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The Relationship Between Snack Consumption Behavior And The Incidence Of Typhoid Fever At The Tarbiyatul Qur'an Al-Falah Islamic Boarding School

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ABSTRACT

Typhoid fever remains a public health issue in Indonesia, particularly in densely populated environments such as Islamic boarding schools (Pondok Pesantren). One factor suspected of contributing to the increased risk of this disease is the habit of consuming snacks without regard for hygiene and food safety. This study aimed to analyze the relationship between snack consumption habits and the incidence of typhoid fever among female students at the Tarbiyatul Qur'an Al-Falah Islamic Boarding School in Kediri Regency. An observational analytic study design with a cross-sectional approach was employed. The study population consisted of 800 female students, with a sample of 89 respondents determined based on a 10% margin of error. Data were collected using a structured questionnaire and analyzed via univariate and bivariate methods (Chi-square test) at a 5% significance level. The results showed that 56 respondents (62.9%) exhibited good snack consumption habits, while 33 respondents (37.1%) exhibited poor habits. A total of 31 respondents (34.8%) had a history of typhoid fever. Bivariate analysis revealed a significant relationship between snack consumption habits and the incidence of typhoid fever (p=0.001). Poor snack consumption habits increased the risk of typhoid fever among the female students. These findings underscore the importance of enhancing education on selecting safe and hygienic snacks as part of typhoid fever prevention efforts within the Islamic boarding school environment.

Keywords: Food Safety, Female Students, Islamic Boarding School, Snack Consumption Behavior, Typhoid Fever

INTRODUCTION

Typhoid fever is a systemic bacterial disease characterized by a distinctive "step-ladder" fever pattern and gastrointestinal manifestations, caused by infection with the bacterium Salmonella typhi. It can be transmitted through food and beverages contaminated with the pathogen; frequent occurrence of the disease in an individual strongly suggests the consumption of contaminated food or drink (Bhandari, Jenish et al., 2020; cited in Ramanda, 2021).

Snack consumption habits represent a behavioral factor that can increase the risk of Salmonella typhi infection. Snacks processed without regard for hygiene and sanitation, served in unsanitary environments, or left uncovered—thereby exposed to dust or flies—pose a risk of transmitting various foodborne diseases, including typhoid fever. Beyond the characteristics of the snacks themselves, consumer behavior—such as the choice of food vendor, attention to the vendor's cleanliness, and verification of food safety—also plays a role in determining the level of infection risk.

According to World Health Organization (WHO) data, there are an estimated 11 to 20 million cases of typhoid fever worldwide annually, resulting in approximately 128,000 to 161,000 deaths each year. The highest number of cases occurs in South Asia, Southeast Asia, and sub-Saharan Africa (WHO, 2022).

In Indonesia, typhoid fever is endemic (a disease constantly present in the community, albeit at low incidence rates). The incidence rate of typhoid fever in Indonesia is 81.7 per 100,000 people. According to the 2018 Indonesia Health Profile, there were 41,081 hospitalizations for typhoid and paratyphoid fever, with 279 resulting in death (Indonesian Ministry of Health, 2018).

Infectious diseases like typhoid fever can be fatal in Indonesia. Adolescents and adults are the groups most frequently infected. This is attributed to a lack of understanding regarding the importance of personal and environmental hygiene. Furthermore, children often lack complete protection against the disease. Typhoid can spread due to inadequate food handling and poor personal hygiene practices (Suprapto, 2022).

According to administrative data from PPTQ Al-Falah, located in Ploso Mojo, Kediri Regency, the institution had 800 female students (santriwati) during the 2024/2025 academic year. As an initial step, the researcher conducted a preliminary study by administering questionnaires to 10 student representatives. This preliminary study aimed to determine whether any students were suffering from typhoid fever; the results revealed five cases, indicating that the issue persists within the environment. Behavioral factors primarily driving typhoid fever in the pesantren (Islamic boarding school) setting are closely linked to poor healthy living practices (PHBS), a situation exacerbated by high residential density. Since Salmonella typhi bacteria spread via the fecal-oral route (through food or beverages contaminated with feces), the students' habits play a crucial role.

PPTQ Al-Falah is an Islamic boarding school with a substantial population of female students. Research conducted at the site identified female students suffering from typhoid fever, alongside varying snack consumption habits among the respondents. These findings indicate that snack consumption behavior remains a critical factor to address in efforts to prevent infectious diseases within the pesantren environment.

This study employed an analytic observational design with a cross-sectional approach. Data were collected via questionnaires from 89 respondents selected through purposive sampling and subsequently analyzed using the Chi-Square test to determine the relationship between snack consumption behavior and the incidence of typhoid fever.

The study aims to analyze the relationship between snack consumption behavior and the incidence of typhoid fever among female students at PPTQ Al-Falah, Kediri Regency.

