



Effect of poster-based educational intervention on food hygiene and sanitation knowledge, attitudes and practice among food handlers at RSUD Dr. Loekmono Hadi Kudus

Pengaruh edukasi berbasis poster tentang higiene dan sanitasi makanan terhadap pengetahuan dan sikap penjamah makanan di instalasi gizi RSUD Dr. Loekmono Hadi Kudus

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Abstract

Food hygiene and sanitation are essential for ensuring food safety in hospitals, where improper food handling may increase the risk of cross-contamination and foodborne illnesses among vulnerable patients. Visual education, including posters, may improve food handlers' knowledge, attitudes and practices. This quasi-experimental study employed a one-group pretest-posttest design and was conducted at the Nutrition Unit of Dr. Loekmono Hadi Kudus Regional General Hospital in July 2025. A total sampling technique was used, involving 51 food handlers. Data on knowledge, attitudes, and practices related to food hygiene and sanitation were collected using structured questionnaires, both before and after the intervention. The intervention consisted of direct counseling supported by the distribution of digital posters. Data were analyzed using the paired sample t-test for knowledge and Wilcoxon signed-rank test for attitudes and practices. The mean knowledge, attitude, and practice scores increased from 69.18 to 82.43, 65.16 to 81.37, and 56.25 to 76.40, respectively. All improvements were statistically significant ($p < 0.05$). In conclusion, poster-assisted education significantly improved food handlers' knowledge, attitudes and practices regarding food hygiene and sanitation. This strategy may serve as an effective, low-cost intervention for strengthening food safety in hospital nutrition services.

Keywords: Food hygiene, sanitation, food handlers, poster education, hospital nutrition services

Abstrak

Higiene dan sanitasi pangan merupakan aspek penting dalam menjamin keamanan makanan di rumah sakit. Pengelolaan makanan yang tidak tepat dapat meningkatkan risiko kontaminasi silang dan penyakit bawaan makanan, terutama pada pasien yang rentan. Edukasi visual, seperti poster, berpotensi meningkatkan pengetahuan, sikap, dan praktik penjamah makanan. Penelitian kuasi-eksperimental ini menggunakan desain *one-group pretest-posttest* dan dilaksanakan di Unit Gizi RSUD Dr. Loekmono Hadi Kudus pada Juli 2025. Sampel penelitian diambil dengan teknik total sampling, melibatkan 51 penjamah makanan. Data mengenai pengetahuan, sikap, dan praktik higiene serta sanitasi pangan dikumpulkan menggunakan kuesioner terstruktur sebelum dan sesudah intervensi. Intervensi dilakukan melalui penyuluhan langsung yang diperkuat dengan distribusi poster digital. Analisis data menggunakan *paired sample t-test* untuk variabel pengetahuan dan uji *Wilcoxon signed-rank* untuk variabel sikap dan praktik. Hasil, rata-rata skor pengetahuan meningkat dari 69,18 menjadi 82,43, skor sikap meningkat dari 65,16 menjadi 81,37, dan skor praktik meningkat dari 56,25 menjadi 76,40.

Seluruh peningkatan tersebut bermakna secara statistik ($p < 0,05$). Kesimpulan, edukasi berbasis poster terbukti efektif meningkatkan pengetahuan, sikap, dan praktik penjamah makanan terkait higiene dan sanitasi pangan. Strategi ini dapat menjadi intervensi sederhana, murah, dan aplikatif untuk memperkuat penerapan keamanan pangan pada layanan gizi rumah sakit.

Kata Kunci: Higiene pangan, sanitasi, penjamah makanan, edukasi poster, layanan gizi rumah sakit

Introduction

The WHO reports that foodborne diseases can cause 600 million cases of poisoning and 420.000 deaths annually worldwide. Foodborne diseases are illnesses caused by contaminated food, and contamination can occur at any stage of production, from the receipt of ingredients to distribution of the final product. Hospitals function as providers of health services, including patient treatment and recovery. In addition to medical treatment, hospitals are responsible for providing ready-to-eat meals, as stipulated in Minister of Health Regulation No. 7 of 2019 concerning Hospital Environmental Health. Nutritional services in hospitals are an important factor in supporting the acceleration of patient recovery in the shortest possible time because meeting nutritional needs shortens the length of stay. However, in practice, food management often does not meet health standards, which risks prolonging hospitalization and causing cross-infection or foodborne diseases (Young et al., 2019).

