and food poisoning (Yusminatati, 2020).

Individuals who come into direct contact with food and equipment—throughout the stages of preparation, cleaning, processing, transportation, and serving—are referred to as food handlers. The behavior of food handlers regarding food hygiene is a critical factor to consider. Personal cleanliness is a key element in ensuring safe and healthy food management. Essential practices for food handlers include proper handwashing, maintaining personal hygiene, and wearing appropriate work attire, such as full uniforms, aprons, and head coverings (Gerung & Wulandari, 2020). National monitoring data indicate that this risk is not merely theoretical. The Food and Drug Monitoring Agency (BPOM) recorded 219 suspected food poisoning outbreaks linked to the Nutritious School Meals (MBG) program throughout 2025, affecting 21,084 people across 140 regencies or cities in 31 provinces. These figures must be understood as suspected outbreaks associated with the program rather than cases entirely confirmed to share the same cause. Nevertheless, the widespread distribution of these incidents indicates that food safety is an aspect requiring systematic control during the implementation of the MBG program (BPOM, 2026).

The National Nutrition Agency also reported that food safety-related incidents peaked at 85 in October 2025, subsequently dropping to 40 in November and 12 in December 2025. In January 2026, 10 incidents were still recorded, despite the target of zero food safety incidents. Meanwhile, only 32% of SPPGs—approximately 6,150 units—were reported to have met the Hygiene and Sanitation Suitability Standards. These data do not necessarily imply that all SPPGs lacking certification are unsafe, as some may still be undergoing inspection or the application process. Nevertheless, the situation highlights a persistent gap between operational coverage and the verification of hygiene and sanitation compliance that needs to be addressed (Keputusan Kepala Badan Gizi Nasional Republik Indonesia, 2025).

The Nutrition Provision Service Unit (SPPG) occupies a central position in the Nutritious Meal (MBG) system, serving as the hub for receiving ingredients, storage, preparation, processing, cooking, portioning, packaging, and food delivery. According to the Technical Guidelines for MBG Governance for the 2026 Fiscal Year, a single SPPG generally serves up to 2,500 beneficiaries, a capacity that can be increased to 3,000 if the unit employs skilled, certified cooks. Beneficiary locations must fall within a maximum

radius of six kilometers or a distribution travel time of no more than 30 minutes from the SPPG. Furthermore, all meals must be prepared within the SPPG facility; purchasing ready-to-eat meals from third parties is prohibited (National Nutrition Agency, 2025).

The production process within the SPPG is carried out in stages aligned with the beneficiaries' meal times. Food processing may begin as early as 02:00, while cooking takes place in phases starting at 03:00, 05:00, and 07:00. These stages are followed by food testing, cooling, portioning, packaging, and delivery according to the recipient group's schedule. The technical guidelines also mandate that the portioning area remain clean and hygienic, serving containers be covered, distribution vehicles be kept clean, and the travel time to the destination not exceed 30 minutes. These regulations demonstrate that MBG food safety is ensured through a series of interconnected processes, rather than relying solely on raw material quality or post-production inspections (National Nutrition Agency, 2025). Ideal SPPG standards require that processing be carried out by food handlers equipped with proper hygiene gear and possessing adequate competence. The National Nutrition Agency (BGN) also mandates training prior to the SPPG becoming operational, particularly given that handlers must prepare meals in volumes reaching up to 3,000 portions. Furthermore, obtaining the Hygiene and Sanitation Suitability Certificate, conducting health checks, providing food safety training, using compliant water, ensuring equipment sanitation, controlling temperatures, and documenting processes are all integral parts of the food safety assurance system. Consequently, compliance by food handlers cannot be viewed merely as an ancillary measure but rather as a core element of SPP operations (National Nutrition Agency, 2025).

Field observations reveal that the SPPG context is unique due to mass production targeting up to 2,500–3,000 portions, early-morning work schedules, distribution to multiple schools, and a recipient base consisting primarily of children. A review of existing literature indicates a lack of published studies specifically analyzing the relationship between knowledge, attitudes, and the hygiene and sanitation practices of SPPG food handlers in Balikpapan City. Furthermore, there is a gap regarding measurement methods; some studies assess practices based on self-reported data, which risks overestimating actual performance. This study treats hygiene and sanitation practices as behaviors directly observed using a structured checklist, ensuring that practice scores reflect actual actions rather than merely the respondents' perceptions of their own behavior. Based on this background, the study is titled "The Relationship Between Food Handlers' Knowledge and Attitudes and Hygiene-Sanitation Practices at the South Balikpapan Sepingga 4 Nutrition Service Unit (SPPG)."

