

ARTICLE INFORMATION

Received: June, 20, 2024

Revised: October, 29, 2024

Available online: October, 30, 2024

at : <https://ejournal.malahayati.ac.id/index.php/minh>

The effectiveness of information, education, and communication (IEC) methods on food safety and hygiene among food vendors during Ramadan

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Abstract

Background: During Ramadan 2023, only 4.7% of the 104 snack and food outlets in Jakarta, Indonesia, at the Cilandak District Primary Health Center met hygiene and sanitation standards. The inspections involved supervising cleanliness, implementing HACCP (Hazard Analysis & Critical Control Point), and counseling on the implementation of health and food safety practices.

Purpose: To evaluate the impact of information, education, and communication (IEC) methods on food safety and hygiene practices among street food vendors during Ramadan.

Method: A quantitative design with a quasi-experimental approach, an information, education, and communication (IEC) methods on food safety and hygiene for food vendors during the month of Ramadan consisting of one group. The study had two steps: first, it inspected food outlets before and after an educational intervention using a health environment inspection (*eIKL PaJan*) form; secondly, it tested food samples using a rapid test. Three outlets were randomly selected from each of the five sub-districts, and the data was analyzed using a paired T-test. The level of statistical significance was set at an alpha level of 0.05.

Results: Fifteen "takjil" snack vendors were evaluated, and most had non-conformity scores. The highest non-conformity scores were due to hand hygiene issues and lack of knowledge about food safety. After the intervention, the mean score of knowledge about safe food handling increased from 57.5 to 75.9, with $p < 0.001$ indicating an increase in awareness of food safety perceptions. Of the fifteen food samples tested, six showed the presence of formalin in the rapid test. However, subsequent testing at the laboratory revealed that the samples were free of formalin.

Conclusion: Our study highlights a significant public health concern: enhancing awareness can bolster the safety, cleanliness, and knowledge of snack food outlet proprietors. This could positively affect the economy, human resource quality, and health through the implementation of food security practices.

Keywords: Food Safety; Food Traders; Hygiene; Information, Education, and Communication (IEC).

INTRODUCTION

During the month of Ramadhan in Indonesia, a characteristic phenomenon is the emergence of street market and "takjil" snack sellers in various places. That is usually a non-permanent market that is only open during the Ramadhan fasting month, with an operating hour in the afternoon before the breaking time of fasting. This situation is connected with

people's consumption patterns that change during the month of Ramadhan. The meaning of "takjil" means to hasten breaking fast when the time comes for the first break of fasting, before eating dinner (Kantari, Ashari, & Purnawan, 2023).

Food is anything from biological sources, including agriculture, forestry, fisheries, animal husbandry, and

water. Contamination is a persistent issue, with undesirable compounds accidentally present in food from the environment or actions in the food chain. Food sanitation reduces harmful bacteria in food through sterilization and pest control. Food safety is a multidisciplinary issue that impacts the economy and public health. It involves experts in toxicology, microbiology, parasitology, health economics, nutrition, and veterinary science, as well as local communities and schools. Food sanitation protects and preserves food to ensure its cleanliness, health, and safety. Poor food sanitation can be caused by three different factors, including physical, chemical, and microbiological issues. Sanitation refers to the set of practices aimed at preventing the spread of disease and promoting cleanliness and hygiene, both for humans and the environment (Djukic et al., 2016; World Health Organization, 2022).

Based on the guidelines for hygiene and sanitation standards for snack and food outlets ensure that the public is protected from consuming food and drinks that do not meet health criteria, which could potentially harm their health (Ministry of Health of the Republic of Indonesia, 2003). These guidelines, the local District/City Health Service should be regularly inspect the food sellers to maintain cleanliness and implement Hazard Analysis and Critical Control Points (HACCP).

Health officials of the health center program officer and market associations collaborate with community cadres to encourage behaviour that supports snack food hygiene (National Legal Development Agency 2012). There is a joint regulation by the Indonesian Minister of Home Affairs and National Agency of Drug and Food Control. The regulation includes the following substances: Boric Acid, Borax, Formalin (formaldehyde solution), Paraformaldehyde (Paraformaldehyde Powder and Tablets), Rhodamine B Red Dye, Amaranth Red Dye, Metanil Yellow Dye, and Auramin Yellow Dye (Ministry of Health of the Republic of Indonesia., 2012; Government Regulations, 2019; Ministry of Health of the Republic of Indonesia., 2013).