Food services in hospitals involve a series of stages, from food procurement and storage to food preparation and serving. At each stage, the application of hygiene and sanitation principles is crucial to keeping food safe from contamination and ensuring food safety. Contaminated food can cause health problems, such as foodborne diseases (Pebrianti, 2023). Therefore, food safety must be optimally maintained to prevent biological, chemical, physical, and other foreign object risks that can harm consumers (Yulianti et al., 2022).

Food service activities in hospitals must pay attention to and control food safety risk factors to meet quality standards based on Minister of Health Regulation No. 7 of 2019. Risk factors that need to be controlled include food processing areas, cooking equipment, food quality, food transportation, food presentation, food hygiene and sanitation supervision, and

food handling. Based on the Decree of the Minister of Health of the Republic of Indonesia Number 1204/MENKES/SK/X/2004 concerning Hospital Environmental Health Requirements, hygiene is a health measure that involves maintaining and protecting individual cleanliness, for example, washing hands, washing cooking equipment, and using complete personal protective equipment. Food sanitation is an effort to prevent the growth of pathogenic microorganisms in food, equipment, and food processing buildings (Yulianti et al., 2022). In practice, the application of hygiene and sanitation covers food handlers, the processing environment, and equipment used. Improperly managed food can cause illness, allergic reactions, or poisoning due to contamination by microbes, chemicals, or other biological elements (Achnia & Pratiwi, 2023). Patients, as the primary consumers of food in hospitals, are a vulnerable group, making food safety a priority for healthcare facilities. Therefore, food handlers must understand and apply hygiene principles to every food processing activity.

Health education is a key strategy for promoting clean and healthy living behaviors (PHBS). Education is not merely a transfer of information; rather, it aims to foster awareness among individuals and groups to consciously and sustainably change their behaviors (Rosyidah et al., 2021). Food handlers who receive education tend to have better knowledge of and compliance with hygiene and sanitation standards. Previous meta-analytic studies have indicated that educational interventions or food safety training are effective in improving food handlers' knowledge, but their effectiveness in improving behavior has not yet been proven (Young et al., 2019). The educational methods commonly used in food safety training remain conventional and do not utilize interactive media. Posters are a type of visual interactive medium that can be used in health education.

Several studies have shown that education through visual media, such as posters, is effective in improving food handler behavior. Ahfis's research (Ahfis, 2022) shows that most food handlers at the Nutrition Unit of Dr. M. Ashari Regional General Hospital still have low levels of knowledge (33.3%), attitude (46.7%), and implementation of sanitation and hygiene (43.3%). In contrast, Putri et al. (2024) noted a significant increase in knowledge and attitude from 65.9% to 85.54% after education using posters. Another study also showed a change in the attitudes of food handlers after visual education at M. Th. Djaman Sanggau Regional General Hospital (Inge et al., 2024). Meanwhile, the demographic characteristics of food handlers, such as education level, type of work, and work experience in the food service industry, are significantly related to knowledge, attitudes, and practices regarding food safety (Kulpiisova et al., 2025).

Although hygiene and sanitation education for food handlers has been widely implemented in various healthcare facilities, research specifically evaluating the effectiveness of such educational programs in the nutrition units of regional hospitals remains limited. Results from a preliminary study at the Nutrition Unit of Dr. Loekmono Hadi General Hospital in Kudus indicate that 21 food handlers frequently fail to use personal protective equipment (PPE) properly, such as gloves and masks, during food preparation and distribution. This is attributed to the low compliance among food handlers, particularly regarding hygiene and sanitation practices. This situation highlights the gap between the food safety standards that should be implemented and the practices observed on the ground.

Although training programs are in place, compliance gaps persist among hospital food handlers, with limited evaluations of poster-based approaches in this setting. Therefore, this study aimed to address this gap by assessing the effectiveness of poster-based education at Dr. Loekmono Hadi General Hospital in Kudus. This study is expected to provide contextual and hospital-specific scientific evidence that has not been previously investigated.

