



P3PM Poster Improves Knowledge and Attitudes Toward Personal Hygiene of Food Handlers at SPPG A

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Abstract

Effective educational interventions are necessary to ensure food safety in the Free Nutritional Meal Program (MBG) by promoting personal hygiene among food workers. The purpose of this research is to examine how nutrition fulfillment service unit (SPPG) A food handlers' knowledge and attitudes toward personal hygiene were affected by counseling that made use of the P3PM posters (Personal Hygiene, Use of PPE, and Handwashing Practices for Food Handlers). A pre-experimental design with a one-group pre-test-post-test layout was utilized in this investigation. Thirteen food handlers chosen at random using a complete sample method made up the study's subjects. Before and after the intervention, data was collected using a knowledge and attitude questionnaire. Installation of three A3-sized P3PM posters in the food processing area and 45 minutes of counseling comprised the intervention. The results demonstrated that food handlers' expertise increased following the intervention, as evidenced by a change from adequate to good. Counseling also led to an 8.9 point improvement in food workers' attitudes about personal cleanliness. The results of the statistical analysis demonstrated a notable change in both knowledge and attitudes from the pre- to post-intervention periods ($p < 0.005$). The results show that food handlers in SPPG A can benefit from counseling using P3PM posters in terms of both knowledge and attitude.

Introduction

Food safety remains one of the most critical public health concerns worldwide because unsafe food contributes significantly to morbidity, mortality, and economic losses across both developed and developing countries. The World Health Organization has consistently identified foodborne diseases as a major global health burden, affecting millions of individuals annually and placing considerable pressure on healthcare systems. Food contamination can occur at any stage of the food supply chain, from production and processing to distribution and consumption. Consequently, ensuring food safety requires the integration of effective hygiene and sanitation practices throughout food handling activities. Among the many determinants of food safety, the role of food handlers is particularly important because their behavior directly influences the quality and safety of food served to consumers (Sadomo & Siwiendrayanti, 2023). Inadequate personal hygiene practices among food handlers have been repeatedly identified as major contributors to biological, chemical, and physical contamination, ultimately increasing the risk of foodborne illness outbreaks (Nurhayati et al., 2020; Karima et al., 2021).

The relationship between food handlers and food safety is especially relevant in institutional food service settings where large quantities of food are prepared and distributed daily. In such environments, even minor deviations from established hygiene standards can have substantial consequences for many consumers. Personal hygiene practices, including proper handwashing, the use of personal protective equipment (PPE), maintenance of clean clothing, and adherence to sanitation procedures, constitute essential preventive measures against food contamination

(Kementerian Kesehatan Republik Indonesia, 2023; Fizulmi & Agustina, 2024; Tannor et al., 2022; Ada et al., 2025). Previous studies have demonstrated that inadequate compliance with these practices is associated with increased contamination risks and higher incidences of foodborne diseases (Nurhayati et al., 2020; Garmini et al., 2023). Therefore, strengthening food handlers' knowledge and attitudes regarding personal hygiene represents a fundamental strategy for improving food safety outcomes.

In Indonesia, food safety has become increasingly important following the implementation of the Makan Bergizi Gratis (MBG) program, a national initiative designed to improve nutritional status and support human resource development (Shiddiq & Effendi, 2025; Kurniawan et al., 2026). Managed by the National Nutrition Agency, the MBG program targets a wide range of beneficiaries, including preschool children, elementary and secondary school students, teachers, school staff, pregnant women, and toddlers (Mathebula et al., 2025; Kurt & Serdaroğlu, 2024; Diarsvitri & Utomo, 2022; Keane & Evans, 2022). Through the provision of nutritious meals on a large scale, the program seeks to address nutritional deficiencies while simultaneously promoting educational attainment and long-term public health improvements. Given its extensive coverage and ambitious objectives, the success of MBG depends not only on nutritional adequacy but also on the safety and quality of the food provided to beneficiaries.

