

Food Safety Training and Food Safety Practices Among Street Vendors at Public Elementary Schools

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ARTICLE INFO	ABSTRACT
<p>Manuscript Received: 21 Jan, 2025 Revised: 06 Feb, 2025 Accepted: 07 Feb, 2025 Date of Publication: 09 Feb, 2025 Volume: 8 Issue: 2 DOI: 10.56338/mppki.v8i2.6937</p>	<p>Introduction: In Indonesia, only about $\leq 30\%$ of street vendors in schools implement good food safety practices. This can have a negative impact on health that can lead to foodborne disease. Food safety practices are still low, especially for street vendors at public elementary schools in Tanjung Balai City, so food safety training is needed. Proper food safety training will be very influential in reducing the incidence and overall rate of foodborne illnesses. The purpose of this study is to analyze the relationship between food safety training and food safety practices in street vendors at public elementary schools in Tanjung Balai City.</p> <p>Methods: This study uses a cross-sectional design. The research is located at public elementary schools in Tanjung Balai City during November 2024. The sample involved 335 street vendors from 67 elementary schools. Data collection uses a questionnaire accompanied by interviews with respondents who have signed informed consent. This research has obtained permission from the Research Ethics and Community Service Commission, Faculty of Public Health, University of Indonesia.</p> <p>Results: The results of the study show that most street vendors at Public Elementary Schools have poor food safety practices as much as 61.2% and have never participated in food safety training as much as 80%. Factors that were significantly related to food safety practices were food safety training, gender, age, knowledge and attitudes related to food safety (p-value < 0.05), while education level, Vending Duration, and monthly income did not show significant results. The results of the multivariate test showed a significant relationship between food safety training and food safety practices after being controlled by gender, age, education and knowledge related to food safety (AOR=3.00; CI: 1.25-7.24; $p=0.01$).</p> <p>Conclusion: Food safety training is significantly related to food safety practices. Therefore, it is hoped that the relevant agencies can provide comprehensive food safety training to all street vendor in public elementary school's environment".</p>
<p>KEYWORDS</p> <p>Foodborne Disease; Food Safety; Street Vendors</p>	

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Food safety is a guarantee that food will not cause adverse health effects to consumers when prepared and/or eaten in accordance with its intended use (1).

Street vendors have an important role in determining good food safety practices, to provide healthy, clean and suitable food for consumption (2). Poor food safety practices will trigger contamination in the form of viruses, bacteria, fungi, parasites, and other harmful chemicals that cause foodborne diseases. One such pathogenic bacteria is *Salmonella* spp., a Gram-negative bacterium that multiply in the stomach, infecting the small intestine and triggering inflammation that often causes diarrhea (3).

About 600 million, or 1 in 10 people in the world, get sick and 549 million suffer from diarrhoeal diseases and 420,000 people die each year after consuming contaminated food and drinks. Meanwhile, in Southeast Asia, because of contaminated food consumption, more than 600,000 children are reported to die each year (4-6).

Elementary school children are a high-risk group to experience foodborne disease purchased from canteens or street vendors around schools (BPOM, 2024). This is due to several factors, including; The ability to choose healthy and safe food is still limited, spending more time at school, and there is a tendency to choose street food rather than bringing provisions from home (7, 8).

In Indonesia, based on the results of the 2008 National Monitoring and Verification of Food Safety Profile of School Children (PJAS) conducted by Southeast Asian Food and Agricultural Science and Technology (SEAFST) and the Food and Drug Supervisory Agency of the Republic of Indonesia, most (>70%) of PJAS traders implement poor food safety practices (9). This is reflected in the results of the study which shows the variation in the proportion of PJAS traders with good food safety practices in several regions of Indonesia, especially in SDN, namely 47.6% in North Pontianak, 15% in Bantul, 58.8% in Banyumas, 41.7% in Cipayung, and 70.4% in Aceh (10-14).

Appropriately, the circulation of healthy snack food in schools involves various parties, both from sellers, school leaders, related agencies, and the government as the highest regulatory holder (15) Currently, the Indonesian government is running the Free Lunch Program or "Free Nutritious Meals" (MBG) for the next five years and will be focused on student groups, including elementary school children. The MBG program local micro, small, and medium enterprises MSMEs closest to the school as a food/public kitchen to provide nutritious food to beneficiary students. The involvement of MSMEs can pose various risks such as food contamination, lack of hygienic facilities, or lack of MSME knowledge about hygiene standards. Therefore, supervision is needed from the regional Health Office to ensure food nutrition and hygiene during the production process are guaranteed. The Cooperatives and Small and Medium Enterprises Office (KUKM Office) also has a crucial role in providing periodic training to the MSME actors involved (16).