Given this background, this study aimed to examine the effect of education via posters on improving the knowledge and attitudes of food handlers at the Nutrition Unit of Dr. Loekmono

Hadi General Hospital in Kudus. This study is important for ensuring the quality and safety of food consumed by patients and for raising food handlers' awareness of the importance of hygiene and sanitation practices that meet established standards.

Methods

This study employed a quasi-experimental design using a one-group pretest-posttest design to examine changes in knowledge, attitudes, and behavior following the provision of education to a single group. This study was conducted at the Nutrition Unit of Dr. Loekmono Hadi General Hospital in Kudus in July 2025. The population in this study consisted of all food handlers at the Nutrition Unit of Dr. Loekmono Hadi Kudus Regional General Hospital, totaling 51 individuals. The inclusion criteria for this study were food handlers who had been working for at least two years and were present during the educational session.

The subjects were selected using total sampling, with a sample size of 51 people comprising a preparation group (5 people), servers (33 people), and a kitchen staff (13 people). Strict health protocols were enforced during data collection, which involved interviews conducted by trained enumerators with a nutrition background. Before the educational session, food handlers were given a questionnaire in the form of a pre-test, followed by a presentation on hygiene and sanitation. A post-test was administered seven days after the education session.

Data were collected through interviews using a questionnaire based on previous research by Brutu (2021). The questionnaire was validated and reliability was tested beforehand. The questionnaire used was A questionnaire on knowledge and attitudes regarding food hygiene and sanitation was administered before and after the educational intervention through posters. In addition to direct education, posters were sent via WhatsApp to each respondent as reinforcement material that could be accessed independently.

The knowledge variable covered aspects of hygiene, sanitation, and food contamination. The attitude variable covered aspects of personal hygiene, equipment and ingredient hygiene, and

facility hygiene. The attitude questionnaire uses a Likert scale. Scores were calculated by multiplying each response category by the corresponding point value. The rating scores were divided into two types: positive and negative questions. The categorization of knowledge, attitude, and behavior variables falls into the “good” category if the score is >75 and into the “poor” category if ≤ 75 of the total score (Brutu, 2021).

The questionnaire used underwent validity and reliability testing. The validity test yielded a table r-value of 0.456, indicating that the questionnaire was valid. The reliability of the questionnaire was confirmed by a Cronbach's alpha value of 0.924, indicating that it was reliable.

This study conducted normality tests on the knowledge ($p > 0.05$), attitude, and behavior data ($p < 0.05$). The results indicated that the knowledge data were normally distributed, whereas the attitude and behavior data were not. Since the knowledge data were parametric, they were analyzed using the Paired Sample T-Test; since the attitude and behavior data were non-parametric, they were analyzed using the Wilcoxon Signed-Rank Test at a 95% significance level. This study was approved by the Health Research Ethics Committee of the Dr. Loekmono Hadi Kudus Regional General Hospital (RSUD) (letter number 53/KEPK/RSLH/VI/2025).

Result and Discussion

Educational media are widely recognized as an effective approach to improving compliance with food hygiene and sanitation standards, particularly among food handlers in institutional settings. As part of the intervention, educational materials were developed and delivered in the form of posters. Figure 1 shows the poster used in this study, which contained key messages related to food hygiene and sanitation, including personal hygiene, proper handwashing techniques, safe food handling practices, sanitation principles, and the use of personal protective equipment (PPE). The poster was designed using simple language and visual illustrations to enhance comprehension and facilitate behavior change among food handlers.



Figure 1. Poster media

This study involved 51 food handlers working at the Nutrition Installation of Dr. Loekmono Hadi Regional General Hospital, Kudus. Respondent characteristics included age, sex, educational level, and length of employment (Table 1).

The majority of respondents were female (86.3%), while males accounted for 13.7%. Based on age classification, most respondents were in early adulthood (20–40 years), comprising 64.7%, whereas 35.3% were in middle adulthood (41–60 years). Regarding educational background, nearly all respondents had completed senior high school education (96.1%), with only a small proportion having primary school education (2.0%) or a bachelor's degree (2.0%). Age and work experience can influence a person's knowledge and attitude toward food safety practices (Lee et al., 2017). In general, the higher a person's level of formal education, the easier it is for them to understand and accept the information given to them. This is because formal education helps improve an

individual's cognitive abilities in understanding new concepts, including food safety concepts taught in nutrition education. However, education is not the only determinant of behavior, as work experience and individual motivation also play important roles in the application of knowledge (Lee et al., 2017).