Despite its potential benefits, the implementation of MBG has encountered several food safety challenges. Evidence suggests that compliance with food safety standards and quality assurance procedures remains inconsistent across different implementation sites (Rayhan & Zulham, 2025). Reports compiled from regulatory agencies and national media indicate that multiple food poisoning incidents associated with MBG occurred between January and May 2025, affecting more than 1,600 individuals across multiple provinces in Indonesia (Putra & Zaenal Z, 2025). Although these cases represent only a small proportion of total beneficiaries, they nevertheless raise important concerns regarding the effectiveness of food safety management within the program. Foodborne illnesses can lead to symptoms ranging from mild gastrointestinal discomfort to severe health complications, potentially undermining public trust in government nutrition initiatives and compromising the intended benefits of the program (Herniati & Idawati, 2025; Basu et al., 2025; Sawyer & Izah, 2024).

The occurrence of food poisoning incidents within large-scale feeding programs highlights the necessity of strengthening preventive measures at the operational level. Within the MBG framework, food preparation and distribution activities are conducted through Satuan Pelayanan Pemenuhan Gizi (SPPG), which serves as the primary technical implementation unit responsible for delivering meals to beneficiaries (Badan Gizi Nasional, 2025). As frontline actors in food production, food handlers employed in SPPG occupy a strategic position in safeguarding food quality and preventing contamination. Their daily responsibilities involve direct contact with food ingredients, processing equipment, preparation surfaces, and final food products. Consequently, unsafe practices such as improper handwashing, failure to use PPE, sneezing or coughing near food, touching contaminated surfaces, and inadequate personal cleanliness may significantly increase contamination risks (Nurhayati et al., 2020; Karima et al., 2021).

Research has shown that knowledge and attitudes are among the most influential determinants of hygiene behavior among food handlers (Imawati et al., 2022; Septiyani et al., 2021). Individuals who possess adequate knowledge regarding food safety principles are generally more capable of recognizing contamination hazards and implementing preventive actions. Likewise, positive attitudes toward hygiene practices encourage greater compliance with established food safety protocols. However, knowledge and attitudes do not develop automatically; they require continuous education, training, and reinforcement through effective

communication strategies (Dharmawati & Wirata, 2016; Rizani et al., 2018). Consequently, educational interventions have become an essential component of food safety promotion programs in various institutional settings.

Health education interventions can be delivered through a variety of communication media, each possessing distinct strengths and limitations. Among these, posters have emerged as one of the most practical and cost-effective educational tools due to their ability to present information in a visually attractive, concise, and easily understandable format (Chandio et al., 2016). Posters can be strategically displayed in workplaces, allowing repeated exposure to key messages and facilitating continuous reinforcement of desired behaviors (Iqbal & Winarsih, 2020). Unlike one-time verbal instructions, posters provide ongoing reminders that can influence both cognitive understanding and behavioral intentions over extended periods.

Empirical evidence supports the effectiveness of poster-based education in improving food safety outcomes. Eurilla et al. (2024) reported that personal hygiene posters significantly improved food handlers' knowledge and attitudes regarding hygiene practices. Similarly, Rahayu et al. (2022) found that poster interventions enhanced both knowledge and practical implementation of personal hygiene among catering food handlers. Additional studies have demonstrated positive effects of poster-based education on behavioral change, health awareness, and compliance with hygiene protocols across various populations (Hasanica et al., 2020; Dewi & Aina, 2024; Ilhami et al., 2025; Suarianti et al., 2025). These findings suggest that posters can function not merely as information delivery tools but also as behavioral reinforcement mechanisms that support sustained improvements in workplace hygiene practices.

Although previous studies have established the effectiveness of posters in promoting hygiene behavior, evidence regarding their application within the MBG operational environment remains limited. The unique characteristics of SPPG, including large-scale food production, diverse workforce backgrounds, and the critical importance of maintaining food safety for vulnerable beneficiary groups, create a context that warrants specific investigation. Preliminary observations at SPPG A indicated that although food handlers are actively involved in food preparation and distribution processes, the implementation of personal hygiene practices remains suboptimal. This condition highlights the need for targeted educational interventions capable of improving awareness and fostering positive attitudes toward food safety.