Method

This study employs an observational analytic design with quantitative data collection via a cross-sectional approach. The study population consists of 45 SPPG Sepingga 4 personnel involved in food processing, portioning, and meal-container washing. A total sampling technique was used; consequently, the final sample size comprises all 45 SPPG Sepingga 4 personnel.

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Research and Discussions

1. Result

Relationship between Food Handlers' Knowledge and Hygiene and Sanitation Practices

Table 1

Relationship between Food Handlers' Knowledge and Hygiene and Sanitation Practices

Variable	Hygiene Practices						Total		p value	Note
	Good		Fair		Poor		N	%		
	n	%	n	%	n	%				
Knowledge										
High	1	100	0	0	0	0	1	100	0.007	Signifikan
Moderate	41	93.2	3	6.8	0	0	44	100		
Low	0	0	0	0	0	0	0	0		
Total	42	93.3	3	6.7	0	0	45	100		

(Source: Primary data, 2026)

Based on Table 1, regarding respondents with a high level of knowledge, 1 respondent (100%) demonstrated good hygiene practices, while 0 respondents (0%) demonstrated fair hygiene practices, and 0 respondents (0%) demonstrated poor hygiene practices. Among respondents with a moderate level of knowledge, 41 (93.2%) demonstrated good hygiene practices, 3 (6.8%) demonstrated fair hygiene practices, and 0 (0%) demonstrated poor hygiene practices. Meanwhile, among respondents with a low level of knowledge, 0 (0%) demonstrated good hygiene practices, 0 (0%) demonstrated fair hygiene practices, and 0 (0%) demonstrated poor hygiene practices. Statistical test results showed a p-value of 0.007, indicating a relationship between food handlers' knowledge and hygiene-sanitation practices at the South Balikpapan Sepinggan 4 Nutritional Service Unit in Balikpapan City.

Relationship between Food Handlers' Knowledge and Hygiene and Sanitation Practices

Table 2

Relationship between Food Handlers' Attitudes and Food Hygiene and Sanitation Practices

Variable	Hygiene Practices						Total		p-value	Note
	Good		Fair		Poor		N	%		
	n	%	n	%	n	%				
Attitude										
Good	28	90.3	3	9.7	0	0	31	100	0.028	Signifikan
Moderate	14	100	0	0	0	0	14	100		
Poor	0	0	0	0	0	0	0	0		
Total	42	93.3	3	6.7	0	0	45	100		

(Source: Primary data, 2026)

Based on Table 2, regarding the respondent attitude variable, there were 28 respondents (90.3%) with a "good" attitude who demonstrated "good" hygiene practices, and 3 respondents (9.7%) with a "good" attitude who demonstrated "fair" hygiene practices; no respondents with a "good" attitude demonstrated "poor" hygiene practices. Regarding a "moderate" attitude, there were 14 respondents (100%) who demonstrated "good" hygiene practices, while no respondents with a "moderate" attitude demonstrated "fair" or "poor" hygiene practices. Meanwhile, there were no respondents with a "low" attitude.

attitude across any of the hygiene practice categories ("good," "fair," or "poor"). Statistical test results showed a p-value of 0.028, indicating a relationship between food handlers' attitudes and hygiene-sanitation practices at the South Balikpapan Sepinggan 4 Nutrition Service Unit in Balikpapan City.