METHODS

This study employs a quantitative design with an analytic observational approach and a cross-sectional framework. This approach was selected to analyze the relationship between snack consumption behavior (independent variable) and the incidence of typhoid fever (dependent variable) at a single point in time. The cross-sectional design allows for the simultaneous measurement of respondent characteristics, snack consumption behaviors, and typhoid fever status, thereby enabling an efficient analysis of the relationships between variables.

The study was conducted at the Tarbiyatul Qur'an Al Falah Islamic Boarding School in Kediri Regency. The study population consisted of all 800 female students residing within the boarding school complex. The sample comprised 89 respondents who met the inclusion criteria and were selected using purposive sampling. Inclusion criteria required respondents to be willing to participate, present at the study site during data

collection, and capable of completing the questionnaire independently. Respondents who failed to complete the questionnaire fully or were absent during the study were excluded.

Data collection utilized a structured questionnaire developed based on indicators of snack consumption behavior. The snack consumption behavior variable encompassed habits regarding the selection of snack vendors, frequency of snack consumption, attention to food hygiene, vendor conditions, and food safety prior to consumption. Data on the incidence of typhoid fever were obtained based on the respondents' self-reported history of typhoid fever diagnoses, in accordance with the study criteria. Prior to use, the instrument underwent validity and reliability testing in accordance with quantitative research procedures.

The research process began with obtaining research permits and ethical approval, followed by coordination with the Islamic boarding school administration. Subsequently, respondents were briefed on the study's objectives and asked to provide informed consent before completing the questionnaire. Collected data underwent completeness checks (editing), coding, entry into statistical software, and a cleaning process prior to analysis.

Data analysis was conducted using univariate analysis to describe the distribution of respondent characteristics, snack consumption behaviors, and the incidence of typhoid fever. Bivariate analysis was conducted using the Chi-Square test with a 95% confidence level ($\alpha = 0.05$) to determine the relationship between snack consumption behavior and the incidence of typhoid fever. The relationship was considered significant if the p-value was less than 0.05.

This study adhered to ethical principles for health research, including respect for respondents' rights, confidentiality of identity, fairness in respondent selection, and the provision of complete information prior to the study. All respondents participated voluntarily after providing their consent to take part in the research.

RESULT

This study aims to determine the relationship between snack consumption habits and the incidence of typhoid fever among female students at the Tarbiyatul Qur'an Al Falah Islamic Boarding School in Kediri Regency. The study involved 89 respondents who met the inclusion criteria. The results include the distribution of snack consumption habits and an analysis of the relationship between these habits and the incidence of typhoid fever using the Chi-Square test. The research findings are presented below.

Table 1. Characteristics of Variables Based on Snack Consumption Behavior at PPQ Al Falah

Snack Consumption Behavior	Frequency	Precentage (%)
Good Snack Consumption Habits	56	62,9%
Unhealthy Snack Consumption Habits	33	37,1%
Total	89	100,0%

Based on Table 1, the respondents' snack consumption behavior generally falls into the "good" category. This indicates that the majority of respondents have adopted habits of selecting and consuming snacks while considering food safety aspects—such as the cleanliness of the food, the condition of the sales venue, and the state of the snacks

themselves. Such behavior reflects an awareness among respondents of the need to reduce the risk of exposure to foodborne diseases. However, a portion of the respondents still falls into the category of "poor" snack consumption behavior. This indicates that some respondents have not yet fully adopted safe snack consumption practices, thereby potentially increasing their risk of exposure to food that fails to meet hygiene and sanitation standards. Consequently, sustained educational and health promotion efforts are required to raise awareness regarding the selection of safe and healthy snacks, thereby reducing the risk of foodborne illnesses, including typhoid fever.

- Bivariate analysis

  Bivariate analysis was conducted in this study to determine the presence or absence of a relationship between the independent variables—specifically personal hygiene and snack consumption habits—and the incidence of typhoid fever at PPTQ Al Falah. The analysis utilized a 95% confidence level ($\alpha = 0.05$) and the Chi-Square statistical test.

Table 2. Cross-tabulation of snack consumption behavior and the incidence of typhoid fever.

Incidence of Typhoid Fever				
Snack Consumption Behavior	Did Not Occur	Occurred	Total	P *value*
	F (%)	F (%)	F (%)	
Poor Snack Consumption Habits	10 (11,2%)	22 (24,7%)	32(35,9%)	0,001
Good Snack Consumption Habits	48 (53,9%)	9 (10,1 %)	57 (64,0%)	
Total	58 (65,2%)	31 (34,8%)	89(100,0%)	

Based on the cross-tabulation results in Table 2, it is evident that respondents with good snack consumption habits were less likely to contract typhoid fever, whereas the incidence of typhoid fever was higher among those with poor snack consumption habits. This indicates that the behavior of selecting and consuming safe snacks plays a crucial role in reducing the risk of typhoid fever. Conversely, poor snack consumption habits can increase the likelihood of exposure to food or beverages contaminated with *Salmonella typhi*.