Given the strategic importance of food handlers in preventing food contamination and ensuring the success of the MBG program, evaluating effective educational approaches becomes increasingly relevant. Therefore, this study aims to examine the effect of counseling using P3PM (Personal Hygiene, Personal Protective Equipment, and Handwashing Practices for Food Handlers) posters on the knowledge and attitudes of food handlers at Satuan Pelayanan Pemenuhan Gizi (SPPG) A regarding personal hygiene practices.

Method

Research Design

This study employed a pre-experimental research design using a one-group pre-test–post-test approach to evaluate the effectiveness of personal hygiene education delivered through P3PM (Personal Hygiene, Personal Protective Equipment, and Handwashing Practices for Food Handlers) posters. The design was selected because it allows the measurement of changes in participants' knowledge and attitudes before and after exposure to the educational intervention. In this design, all participants were assessed at baseline through a pre-test, received the intervention, and subsequently completed a post-test using the same measurement instruments. The difference between pre-test and post-test scores was used to determine the effectiveness of

the intervention in improving food handlers' knowledge and attitudes regarding personal hygiene practices. The study was conducted at Satuan Pelayanan Pemenuhan Gizi (SPPG) A in January 2026.

Population and Sample

The target population consisted of all food handlers actively involved in food preparation and distribution activities at SPPG A. At the time of the study, the total population comprised 47 food handlers. Sample selection was conducted using simple random sampling to provide equal opportunities for all eligible food handlers to participate in the study. Based on the sampling procedure, 31 respondents were selected as study participants. Inclusion criteria included food handlers who were able to read and write, actively involved in food processing activities, and willing to participate voluntarily in the study. Individuals who were absent during the intervention period or did not complete either the pre-test or post-test questionnaire were excluded from the analysis.

Variables and Operational Definitions

The independent variable in this study was personal hygiene education delivered through P3PM posters. The educational intervention focused on three key aspects of food safety practices, namely personal hygiene, the proper use of personal protective equipment (PPE), and correct handwashing procedures among food handlers. The dependent variables were food handlers' knowledge and attitudes regarding personal hygiene. Knowledge referred to respondents' cognitive understanding of hygiene principles, PPE utilization, and handwashing practices required in safe food handling. Attitude referred to respondents' beliefs, perceptions, and predispositions toward implementing personal hygiene practices during food preparation and distribution activities.

Research Instruments

Data were collected using a structured questionnaire designed to assess respondents' knowledge and attitudes regarding personal hygiene practices. The knowledge section consisted of questions related to food contamination prevention, personal cleanliness, appropriate use of PPE, and handwashing procedures. Correct responses were assigned a score of one, while incorrect responses received a score of zero. The total score was then converted into a percentage scale. The attitude section consisted of statements measuring respondents' perceptions and acceptance of personal hygiene practices. Responses were measured using a Likert scale ranging from strongly disagree to strongly agree. Higher scores indicated more positive attitudes toward personal hygiene implementation. In addition to the questionnaire, three P3PM educational posters measuring A3 size (29.7 cm × 42 cm) were developed based on the provisions outlined in the Indonesian Ministry of Health Regulation Number 2 of 2023 concerning environmental health and food sanitation standards.

Intervention Procedure

The intervention was implemented through a structured educational session designed to improve food handlers' awareness and understanding of personal hygiene practices. Prior to the intervention, all respondents completed a pre-test questionnaire to assess baseline knowledge and attitudes. Following the pre-test, participants attended a 45-minute educational session consisting of lectures, group discussions, and question-and-answer activities. The educational content covered the importance of personal hygiene in food safety, the correct use of personal protective equipment, and proper handwashing techniques. During the session, P3PM posters were used as visual learning aids to reinforce key messages and facilitate comprehension. After the educational session, the posters were installed in strategic locations

within the food processing area to provide continuous visual reminders and reinforce the educational messages delivered during counseling. Following completion of the intervention period, respondents completed a post-test questionnaire using the same instrument administered during the pre-test.