Food safety training is effective in increasing changes in food safety practices (17). Food safety training is also seen as one of the strategies to improve food safety practices that can offer long-term benefits to the food industry (18).

In Indonesia, the proportion of street vendors who have participated in food safety training is still relatively low, such as in Banyumas (6.6%), Yogyakarta (56%), Jakarta (31.6%) and Sukabumi (44.8%) (12, 19, 20). In North Sumatra, the proportion street vendors in public elementary schools who have received food safety training is unknown, while based on data from the North Sumatra Provincial Health Profile in 2021-2023, there are 689 cases of KLB due to food poisoning (21-23). This shows that food safety practices are still low, so food safety training is needed to produce healthy, safe and clean food.

The purpose of this study is to analyze the relationship between food safety training and food safety practices at street vendors at public elementary schools in Tanjung Balai City, North Sumatra Province in 2024.

METHOD

This study uses a quantitative approach with a cross-sectional study design. The research is located in all public elementary schools in Tanjung Balai City. The research time will be carried out during November 2024. The unit of analysis is street vendors who sell at public elementary schools. The sample in this study is part of the total population of street vendors who sell at SDN.

The calculation of the minimum sample size uses the formula of the hypothesis test of two proportions (24) The minimum number of samples was selected from the proportion of previous research, namely the proportion of sex with poor food safety practices of 0.4 (25) The results of the calculation resulted in a minimum number of samples of 328 and then rounded to 335 samples. In this study, the cluster used is an elementary school with a total

of 67 schools. This method was chosen because there is no sample framework for all street vendors in Tanjung Balai City in 2024. The number of samples consisting of 335 was then divided by 67 schools, so that 5 samples were obtained for each school. Each of these 5 samples will be selected using a simple random sampling technique, which is carried out by randomization to get as many as 5 street vendors in each school.

The measuring tool of this study uses a questionnaire conducted by interviewing respondents who are willing to sign an informed consent sheet. The interview takes 15 minutes. The reliability test of the questionnaire yielded an Alpha Cronbach coefficient of 0.650 which indicates that the instrument is quite reliable.

The questionnaire was developed based on a literature review. The questionnaire consists of five parts. The first part includes information in the form of gender, age, education level, length of sales and monthly income (20). The second part includes food safety training which consists of questions about having or not received training, who is the training organizer, when it was held, how many times have participated in the training and how long the duration of the training is. The third part consists of statements regarding knowledge related to food safety with the choice of answering "true" with a score of 1 and "false" with a score of 0 (26-29). The fourth part contains attitude statements measured by the Likert scale, with scores of strongly disagree (1), disagree (2), disagree (3), agree (4), strongly agree (5) (20, 26, 27, 29). The fifth section on food safety practices consists of statements on personal hygiene, food processing and serving as well as sanitation of equipment and the environment of the place of sale (25, 30-32) If you answer "yes" you will be given a score of 1, if you "no" you will be given a score of 0. Each of the knowledge, attitude, and practice scores is summed up and then calculated with a cut-off point, if the respondent's score > mean or median is categorized as good, if the < mean or median is categorized as poor (25). To address social desirability bias, conduct direct observations of respondents' behavior and compare the interview results with observational findings to identify discrepancies caused by bias.

Statistical analysis uses chi-square test and logistic regression of risk factor models. The chi-square test was used to determine the relationship between food safety training, gender, age, education level, length of sale, monthly income, as well as knowledge and attitudes related to food safety towards food safety practices. Logistic regression analysis with a risk factor model was carried out to understand the relationship of the main independent variable with the dependent variable after it was controlled by the confounding variable. The confounding test is carried out by calculating the OR difference of the main independent variable, if the calculation result is greater than 10%, it is declared as confounding and the variable must remain in the model.

Ethical Approval

This research has obtained permission from the Research Ethics and Community Service Commission, Faculty of Public Health, University of Indonesia with registration number Ket-596/UN2. F10. D11/PPM.00.02/2024.