Cilandak in South Jakarta Administrative City covers an area of 17.35 km² and is divided into 5 districts. There are 408 Food Management Places in the Cilandak area, of which 104 are Ramadan Snack

Food vendors that provide food for residents. In 2022, the Cilandak District Health Center had achieved 72% that met the required criteria, with a total of 258 Snack Food vendors meeting the requirements. However, during the first semester of 2023, only 11 snack food stalls (4.7%) out of 104 had been inspected and developed as part of the scope activities (South Jakarta Health Office, 2023). Foodborne infections can arise as a result of improper food handling during preparation, lack of awareness among food handlers or consumers, and neglect of safe food management. To prevent foodborne disease outbreaks, food handlers must prioritize personal hygiene and be aware of food sanitation hygiene during the food processing process. The seller's knowledge of sanitation and hygiene in food processing greatly affects the quality of food provided to customers. Food poisoning can affect anyone, but improper handling, cooking, storing, and reheating of food can increase the risk (World Health Organization, 2006; World Health Organization, 2016). The distribution of ready-to-eat food in the community must be reviewed periodically.

RESEARCH METHOD

This study was conducted between March and April 2023. Using the Federer formula and obtaining a minimum sample size of 15 participants (seasonal vendor/only during the month of Ramadan and has never received formal training in food safety and hygiene processing, by using a quantitative design with a quasi-experimental approach, information, education, and communication (IEC) methods on food safety and hygiene for street food vendors during the month of Ramadan consisting of one group. Health education employs lecture-based media and informative booklets. Where the booklet has gone through the Intellectual Property Rights procedure according to operational standards. Intervention activities were carried out in five areas, namely **Cipete Selatan (CS)**, **Gandaraia Selatan (GS)**, **Cilandak Barat (CB)**, **Pondok Labu (PL)**, and **Lebak Bulus (LB) Villages**. Thus, this activity involved 5 enumerators to conduct interventions and data collection. 3 of the enumerators had a master's degree in public health, while the other 2 had a master's degree in community nursing. The

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intervention process was carried out for 1 hour by providing an explanation according to the booklet that had been given to the participants.

Instrument

The questionnaire on environmental health knowledge of snack food outlets consists of 29 questions consisting of 2 multiple choices that evaluate the environmental health conditions of their food handling practices. This questionnaire is divided into 3 parts, namely those covering indicators of the issue of safety, hygiene and sanitation of ready-to-eat food. Respondents can choose one correct answer from the two available answers for each question and get three points for each correct answer. The overall safe food handling score is calculated by adding up each correct answer, with a potential range of 0 to 87, where a higher total reflects greater understanding.

A laboratory test that aims to identify the hazardous content in the food. This test uses the rapid test method. The test used reagents for addictive formalin, borax, rhodamine B, and methyl yellow. If

the test results show a positive indicator, confirmation tests will be continued and conducted by the Regional Health Laboratory.

A biostatistical test consisting of 3 stages, namely the normality test, univariate test and bivariate test. In the first stage, namely the normality test where the results show using Shapiro-Will shows a sign result of $0.781 > 0.05$ which means that the data is normally distributed. After that, a univariate test was carried out on the respondent's characteristic data and at the end with a bivariate test using the paired t-test. Evaluation was carried out before and after the intervention, to see the level of knowledge of food vendors and a food content test was also carried out to determine the food content that could endanger consumer health.

Ethical Consideration

The initial survey was carried out with the District Public Health Centre's authorization, adhering to ethical norms, and as part of their routine program under the number of ethical clearance 57/KER-FK/II/2023.

RESEARCH RESULTS

Table 1. Characteristics of Participants (N=15)

Characteristics	Results
Age (Mean±SD) (Range)(Year)	(39.8±10.8)(17-65)
Gender (n/%)	
Male	4/27
Female	11/73
Education (n/%)	
Elementary and Junior High School	8/53
Senior High School	7/47
Type of Stall (n/%)	
Street Food Stall	7/53
Permanent Stall	8/47
Types food selling (n/%)	
Traditional snack	5/33
Traditional beverages	2/13
Traditional food	8/54

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Based on Table 1, the average age of traders is 39.8 years and the standard deviation is 10.8 years with an age range of 17 to 65 years. Most traders are women with elementary and junior high school education backgrounds, they have permanent stalls, and sell traditional food type