Data Collection Procedure

Data collection was conducted in two stages. The first stage involved collecting baseline data through the administration of pre-test questionnaires prior to the educational intervention. The second stage involved administering post-test questionnaires after participants had received the educational intervention and been exposed to the P3PM posters. Primary data consisted of respondents' knowledge and attitude scores obtained from the questionnaires. Secondary data included information regarding food processing activities, organizational structure, and operational characteristics of SPPG A. All questionnaires were completed directly by respondents under the supervision of the research team to ensure completeness and accuracy of responses.

Data Analysis

Data processing was performed systematically through several stages, including data editing, coding, scoring, entry, cleaning, and tabulation. Descriptive statistical analysis was conducted to summarize respondent characteristics and describe the distribution of knowledge and attitude scores before and after the intervention. Frequencies, percentages, means, medians, standard deviations, and minimum–maximum values were calculated as appropriate. Inferential statistical analysis was performed to determine whether significant differences existed between pre-test and post-test scores. Because the data did not meet the assumption of normal distribution, the Wilcoxon Signed-Rank Test was used to compare paired observations before and after the intervention. Statistical significance was established at a p-value of less than 0.05. All findings were presented in the form of tables and narrative explanations to facilitate interpretation.

Ethical Considerations

This study was conducted in accordance with established ethical principles for research involving human participants. Ethical approval was obtained from the relevant Research Ethics Committee under approval number 0925-03.021/DPKE-KEP/FINAL-EA/UEU/III/2026. Prior to participation, all respondents received an explanation regarding the objectives, procedures, benefits, and potential risks of the study and provided informed consent voluntarily. Participation was entirely voluntary, and respondents were free to withdraw from the study at any stage without consequence. To protect participant confidentiality, all collected data were anonymized and used solely for research purposes. The principles of privacy, anonymity, confidentiality, and data security were maintained throughout the research process.

Result and Discussion

This section presents the findings of the study regarding the effect of personal hygiene counseling using P3PM posters on the knowledge and attitudes of food handlers at Satuan Pelayanan Pemenuhan Gizi (SPPG) A. The results are organized into three main parts. First, the demographic characteristics of food handlers are described to provide an overview of respondent profiles. Second, changes in respondents' knowledge and attitudes toward personal hygiene before and after the intervention are presented. Third, statistical comparisons between pre-test and post-test scores are analyzed to determine the effectiveness of the P3PM poster intervention. All findings are presented systematically based on the primary data collected from questionnaires administered to 31 food handlers at SPPG A.

Table 1. Distribution of Food Handler Characteristics at SPPG A (n = 31)

Characteristics	n	%
Gender		
Male	26	83.9
Female	5	16.1
Age (years)		
20–30	7	22.6
30–40	7	22.6
>40	17	54.8
Educational Background		
Elementary School/Equivalent	1	3.2
Junior High School/Equivalent	8	25.8
Senior High School/Equivalent	22	70.9
Work Experience		
<5 Years	18	58.1
≥5 Years	13	41.9

Source: Primary Data, 2026.

Table 1 shows that the majority of food handlers were male, accounting for 83.9% of all respondents, while female food handlers represented only 16.1%. This finding indicates that food processing activities at SPPG A were predominantly performed by male workers. In terms of age distribution, more than half of respondents (54.8%) were above 40 years old, while respondents aged 20–30 years and 30–40 years each represented 22.6% of the sample. This suggests that most food handlers had reached mature adulthood, which may influence work experience and understanding of food safety practices. Regarding educational background, most respondents had completed senior high school or equivalent education (70.9%), followed by junior high school graduates (25.8%). Only one respondent had elementary school education. These findings indicate that the majority of food handlers possessed a moderate educational background that may support the comprehension of educational materials delivered during the intervention. Based on work experience, 58.1% of respondents had worked for less than five years, whereas 41.9% had work experience of five years or more. The relatively large proportion of respondents with shorter work experience suggests that some food handlers may still require continuous training and supervision related to food hygiene and sanitation practices.