In terms of work experience, more than half of the respondents (66.7%) had been employed for five years or longer, while 33.3% had worked for less than five years. These characteristics indicate that most food handlers were experienced workers with a relatively homogeneous educational background.

Table 1. Characteristics of respondents

Characteristic	n	%
Age		
Early Adulthood	33	64.7
Middle Adulthood	18	35.3
Sex		
Male	7	13.7
Female	44	86.3
Length of Employment		
< 5 years	17	33.3
≥ 5 years	34	66.7
Educational Level		
Primary School	1	2
Junior High School	0	0
Senior High School	49	96.1
Bachelor's Degree	1	2

The distribution of respondents' knowledge, attitudes, and hygiene and sanitation practices was assessed before and after the poster-based educational intervention. The results of the distribution analysis are presented in Table 2.

Table 2. Distribution of respondents' knowledge, attitudes, and hygiene sanitation practices before and after educational intervention

Variables by Measurement Time and Category	n	%
Knowledge		
Before	Poor 32	62.75
	Good 19	37.25
After	Poor 12	23.53
	Good 39	76.47
Attitude		
Before	Poor 38	74.51
	Good 13	25.49
After	Poor 13	25.49
	Good 38	74.51
Hygiene and Sanitation Practice		
Before	Poor 11	21.57
	Good 9	17.65
After	Poor 2	3.92
	Good 18	35.29

As shown in Table 2, prior to the educational intervention, most respondents exhibited poor knowledge (62.75%), poor attitudes (74.51%), and poor practice (21.57%), with only a small proportion demonstrating good hygiene and sanitation practices. After the intervention, the proportion of respondents with good knowledge, attitudes, and practice increased to 76.47 %, 74.51%, and 35.29 %, respectively, accompanied by a marked improvement in hygiene-sanitation practices and a substantial reduction in the poor category across all variables, indicating the effectiveness of poster-based education in improving food handlers' knowledge, attitudes, and practices related to food hygiene and sanitation.

Table 3. Comparison of knowledge, attitude, and practice scores before and after education

Variables	Measurement Time	Mean ± SD	Min-Max	Mean Difference	p-value
Knowledge	Before education	69.18 ± 17.37	40-100	13.25	<0.001
	After education	82.43 ± 10.65	60-100		
Attitude	Before education	65.16 ± 12.08	59-91	16.21	<0.001
	After education	81.37 ± 7.60	67-96		
Practice	Before education	56.25 ± 4.38	53-68	20.15	<0.001
	After education	76.40 ± 4.96	63-84		

In addition, the average knowledge and attitude scores of the respondents before and after receiving education through poster media were analyzed. The results of this study

demonstrated a significant effect of poster-based education on the knowledge and attitudes of food handlers. The mean knowledge score increased from 69.18 ± 17.37 to 82.43 ± 10.65,

and the mean attitude score increased from 65.16 ± 12.08 to 81.37 ± 7.60 . The mean practice score increased from 56.25 ± 4.38 to 76.40 ± 4.96 after the intervention. The Paired Sample T-Test and Wilcoxon tests yielded a significance value of $p < 0.001$ for both variables, indicating that the educational intervention effectively enhanced understanding and encouraged positive attitude change among food handlers.

The increase in knowledge scores can be attributed to the effectiveness of the educational media. An intervention combining direct communication with visual media in the form of posters was successful. Posters distributed digitally via WhatsApp enabled respondents to independently review and process the material, reinforcing knowledge retention. This strategy effectively raised awareness of the importance of applying proper hygiene and sanitation principles in daily work activities. These results align with the findings, who reported that nutrition education using visual media significantly improved knowledge (Nurjanah et al., 2023).

The improvement in food handlers' attitudes also reflects the success of the intervention. This change is consistent with the principle that behavioral change is often preceded by improvements in knowledge and attitudes. Informative posters can stimulate curiosity and encourage respondents to engage more deeply with health messages (Susianto et al., 2020). This increase in attitude is also supported by Azzahro & Kurniasari (2024), who found that visual educational media improved students' attitudes toward hygiene and sanitation.