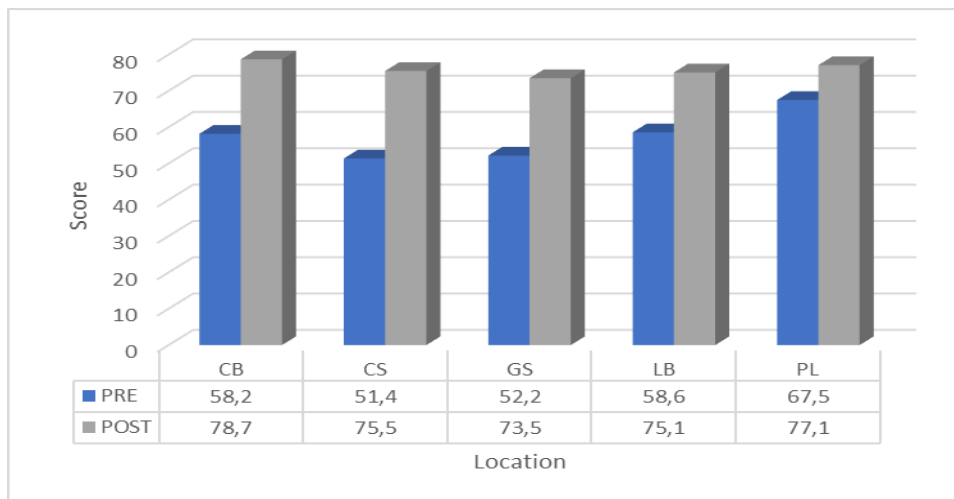


Figure. Traders Evaluation Average Score Before and After IEC Intervention

Figure 1 shows the average knowledge and compliance scores before and after education, *eIKL PaJan* form was used to screen 15 vendors in 5 sub-districts. The results showed that all sub-districts had food knowledge and hygiene scores. Sub-district (PL) had the highest score (67.5) and Sub-district (CS) had the lowest score (51.4). of the 15 traders, the highest non-compliance scores were in three areas, namely not washing hands with soap and water before handling food, not using hand sanitizer when in contact with food, and never receiving information about food safety for ready-to-eat food.

The average score of sellers in each of the five sub-districts increased following intervention in the form of Information, Education, and Communication (IEC) Intervention programs for issues of safety, hygiene, and sanitation of ready-to-eat food, with significant paired T-test $p < 0.001$. Although the average score has increased, many have not yet achieved the maximum score, however, 87% are heading towards a good knowledge score.

Table 2. Rapid Test Results.

Area	Food Samples	Formalin	Borax	Methane Yellow	Rhodamin B
CB	Fried stuffed tofu (<i>Tahu isi goreng</i>)	+	-	-	-
	Martabak Chicken egg				
	Risol sausage	+	-	-	-
CS	Risol mie	+	-	-	-
GS	Risol smoked beef	+	-	-	-
	Martabak tofu	+	-	-	-

Table 2. All of these samples were tested using a rapid test kit (confirmation test samples using spectrophotometric techniques by the regional health laboratory). The test results revealed that six out of the fifteen snack samples tested positive for the presence of prohibited Food Additives, specifically formalin.

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DISCUSSION

The aforementioned results highlight the significance of vendors possessing and applying knowledge of safe food-handling practices. The results also indicate that most of the participants correctly recognized that food handlers are required to wash their hands after using the toilet or after touching their nose. Additionally, the majority of the respondents agreed that individuals who are experiencing diarrhea should avoid handling food, even if they regularly wash their hands. Furthermore, they correctly noted that individuals who have flu, cold or cough should not handle food or money to prevent the spread of illness.

There are differences in the results of the analysis of regional health laboratories and rapid tests. The test results show that the sample is free of formalin, which is caused by differences in methodology between the spectrophotometric tool and the rapid test tool. The rapid test tool can detect formalin levels if the levels are between 0-10 mg/L in the food being tested. According to a 2014 study by the European Food Safety Authority (EFSA), daily exposure to formalin levels from food should not exceed 100 mg per day (European Food Safety Authority, 2014).

The effectiveness of formaldehyde as an antimicrobial is proven through the MIC (Minimum Inhibition Concentration) value obtained during testing on various test microbes, from the weakest to the strongest microbes. The MIC value of formaldehyde ranges from 39-246 ppm (mg/L or mg/kg) based on testing on the weakest to the strongest microbes. Formaldehyde is known to have antimicrobial activity when given at concentrations above 39 ppm. Therefore, this concentration level is considered the threshold value for formaldehyde as an antimicrobial agent. To prevent the misuse of formaldehyde in food products, the maximum limit of formaldehyde in food products must be lower than the lowest MIC value. It is proposed to limit the amount of formaldehyde in various foods to no more than 35 mg/kg or mg/L (Directorate of Processed Food Standardization, 2019; Kiroh et al., 2019). This examination is important to ensure public health and safety, especially during the festive season when such snacks are in high demand.

Based on the results of the eKLPaJan screening, it was found that they had the highest non-compliance scores in three areas: "habits of washing hands with soap and running water regularly before handling food, regular use of hand sanitizers when in contact with food, and lack of education about the safety of ready-to-eat food". The vendors admitted that they did not wash their hands thoroughly with soap and running water regularly. However, they used hand sanitizer before handling food, although not regularly. During the COVID-19 epidemic, they used hand sanitizers because of the reduced habit of washing hands with soap and running water. Due to the limited availability of clean running water in the marketplace area, they found it easier to provide hand sanitizers. These results are in accordance with previous studies, that during the pandemic regarding the behavior of washing hands before touching food to be processed but the limited availability of clean running water in the sales area (Aprilia & Pawenang, 2023; Setiawan et al., 2022). At that time, the Government had implemented effective Covid-19 prevention measures by implementing food safety protocols, maintaining cleanliness, maintaining social distancing, conducting supervision, and involving the community in prevention efforts.