Table 2. Descriptive Statistics of Food Handlers' Knowledge Scores Before and After the Intervention

Variable	Pre-Test	Post-Test
Mean	61.29	83.22
Median	70	90
Standard Error	2.61	1.42
Standard Deviation	14.54	7.91
Minimum	20	70
Maximum	80	90

Source: Primary Data, 2026.

As shown in Table 2, respondents' knowledge scores improved substantially after the intervention. Before counseling using P3PM posters, the mean knowledge score was 61.29, with a median value of 70. The minimum score recorded during the pre-test was 20, while the maximum score was 80, indicating considerable variation in respondents' understanding of personal hygiene practices before the intervention. Following the intervention, the mean knowledge score increased to 83.22, while the median score rose to 90. In addition, the minimum score increased from 20 to 70, indicating that respondents with initially low knowledge experienced substantial improvement after receiving counseling and exposure to educational posters. The decrease in standard deviation from 14.54 to 7.91 also suggests that respondents' knowledge became more homogeneous after the intervention. The findings demonstrate that counseling supported by visual educational media in the form of P3PM posters effectively improved respondents' understanding of personal hygiene, use of PPE, and handwashing procedures in food processing activities.

Table 3. Distribution of Food Handlers' Knowledge Categories Before and After the Intervention

Knowledge Category	Pre-Test n (%)	Post-Test n (%)
Poor	13 (41.9)	1 (3.2)
Moderate	3 (9.7)	1 (3.2)
Good	15 (48.4)	29 (93.5)

Source: Primary Data, 2026.

Table 3 indicates a considerable shift in respondents' knowledge categories after the intervention. Prior to counseling, nearly half of respondents (41.9%) were categorized as having poor knowledge, while only 48.4% were classified in the good knowledge category. After the intervention, the proportion of respondents with good knowledge increased substantially to 93.5%, while the percentage of respondents with poor knowledge decreased sharply to 3.2%. These findings suggest that the P3PM poster intervention successfully improved respondents' comprehension of food hygiene principles and encouraged greater awareness regarding safe food handling practices.

Table 4. Descriptive Statistics of Food Handlers' Attitude Scores Before and After the Intervention

Variable	Pre-Test	Post-Test
Mean	80.96	90.24
Median	80	95
Standard Error	2.26	1.77
Standard Deviation	12.62	9.90
Minimum	60	75
Maximum	100	100

Source: Primary Data, 2026.

Based on Table 4, respondents demonstrated improved attitudes toward personal hygiene after the intervention. Before counseling, the mean attitude score was 80.96 with a median value of 80. The minimum score during the pre-test was 60, while the maximum score reached 100. After the intervention, the mean attitude score increased to 90.24, while the median value rose to 95. Furthermore, the minimum score increased from 60 to 75, indicating improvement among respondents with initially less favorable attitudes. The reduction in standard deviation from 12.62 to 9.90 also indicates that respondents' attitudes became more consistent after the educational intervention. These findings indicate that counseling using P3PM posters not only improved cognitive understanding but also positively influenced respondents' attitudes toward the implementation of personal hygiene practices in food handling activities.

Table 5. Distribution of Food Handlers' Attitude Categories Before and After the Intervention

Attitude Category	Pre-Test n (%)	Post-Test n (%)
Negative	18 (58.1)	0 (0.0)
Positive	13 (41.9)	31 (100.0)

Source: Primary Data, 2026.

Table 5 demonstrates that respondents' attitudes improved substantially following the intervention. Before counseling, more than half of respondents (58.1%) exhibited negative attitudes toward personal hygiene practices, while only 41.9% showed positive attitudes. However, after the intervention, all respondents (100%) demonstrated positive attitudes regarding personal hygiene, use of PPE, and proper handwashing practices. These findings suggest that the educational intervention effectively encouraged positive behavioral tendencies among food handlers and increased awareness regarding the importance of hygiene in food processing activities.