2. Discussion

Knowledge

Based on the research regarding the respondents' knowledge variable, one respondent (2.2%) fell into the high knowledge category, while 44 respondents (97.8%) fell into the moderate knowledge category; meanwhile, zero respondents (0%) fell into the low knowledge category. Thus, the highest frequency distribution of respondents' knowledge was found in the moderate knowledge category (44 respondents, 97.8%). Statistical test results showed a p-value of 0.007, indicating a relationship between food handlers' knowledge and hygiene-sanitation practices at the nutritional service unit in Sepinggan 4, South Balikpapan, Balikpapan City. Research conducted by Mulat *et al.* (2024), reported that 65% of food handlers possessed good knowledge and 92.2% demonstrated a positive attitude, yet only 44% carried out good hygiene practices. In that study, the correlation between knowledge and practice was 0.232, while the correlation between attitude and practice was 0.282. The significant gap between the percentages for attitude and practice indicates that agreement with standards does not always translate into actual workplace actions. This study aligns with findings by Yusminatati (2020), which indicate that the level of food handlers' knowledge regarding hygiene and sanitation during food preparation significantly influences the quality of the food served and affects the incidence of food poisoning. Food handlers' attitudes can also impact health risks; a poor attitude negatively affects the hygiene of the food served, whereas a good attitude can prevent food contamination and poisoning.

Attitude

Based on the research results, 31 respondents (68.9%) fell into the "good" attitude category, while 14 respondents (31.1%) fell into the "moderate" attitude category. Meanwhile, the frequency for the "low" attitude category was 0 respondents (0%). Thus, the highest frequency distribution for respondent attitudes was in the "good" category (31 respondents; 68.9%). Statistical test results showed a p-value of 0.028, indicating a relationship between food handlers' attitudes and hygiene-sanitation practices at the South Balikpapan Sepinggan 4 Nutrition Service Unit in Balikpapan City. Research conducted by Sirichokchatchawana *et al.* (2021), involving 718 food handlers in Bangkok found that 85.38% of respondents had never attended food safety training. Work experience, education, and job satisfaction were predictors of knowledge, attitude, and practice, whereas specific training was a significant factor influencing practice.

According to Yahya *et al.* (2022), a positive attitude indicates that handlers view hygiene-sanitation procedures as important and worth implementing. Attitude can increase the willingness to comply with rules, even if the actions involved add steps to the workflow. Handlers who accept their responsibility for the health of beneficiaries are expected to exercise greater caution when handling food.

Other Factors Related to Hygiene and Sanitation Practices

1. **Education:** Education can influence the ability to comprehend written information, training content, and the scientific rationale behind procedures. However, formal education does not always directly improve practices, as food safety material may not be covered in general education curricula.
2. **Food Safety Training:** Training can enhance knowledge and skills, but its impact depends on content, methods, duration, opportunities for practice, evaluation, and post-training reinforcement. One-off, lecture-based training may improve knowledge scores without altering work habits. Studies have found that food handlers who have undergone training tend to demonstrate better attitudes (Putri & Susanna, 2021). Meanwhile, Siddiky *et al.* (2024) identified active engagement in training as a factor associated with better practices.
3. **Length of Service:** Length of service can increase experience but may also foster habits that are difficult to change. Handlers with long tenure may be more skilled but not necessarily more compliant if their established work habits do not align with standards.
4. **Work Section:** Preparation, processing, portioning, and packaging sections involve different types of exposure. Practices regarding tool usage, hand-washing frequency, and cross-contamination risks vary across sections. Work sections must be documented so that observational assessments do not overlook differences in opportunities to perform specific actions.
5. **Facilities:** Hand-washing facilities, running water, soap, PPE, separate utensils, covered waste bins, and adequate workspace serve as enabling factors. A lack of facilities can result in poor practices, even when knowledge and attitudes are positive.
6. **Supervision:** Supervision acts as a reinforcing factor. Consistent supervision can sustain compliance, whereas supervision occurring only prior to inspections may yield merely temporary compliance.
7. **Workload and Pressure:** Factors such as portion volume, time constraints, shift schedules, staffing levels, and fatigue can influence procedural execution. Even well-understood procedures may be bypassed when production targets are perceived as more urgent than procedural compliance.

Conclusion

The highest frequency of respondent knowledge fell into the "moderate" category (44 respondents; 97.8%). The highest frequency of respondent attitudes fell into the "good" category (31 respondents; 68.9%). Regarding hygiene practices, the highest frequency among food handler respondents fell into the "good" category (42 respondents; 93.3%). Knowledge and attitude have a significant relationship with hygiene-sanitation practices at the South Balikpapan Sepingga 4 Nutrition Service Unit in Balikpapan City.

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