Through the provision of interventions in the form of Information, Education, and Communication (IEC) on food safety, hygiene, and the adverse effects of prohibited addictive substances in food, traders' knowledge and awareness of the importance of food hygiene and safety increased. This also helps them understand the importance of vigilance when purchasing food raw materials, to avoid the use of hazardous materials in their food. This is evidenced by a significant increase in pre-post scores as an intervention for the level of knowledge of food traders ($p < 0.001$). Training is one way to increase knowledge and update minimum standards for good, correct, and healthy food processing and serving to avoid cross-contamination of germs and viruses. Personal experience also plays a role in changing the attitudes and actions of food handlers, because having adequate experience in food processing will form a positive attitude to act in accordance with food processing standards. Personal hygiene for food

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handlers must be considered from various aspects such as knowledge, attitudes, and actions towards personal hygiene in food processing. These three aspects are interrelated to create good personal hygiene (Charlesworth & Mullan, 2023; Fekadu et al., 2024; Samapundo et al., 2017; Suryani et al., 2019). Because proper food handling helps prevent foodborne illness by reducing the risk of contamination by bacteria, viruses, and other harmful pathogens, maintaining food quality by maintaining the taste, texture, and nutritional value of food, improving food safety for consumers, ensuring food is safe to eat. Comply with regulations to avoid legal problems and maintain a good reputation.

Food additives serve to increase modern food production either by preserving food from bacterial growth and chemical changes, or by improving its appearance, taste, or texture. Food additives are a mixture of chemicals that do not occur naturally in food raw materials but are sometimes added to food to improve its quality. These hazardous materials include Boric Acid, Borax, Formalin (formaldehyde solution), Paraformaldehyde (Paraformaldehyde Powder and Tablets), Rhodamine B Red Dye, Amaranth Red Dye, Methanol Yellow Dye, and Auramine Yellow Dye. Additional preservatives such as borax, formalin, and textile dyes are still widely found in traditional markets and schools. Several studies have consistently shown that snacks sold in schools are still contaminated with hazardous chemicals. This problem requires serious attention and action from the authorities because of the adverse effects of consuming these hazardous substances (Firdani, 2022; Paratmanitya & Aprilia, 2016). In addition, sub-district officers are involved in supervising food vendors during the month of Ramadan, especially regarding the use of hazardous chemicals that can cause addiction. This activity can be carried out by environmental health cadres in each sub-district in collaboration with related assistant health center officers.

Information and Education Communication (IEC) is one of the methods of socialization and organizing activities to disseminate information, increase knowledge, shape attitudes, and influence behavior related to health programs. In addition, officers also conduct continuous inspections of snack sales

locations using digital forms to improve street vendor behavior in handling food based on hygiene and sanitation aspects. This concept is in line with the standards set by WHO, which recommends five main technical factors to ensure the provision of safe food: maintaining cleanliness, preventing contamination, storing food at a safe temperature, heating food to the right temperature, and using safe water and raw materials (World Health Organization, 2006).

The government implements food safety inspections as an important strategy to prevent and control foodborne diseases, which involves evaluating food handling practices and the condition of food production facilities (Barnes et al., 2022). Access to safe and nutritious food is essential to maintaining public health. Therefore, it is essential to ensure that food products are of good quality and free from physical, biological, and chemical contaminants that can cause foodborne infections, diseases, or poisoning. Sustainable and integrated food handling practices should be adopted at all stages of the food supply chain, from production to consumption, to benefit all stakeholders involved, including producers, businesses, and consumers. The Ministry of Health, Health Services, and Primary Health Care play a critical role in food safety by conducting inspections of food establishments to ensure compliance with safety standards, educating food handlers and the public on proper food safety practices, investigating foodborne disease outbreaks and taking action to prevent further cases, administering and enforcing food safety laws and regulations, and promoting policies that support a safe and healthy food supply.

CONCLUSION

There are two common food safety concerns that we should be aware of, the use of food additives during the food process and poor sanitation. Our health is the most valuable asset we have, which makes it crucial to improve our nation by providing high-quality and healthy food to the next generation. The implications of food security go beyond just health and the quality of human resources, as it also affects the economy.

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ACKNOWLEDGEMENTS

Appreciation to the Cilandak District Primary Health Centre staff in Jakarta for their contribution into this study.

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DOI: <https://doi.org/10.33024/minh.v7i8.454>

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