Table 6. Comparison of Knowledge and Attitude Scores Before and After the Intervention

Variable	Median $\pm$ SE	Mean $\pm$ SD	p-value
Knowledge			
Pre-test	70 $\pm$ 2.61	61.29 $\pm$ 14.54	0.000
Post-test	90 $\pm$ 1.42	83.22 $\pm$ 7.91	
Attitude			
Pre-test	80 $\pm$ 2.26	80.96 $\pm$ 12.62	0.000
Post-test	95 $\pm$ 1.77	90.24 $\pm$ 9.90	

Source: Primary Data, 2026.

Table 6 shows that both knowledge and attitude scores increased significantly after the intervention. For the knowledge variable, the median score increased from 70 during the pre-test to 90 during the post-test. Statistical analysis using the Wilcoxon signed-rank test produced a p-value of 0.000 ($p < 0.05$), indicating a statistically significant difference between knowledge scores before and after counseling using P3PM posters. Similarly, respondents' attitudes also improved significantly after the intervention. The median attitude score increased from 80 during the pre-test to 95 during the post-test. The Wilcoxon test also produced a p-value of 0.000 ($p < 0.05$), demonstrating a statistically significant difference in respondents' attitudes before and after the intervention. The findings indicate that counseling using P3PM posters was effective in improving both knowledge and attitudes of food handlers regarding personal hygiene practices at SPPG A. The intervention successfully increased respondents'

understanding of food safety principles and promoted more positive attitudes toward the implementation of hygiene standards in food processing activities.

Effectiveness of Poster-Based Personal Hygiene Education in Improving Food Handlers' Knowledge and Attitudes

The findings of this study have important implications for the development of food safety management systems within Indonesia's Free Nutritious Meal Program (MBG). Rather than merely demonstrating that educational posters can improve food handlers' knowledge and attitudes, the results indicate that visual-based educational interventions can function as an organizational mechanism for strengthening food safety culture in large-scale food service operations. In institutional feeding environments such as SPPG, where food is prepared and distributed to vulnerable populations on a daily basis, food safety depends not only on technical regulations but also on the extent to which food handlers internalize hygiene principles as part of their routine work behavior. Consequently, educational interventions should be viewed as strategic investments in preventive food safety management rather than supplementary communication activities.

The demographic profile of the food handlers provides an important context for interpreting the effectiveness of the intervention. The predominance of male workers reflects workforce characteristics commonly observed in institutional food production settings. Previous evidence suggests that hygiene compliance may differ according to gender, although such differences are largely shaped by organizational support systems rather than biological characteristics alone (Garmini et al., 2023; Nițescu et al., 2025). This observation reinforces the argument that food safety outcomes are determined less by individual demographic characteristics and more by the existence of structured training programs, supervision mechanisms, and clear operational standards. Similarly, the relatively mature age profile of participants may have facilitated the acceptance of educational messages because accumulated work and life experiences often contribute to broader cognitive perspectives and greater appreciation of workplace responsibilities (Septiyani et al., 2021).

The educational background of food handlers further highlights the importance of selecting appropriate communication strategies. Although most participants possessed only secondary-level education, the intervention remained effective, suggesting that poster-based education successfully translated technical food safety concepts into accessible and actionable messages. This finding supports the proposition that effective health communication is not dependent on educational attainment alone but on the ability of educational media to reduce cognitive barriers and enhance message clarity. Earlier studies have similarly demonstrated that educational attainment influences the ability to process hygiene-related information (Imawati et al., 2022; Dharmawati & Wirata, 2016). Therefore, educational materials intended for food handlers should prioritize simplicity, visual appeal, and practical relevance rather than relying on highly technical content.