The research results also indicated a significant improvement in food hygiene and sanitation practices before and after the educational intervention. This intervention encouraged behavioral changes among food handlers, particularly regarding the habit of washing hands before and after handling food, using complete personal protective equipment, and better maintenance of workplace cleanliness. A similar educational model was implemented by Iqbal and Winarsih (2020), who showed that the use of posters can encourage hygiene practices among food handlers. The effectiveness increases when posters are combined with direct education. A previous meta-analysis stated that education and training on food safety are effective in improving the

knowledge, attitudes, and behaviors of food handlers (Young et al., 2019).

An increase in the participants' knowledge was observed in several key areas, such as the proper and complete use of personal protective equipment, including masks, aprons, and gloves. The participants also became more aware of the risks associated with talking or chatting while handling food during the training. Additionally, there was an increase in knowledge regarding personal hygiene, such as washing hands before and after handling food, after using the restroom, and keeping the nails short and clean. This aligns with the observed improvements in the participants' hygiene and sanitation behaviors following the educational intervention, specifically the use of complete personal protective equipment, more frequent handwashing before and after work, and better-maintained workplace cleanliness, particularly regarding work surfaces and kitchen equipment.

These findings are consistent with those of a systematic review of food safety knowledge and practices among food handlers in Bangladesh (Rifat et al., 2022). According to the behavioral change theory, knowledge, attitudes, and practices are interrelated. Education plays a crucial role in enhancing food safety knowledge, which can contribute to improved hygiene and sanitation practices among food handlers (Malavi et al., 2021; Al Rahmad & Annisa, 2025). Another behavioral change framework is the PRECEDE-PROCEED theory (Arshad et al., 2023), which emphasizes the role of reinforcing factors, such as rewards and incentives, as well as enabling factors, including resources, skills, and supportive policies, in facilitating behavioral change (Bazpour et al., 2019).

Moreover, this study is in line with the findings of Hura et al. (2025), who showed that educational interventions contributed to the development of more positive attitudes among food handlers (Hura et al., 2025). This study similarly reported significant differences in attitudes between groups that received education and those that did not, influencing their likelihood of practicing proper hygiene in daily activities (Maghafirah et al., 2018). Previous studies have shown that health education using posters is effective in improving individuals' knowledge and attitudes (Indah & Junaidi, 2021; Khairunisa et al., 2025; Sari et al., 2025; Wulandari & Kurniasari, 2025).

Overall, these findings reinforce the notion that interactive and visual educational approaches can positively influence food handlers' attitudes and behaviors. The educational activities, both delivered directly and through posters disseminated via WhatsApp, effectively reached the respondents and strengthened the conveyed material. The attitudes formed through this educational process serve as an essential foundation for sustaining improved hygiene and sanitation practices in the food service environment.

This study had some limitations. In particular, this study does not fully capture the underlying reasons for compliance and non-compliance with hygiene, and sanitation practices, which require a qualitative research approach. In addition, the absence of a control group limits the ability to establish causality between the poster-based educational intervention and the observed improvements in knowledge, attitudes, and hygiene and sanitation practices. The relatively small sample size and single-institution setting may limit the generalizability of the findings. In addition, the use of self-reported measures and the lack of long-term follow-up may have introduced response bias and prevented the assessment of the sustainability of behavioral changes. Differences in individual engagement with poster content, particularly when delivered digitally, could not be fully controlled. Future studies should include control groups, objective observational measures, larger samples, and extended follow-up periods.

Conclusion

This study identified a significant association between educational interventions and food handlers' knowledge, attitudes, hygiene, and sanitation behaviors. Poster-based education has proven to be an effective approach for improving food handlers' knowledge and attitudes toward food hygiene and sanitation in hospital settings. The use of visual media supported by direct counseling facilitates a better understanding of hygiene and sanitation principles and encourages positive attitude changes among food handlers.

This educational strategy is practical, cost-effective, and easy to implement, especially

when combined with digital distribution to enhance accessibility of the material. The findings of this study can guide stakeholders in developing policies and interventions, particularly those focused on education for food handlers in hospital food service settings, including personal hygiene, proper handwashing practices, and the use of complete personal protective equipment. Future efforts should focus on reinforcing education and evaluating long-term behavioral sustainability to ensure consistent compliance with food hygiene and sanitation standards.

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