Statistical analysis using the Chi-Square test yielded a p-value of 0.001, which is lower than the significance level of $\alpha = 0.05$. Consequently, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted, leading to the conclusion that there is a significant relationship between snack consumption habits and the incidence of typhoid fever among students at the PPTQ Al Falah Islamic boarding school in Kediri Regency. These results demonstrate that the better the respondents' habits regarding the selection of clean and safe snacks—adhering to food hygiene and sanitation principles—the lower the risk of developing typhoid fever. Therefore, education on selecting healthy and safe snacks needs to be continuously enhanced as a preventive measure against typhoid fever within the Islamic boarding school environment.

DISCUSSION

The study results indicate a significant association between snack consumption habits and the incidence of typhoid fever among female students at the Tarbiyatul Qur'an Al Falah Islamic Boarding School in Kediri Regency ($p = 0.001$; $p < 0.05$). These findings suggest that snack consumption behavior is a factor linked to the occurrence of typhoid fever. Students with poor snack consumption habits tend to face a higher risk of developing typhoid fever compared to those with good habits.

Snack consumption behavior refers to an individual's habits regarding the selection, purchase, and consumption of food or beverages outside of the main meals provided. This behavior encompasses factors such as the choice of vendor, vendor hygiene, the condition of the food being sold, food storage, and hand-washing habits prior to eating. If these aspects are overlooked, the food consumed is at risk of contamination by pathogenic microorganisms, including Salmonella Typhi. This bacterium can enter the body through contaminated food or beverages, causing a gastrointestinal infection that progresses to typhoid fever.

The results of this study align with theories regarding foodborne disease transmission, which explain that food processed, stored, or served without adhering to hygiene and sanitation principles can serve as a vehicle for transmitting various infectious diseases. Densely populated environments, such as Islamic boarding schools, carry a higher risk of disease spread if food safety is neglected. Therefore, the practice of selecting safe snacks is a crucial measure in breaking the chain of typhoid fever transmission.

These findings are also consistent with research by Nuruzzaman and Syahrul (2016), which reported that the habit of consuming food from street vendors is associated with an increased risk of typhoid fever. Research by Fadillah and Simangunsong (2024) further demonstrates a significant link between food consumption habits that disregard hygiene and the incidence of typhoid fever. Additionally, a study by Aprindrian (2018) identified the selection of unhygienic snacks as a risk factor contributing to typhoid fever cases among adolescents.

Although the majority of respondents in this study exhibited good snacking habits, some still consumed snacks without regard for the cleanliness of the sales location or the condition of the food purchased. Habits such as buying uncovered food, ignoring the cleanliness of serving utensils, and failing to ensure hand hygiene before eating are suspected to increase the likelihood of contamination by the bacteria that cause typhoid fever. Beyond individual behavioral factors, the environmental conditions surrounding food vendors can also influence the quality and safety of the food consumed.

According to the researchers, the study findings indicate that modifying snack consumption habits is one strategy to reduce the risk of typhoid fever among female students at Islamic boarding schools. Continuous efforts are needed to provide education on selecting safe snacks and practicing handwashing before meals, as well as to monitor the hygiene of canteens and food vendors in the vicinity of the boarding schools. By increasing knowledge and awareness regarding food safety, it is hoped that healthier snacking habits will be adopted, thereby minimizing the incidence of typhoid fever within the boarding school environment.

CONCLUSION

This study demonstrates a significant association between snack

consumption habits and the incidence of typhoid fever among female students at the Tarbiyatul Qur'an Al Falah Islamic Boarding School in Kediri Regency. These findings indicate that adopting safe snack consumption practices—with a focus on hygiene—is a crucial factor in preventing typhoid fever within the boarding school environment. Consequently, modifying behaviors regarding the selection and consumption of snacks could serve as a health promotion strategy to reduce the risk of foodborne illnesses among adolescents living in communal settings.

This study has several limitations. First, the cross-sectional design only captures the relationship between variables at a single point in time, precluding the determination of a causal relationship. Second, data on snack consumption habits were gathered via questionnaires relying on respondents' honesty and memory, leaving room for recall or response bias. Furthermore, as the study was conducted at a single boarding school, the findings cannot be generalized to the entire student population in other regions where environmental characteristics and consumption habits may differ. Given these limitations, future research should employ cohort or case-control designs to establish stronger evidence of the association, involve a larger number of respondents from multiple boarding schools, and incorporate additional variables—such as food hygiene and sanitation, clean water quality, hand-washing habits, and environmental sanitation conditions—that may influence the incidence of typhoid fever.

The implications of this study suggest that boarding school administrators and health professionals need to strengthen educational programs regarding food safety, the selection of safe snacks, and clean and healthy living practices. Additionally, supervision of food vendors in the vicinity of the boarding school should be intensified as a preventive measure to reduce the risk of typhoid fever transmission and foster a healthier boarding school environment.

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