More broadly, the findings contribute to the growing literature on behavioral approaches to food safety management. Traditional food safety systems often emphasize infrastructure, sanitation facilities, and regulatory compliance. However, food contamination frequently originates from human behavior during food preparation and handling. This study reinforces the argument that behavioral determinants remain a critical yet frequently underestimated component of food safety governance. By providing continuous visual cues within the work environment, posters serve not only as educational tools but also as behavioral reinforcement mechanisms that encourage workers to translate knowledge into everyday practice. This

perspective is consistent with evidence demonstrating that repeated exposure to visual messages strengthens learning retention and promotes adherence to hygiene protocols (Anugrah et al., 2025; Hasanica et al., 2020; Ramaningrum et al., 2025).

The effectiveness of the P3PM posters also underscores the value of environmental communication strategies in institutional settings. Unlike one-time training sessions that rely on participants' memory, workplace posters continuously expose workers to essential hygiene messages during operational activities. Such repeated exposure may create a form of environmental prompting that helps sustain awareness even after formal education has ended. This mechanism is particularly relevant within SPPG operations, where food handlers routinely work under time pressure and high production demands. Under such conditions, visual reminders may be more effective in influencing behavior than periodic classroom-based instruction alone. The findings therefore support previous studies that identified posters as practical and cost-effective tools for improving food safety awareness among food handlers (Dewi & Aina, 2024; Eurilla et al., 2024; Ilhami et al., 2025).

Another important implication concerns the relationship between knowledge and attitudes. Behavioral theories frequently propose that knowledge constitutes a necessary foundation for attitude formation and subsequent behavioral change. The present findings provide further support for this proposition by demonstrating that educational interventions can simultaneously strengthen cognitive understanding and foster more favorable perceptions of hygiene practices. Nevertheless, the literature also recognizes that attitudes are influenced by multiple social and cultural determinants beyond knowledge alone (Suarianti et al., 2025; Waliulu et al., 2024). Consequently, sustainable improvements in food safety behavior require organizational environments that reinforce hygiene norms through supervision, leadership commitment, peer influence, and institutional accountability. Education should therefore be regarded as the starting point of behavioral transformation rather than its final objective.

From a policy perspective, these findings are particularly relevant given the increasing public scrutiny of food safety within the MBG program following reports of foodborne illness incidents in several regions of Indonesia. Preventing food contamination is essential not only for protecting public health but also for maintaining public confidence in national nutrition programs. The results suggest that integrating standardized visual educational materials such as P3PM posters into all SPPG facilities may represent a scalable and economically feasible strategy for strengthening food safety practices nationwide. Because posters require relatively low financial investment while offering continuous educational exposure, their implementation could complement existing food safety regulations and workforce training initiatives.

The study highlights the need to conceptualize food safety as a behavioral and organizational challenge rather than solely a technical one. Sustainable improvements in food safety performance require interventions that shape workplace culture, reinforce hygiene norms, and support continuous learning among food handlers. Future research should therefore move beyond short-term evaluations of knowledge and attitudes and examine whether educational interventions produce sustained improvements in hygiene compliance, food handling behavior, and contamination outcomes over longer periods. Such evidence would provide a stronger foundation for designing comprehensive food safety promotion strategies capable of supporting the long-term success of Indonesia's MBG program.

Conclusion

This study demonstrates that P3PM (Personal Hygiene, Personal Protective Equipment, and Handwashing Practices for Food Handlers) poster-based counseling is an effective educational strategy for improving food handlers' knowledge and attitudes toward personal hygiene at

SPPG A. The findings indicate that visually supported educational interventions can strengthen awareness of food safety principles and foster more positive attitudes toward hygiene compliance among food handlers. These results highlight the importance of integrating continuous health education into institutional food service operations, particularly within the implementation of the Free Nutritious Meal Program (MBG), where food safety is essential for protecting beneficiaries and maintaining public trust. Therefore, the routine use of educational posters, supported by regular supervision and reinforcement of hygiene standards, should be considered an integral component of food safety management in SPPG facilities. Future studies are recommended to employ more rigorous research designs and assess behavioral compliance and food safety outcomes to better understand the long-term effectiveness of educational interventions in institutional feeding settings.

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