RESULTS

Table 1 showed the descriptive analysis results of the characteristics of street vendors, including food safety practices, food safety training, gender, age, education level, length of time selling, monthly income, as well as knowledge and attitudes related to food safety. Food Safety Practices: Most vendors exhibited poor food safety practices (61.2%). Food Safety Training: most vendors (80%) had never attended food safety training. Gender: The proportion of male and female vendors was nearly equal, with a slightly higher percentage of female vendors (50.1%). Age: Most vendors were adults (64.8%). Education Level: most vendors had a low level of education (74%). Vending duration: The majority had been selling for more than 24 months (94.3%). Monthly Income: Most vendors had a high monthly income (55.5%). Knowledge and Attitudes: Most vendors still demonstrated poor knowledge (68.1%) and poor attitudes (65.4%) regarding food safety.

Table 1. Descriptive Characteristics of Food Safety Practices, Training, and Covariate Factors Among Street Vendors

No	Variable	Category	Total (N=335)	Percentage (%)
Dependent Variable				
1	Food Safety Practices	Poor	205	61,2

No	Variable	Category	Total (N=335)	Percentage (%)
		Good	130	38,8
Main Independent Variable				
2	Food Safety Training	Never attended	268	80
		Attended	67	20
Covariate factors				
3	Gender	Male	167	49,9
		Female	168	50,1
4	Age	Young (17-35 Years)	118	35,2
		Adult (>35 Years)	217	64,8
5	Education Level	Low (<Senior High Schools)	248	74,0
		High (≥Senior High Schools))	87	26,0
6	Vending Duration	New (≤ 24 Months)	21	5,70
		Long (>24 Months)	314	94,3
7	Monthly Income	Low (UMK > Rp. 3.046578)	149	44,5
		High (UMK ≤ Rp. 3.046578)	186	55,5
8	Knowledge on Food Safety	Poor	228	68,1
		Good	107	31,9
9	Attitudes on Food Safety	Poor	219	65,4
		Good	116	34,6

The Figure 1 showed the distribution of poor food safety practices among street vendors at public elementary schools in Tanjung Balai City. The map reveals that poor food safety practices are dispersed across several subdistricts, with a notable concentration in areas located farther from the city center of Tanjung Balai.

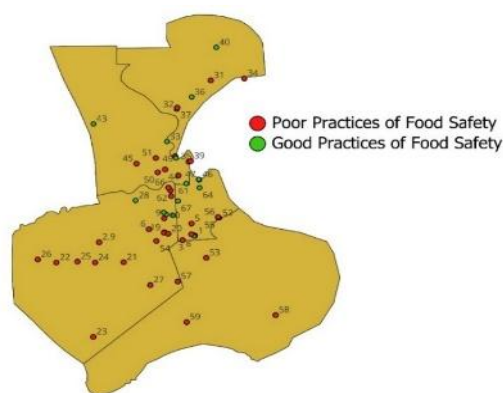


Figure 1. Map of Food Safety Practices Distribution Among Street Vendors

Table 2 showed a significant relationship between food safety training, gender, age, knowledge, and attitudes related to food safety and food safety practices (p -value $\leq 0,05$). Meanwhile, there is no significant relationship between education level, vending duration and monthly income with food safety practices (p -value $> 0,05$).

Table 2. The Relationship Between Food Safety Training and Covariate Factors with Food Safety Practices

Variable	Category	Food Safety Practices (N=335)		Total (N=335)	p-value	OR (95% CI)
		Poor (n, %)	Good (n, %)			
Main Independent						
Food Safety Training	Never attended	191 (71,3%)	77 (28,7%)	268 (100%)	0,00*	2,75 (2,19 – 3,45)
	Attended	14 (20,9%)	53 (79,1%)	67 (100%)		
Covariates						
Gender	Male	126 (76,0%)	41 (24,0%)	167 (100%)	0,00*	2,16 (1,59 – 2,92)
	Female	79 (47,0%)	89 (53,0%)	168 (100%)		
Age	Young	84 (71,2%)	34 (28,8%)	118 (100%)	0,00*	1,53 (1,11 – 2,12)
	Adult	121 (55,8%)	96 (44,2%)	217 (100%)		
Education Level	Low	155 (62,5%)	93 (37,5%)	248 (100%)	0,48	1,13 (0,87 – 1,52)
	High	50 (57,5%)	37 (42,5%)	87 (100%)		
Vending Duration	New	13 (61,9%)	8 (38,1%)	21 (100%)	1,00	1,02 (0,58 – 1,79)
	Long	192 (61,1%)	122 (38,9%)	314 (100%)		
Monthly Income	Low	100 (67,1%)	49 (32,9%)	149 (100%)	0,06	1,32 (0,99 – 1,75)
	High	105 (56,5%)	81 (43,5%)	186 (100%)		
Knowledge on Food Safety	Poor	168 (73,7%)	60 (26,3%)	228 (100%)	0,00*	2,49 (1,92 – 3,21)
	Good	37 (34,6%)	70 (65,4%)	107 (100%)		
Attitudes on Food Safety	Poor	154 (70,3%)	65 (29,7%)	219 (100%)	0,00*	1,89 (1,46 – 2,45)
	Good	51 (44,0%)	65 (56,0%)	116 (100%)		

*) Significant results at p-value ≤ 0,05

Table 3 showed a significant relationship between food safety training and food safety practices after controlling for confounding variables, namely gender, age, education, and knowledge related to food safety (p=0,01; AOR=3,00; CI: 1,25-7,24)

Table 3. Final Multivariate Model of the Relationship Between Food Safety Training and Food Safety Practices

No	Variable	S.E	P-value	AOR (95% CI)
1	Food Safety Training	0,44	0,01	3,00 (1,25 – 7,24)
2	Gender	0,26	0,00	0,31

No	Variable	S.E	P-value	AOR (95% CI)
				(0,18 – 0,52)
3	Age	0,30	0,09	1,67 (0,91 – 3,06)
4	Education Level	0,34	0,13	0,60 (0,31 – 1,18)
5	Knowledge on Food Safety	0,34	0,00	3,35 (1,72 – 6,54)

DISCUSSION

Food safety training for street vendors selling at elementary schools is crucial for improving hygiene standards and food quality while supporting food safety practices to ensure children receive healthy and nutritious meals. According to research findings, only around 67 street vendors have participated in training provided by the local health department. The limited training coverage is due to a policy where the health department only provides training to one representative vendor from each elementary school that has a certificate. This training coverage needs to be expanded so that all vendors have an equal opportunity to understand and implement food safety.

Food safety training is significantly associated with food safety practices because it contributes to improving knowledge related to food safety. Participation in food safety training can ultimately explore attitudes and encourage behavioural changes, enabling vendors to handle food properly (33). Studies in Ethiopia and Tangerang, Indonesia (34-36) show that food safety training is an effective tool for enhancing knowledge and food safety practices among street vendors. This training can prevent foodborne diseases and protect customers or consumers from health risks caused by contaminated food. Additionally, training plays a vital role in maintaining public health and the sustainability of street food businesses (20, 35).

Multivariate analysis using a risk factor model shows that street vendors who have never participated in food safety training are three times more likely to engage in poor food safety practices compared to those who have undergone training after controlling for confounding variables. Research in Brazil and Yogyakarta (20, 37) supports these findings, stating that street vendors who have not undergone training are 1.906 times more likely to exhibit poor food safety practices than those who have. These findings indicate that food safety training is an effective intervention for improving food safety practices among street vendors.

However, confounding factors also contribute to the effectiveness of the training. Therefore, training programs should be designed considering gender, age, education level, and knowledge related to food safety to ensure success. Gender is a confounding factor because there are significant differences in food safety practices between men and women. Studies in Orlando, Florida, and Tangerang, Indonesia (34, 38), indicate that female vendors tend to be more skilled in food preparation, as cooking is often considered a woman's responsibility in developing countries. Furthermore, women are more meticulous in maintaining personal and environmental hygiene (37).

Age is also a confounding factor, as maturity influences the stability of actions, including food safety practices (39). Research in Pakistan (29) supports this finding, showing that adult vendors are more aware of food safety, particularly if they have undergone training or have family responsibilities (38).

Education level affects the reception of information, where the higher the level of education, the easier it is for someone to understand and implement food safety protocols (40). Research in Yogyakarta and Tangerang, Indonesia (20, 34, 41), concludes that better education enables vendors to prepare food according to established standards.

Knowledge related to food safety plays an important role in the provision of food safety training on food safety practices. This statement is supported by the theory of training transfer, which indicates that individuals with higher cognitive abilities are more likely to acquire, understand, and utilize training competencies (42) and translate them into appropriate practices (43).

This also emphasizes that providing food safety training to improve food safety practices requires a holistic approach. This approach can be implemented through collaboration with various parties, such as street vendors

reporting themselves to the elementary school leadership to be recorded as official vendors or the elementary school leadership recording vendors based on specific criteria, such as whether they have participated in training or do not yet have a certificate. After the data collection, the elementary school will coordinate according to the roles of the relevant agencies. If the vendor has never participated in training and does not yet have a certificate, the KUKM department is responsible for providing food safety training. However, if the vendor has participated in training and has a certificate, the local health department is responsible for updating the training materials.

To improve food safety practices and overcome barriers to access for street vendors, several strategies can be proposed to tackle both logistical and motivational challenges. These strategies aim to increase vendor participation in training programs: Flexible Training Schedules and Locations: Vendors may have difficulty attending training sessions due to their working hours or location. Offering training at various times (e.g., evenings or weekends) or through multiple locations can increase participation. For vendors in remote areas, mobile training units or online training platforms can be a viable alternative. Peer-to-Peer Support: Creating a mentorship or peer support network where trained vendors can help untrained vendors understand the value of food safety training. This peer-driven approach can create a more relatable and trustworthy atmosphere.

Limitation and Cautions

The limitations of this study are, first, it is limited to analyze the relationship between training, gender, age, education level, length of sale, monthly income, knowledge and attitudes related to food safety and does not consider other variables that may have an effect. Second, the cross-sectional research design measures independent and dependent variables at the same time and only states that there is an association and cannot confirm a causal relationship between variables, which means that it cannot be certain whether the training is causing a change in practice, or there are other factors that affect both. Third, the data collected can be influenced by the desire to provide answers that are considered "good" (social desirability bias). Fourth, when randomizing samples in the field, it was found that street vendors often moved between public elementary schools and seasonal traders, making it difficult to determine a truly random and representative sample. Fifth, the research instrument was adopted from several questionnaires in previous research conducted abroad and domestically, to adjust the state of food safety practices in Indonesia.

Recommendation for Future Research

It is recommended for future studies to use a cohort design to look at the cause-and-effect relationship between food safety training and food safety practices. In addition, further research is needed to see the relationship between variables that have not been examined in this study that may affect food safety practices, such as supervision by schools and the influence of food safety policies or regulations at the national level.

CONCLUSIONS

This study investigates food safety practices in street vendors at public elementary schools and aims to analyze the relationship between food safety training and food safety practices at public elementary schools Tanjung Balai city. The results of the study showed that the factors that were significantly related to food safety practices in street vendors were food safety training, gender, age, knowledge and attitudes related to food safety. In addition, the results of the multivariate test showed a significant relationship between food safety training and food safety practices after being controlled by gender, age, education and knowledge related to food safety. This finding is expected to contribute to the Health Office and the KUKM Office to increase the number of food safety-related training among street vendors with a minimum duration of two times a year and involving different representatives in each activity. Training can be carried out on a rotational basis per sub-district to reach more traders. In addition, it is hoped that the leadership of public elementary schools will also intervene in food safety by recording a number of street vendors periodically, twice a year, to identify street vendors who mobilize between elementary schools, as well as street vendors who sell seasonally. This strategy is carried out to reach seasonal traders and traders who often change locations in order to ensure that all traders implement good food safety practices.

Although this study provides insights related to food safety training and practices for street vendors, some limitations must be considered, such as looking at the relationship between supervision variables by schools and the

influence of food safety policies or regulations at the regional and national levels. Future research can focus on identifying and developing this research.

AUTHOR'S CONTRIBUTION STATEMENT

All authors confirmed their contribution to this study as follows: Zakianis was responsible for conceptualizing the research framework, developing the study design, and formulating the key research questions to ensure the study's objectives were clearly defined. Apriliya Adha conducted the data collection process, including the preparation of data collection instruments, fieldwork coordination, and ensuring the accuracy and reliability of the gathered data. Zakianis, Laila Fitria, and Apriliya Adha collaborated in performing data analysis, applying appropriate statistical methods, and interpreting the findings to derive meaningful conclusions relevant to the study objectives. Zakianis and Apriliya Adha jointly prepared the initial manuscript draft, including organizing the structure, writing the introduction, methodology, results, and preliminary discussions. Haryoto Kusnopotranto, Halik Hadi, and Surya Kusuma Purba provided critical insights during the discussion phase, offering valuable suggestions, refining interpretations, and recommending improvements to enhance the depth and quality of the research. All authors thoroughly reviewed the manuscript, contributed to revising the content, and assessed the final version to ensure its accuracy, coherence, and scientific rigor before submission.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest related to this study. All authors have no financial, personal, or professional relationships that could be perceived as influencing the content or outcomes of this study.

FUNDING SOURCES

This research received no external funding.

ACKNOWLEDGMENTS

The authors extend our gratitude to the Department of Environmental Health, University of Indonesia, for the support and facilities provided during the research process. Gratitude was also conveyed to the Regional Development Planning, Research, and Innovation Agency of Tanjung Balai City for granting research permits, so that this research can be carried out properly.

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