

## **THE RELATIONSHIP BETWEEN KNOWLEDGE OF HEALTHY FOOD AND FOOD ADDITIVES AND ATTITUDES AND BEHAVIORS TOWARD SAFE FOOD SELECTION AMONG SCHOOL ADOLESCENTS**

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### **ABSTRACT**

Food safety is a critical public health issue among adolescents, particularly in school environments where exposure to processed foods and snacks containing food additives is high. Limited awareness and understanding of healthy foods and food additives may influence adolescents' attitudes and behaviors in food selection. This study aimed to analyze the relationship between knowledge of healthy food and food additives with attitudes and behaviors related to safe food selection among school adolescents. This quantitative study employed a cross-sectional design involving tenth-grade students at SMA X Pekanbaru. Data were collected using a structured questionnaire consisting of 21 items covering knowledge, attitudes, and self-reported behaviors related to healthy food and food additives. Data were analyzed using univariate analysis to describe respondents' characteristics and levels of knowledge, attitudes, and behaviors, as well as bivariate analysis to examine the relationships between variables using appropriate statistical tests. The results indicated that most respondents had a good level of knowledge regarding healthy foods and food additives. However, good knowledge was not consistently accompanied by positive attitudes and healthy food selection behaviors. A significant relationship was found between knowledge level and both attitudes and behaviors toward safe food selection. These findings suggest that knowledge plays an important role in shaping adolescents' attitudes and behavioral tendencies related to food safety. Continuous and context-based nutrition education is therefore necessary to support sustainable behavioral change.

Keywords: adolescents; attitude; behavior; food additives; food safety; knowledge

### **INTRODUCTION**

Safe food is an essential aspect of maintaining and improving adolescents' health status, particularly in the school environment where exposure to ready-to-eat snacks containing various food additives is high (BPOM, 2020). Adolescence is a transitional period characterized by rapid physical growth, cognitive development, and the formation of dietary habits that tend to persist into adulthood (Sawyer et al., 2012). Choosing unsafe and unhealthy foods during this phase may increase the risk of health problems, both in the short and long term.

The school environment offers a wide variety of snacks that are appealing in terms of taste, color, and price; however, food safety aspects are often overlooked. Many school snacks contain food additives such as artificial colorings, preservatives, artificial sweeteners, and flavor enhancers. Although food additives are permitted within certain regulatory limits, excessive and inappropriate consumption may lead to negative health effects, including digestive disorders, allergic reactions, behavioral problems, and an increased risk of non-communicable diseases (WHO, 2015; European Food Safety Authority, 2019). Previous studies have shown that most adolescents still have a low level of knowledge regarding food safety and the health risks associated with excessive additive consumption (Suhartini et al., 2019).

Knowledge about healthy foods and food additives plays a crucial role in shaping adolescents' attitudes and behaviors in selecting safe foods. The Knowledge–Attitude–Behavior (KAB) model explains that knowledge is the initial factor influencing attitudes, which subsequently shape individual behavior (Glanz et al., 2015). Several studies indicate that adolescents with higher levels of nutrition and food safety knowledge are more likely to demonstrate positive attitudes toward healthy foods and exhibit safer food selection behaviors (Wardle et al., 2000; Contento, 2016). Some studies report that adolescents' understanding of food additives remains limited, particularly in identifying potentially harmful additives and interpreting food label information (Laska et al., 2015). Low food literacy contributes to indifferent attitudes toward food safety and unhealthy snacking behaviors in school settings. Additionally, peer influence, taste preferences, and the lack of systematic nutrition education in schools further reinforce adolescents' tendency to choose unsafe foods (Story et al., 2009).

Although food safety issues among adolescents are receiving increasing attention, research examining the relationship between knowledge of healthy foods and food additives, and attitudes and behaviors related to safe food selection among school adolescents, remains limited, especially in Indonesia. Most previous studies have focused primarily on general nutrition knowledge without integrating food additives as an important component of food safety (Suhartini et al., 2019; BPOM, 2020). This study aimed to analyze the relationship between knowledge of healthy food and food additives with attitudes and behaviors related to safe food selection among school adolescents.

## **METHOD**

This study employed a quantitative analytical design with a cross-sectional approach to examine the relationship between knowledge of healthy food and food additives and adolescents' attitudes and behaviors toward safe food selection. The study was conducted among school adolescents in Senior High School X at Pekanbaru City, Riau, Indonesia. Data collection was carried out during the academic year 2025-2026. The study population consisted of adolescents enrolled in secondary school. The inclusion criteria were students aged 12–18 years who were present at the time of data collection and willing to participate in the study. Students who were absent or did not complete the questionnaire were excluded.

The sample size was determined using proportion formula, with a confidence level of 95%. A total sampling technique was used to select participants. Data were collected using a structured, self-administered questionnaire consisting of 21 multiple-choice questions divided into three domains:

1. Knowledge (17 items): assessing understanding of healthy food definitions, criteria and benefits of healthy food, definitions and purposes of food additives, and examples of permitted and prohibited additives.
2. Attitude (2 items): assessing respondents' tendencies in food selection and their attitudes toward foods containing additives.
3. Behavior (2 items): assessing responses and tendencies in selecting healthy foods after receiving information about healthy food and food additives.

The knowledge section was scored as 1 for correct answers and 0 for incorrect answers. Knowledge levels were categorized into good, moderate, and poor based on predetermined cut-off points. Attitude and behavior responses were categorized into positive/negative and safe/unsafe tendencies, respectively. Prior to data collection, permission was obtained from the school authorities. Participants were informed about the study objectives and procedures, and written

informed consent was obtained from students and/or their parents or guardians. The questionnaire was distributed and completed during school hours under researcher supervision. Data were analyzed using SPSS version XXIII]. Descriptive statistics were used to summarize respondent characteristics and variable distributions. The relationship between knowledge level and attitudes, as well as between knowledge level and behavior toward safe food selection, was analyzed using the Fisher's exact test was applied. A p-value of <0.05 was considered statistically significant.

## RESULT AND DISCUSSION

This study involved 408 school adolescents who met the inclusion criteria. Based on gender distribution, the majority of respondents were female, totaling 239 individuals (58.60%), while 167 respondents were male (41.4%). The respondents were aged between 14 and 18 years. The majority were 15 years old, comprising 209 individuals (51.2%), followed by those aged 16 years, totaling 176 individuals (43.1%). These characteristics indicate that the study participants were predominantly in the middle adolescence phase, a critical period for the development of mindset, attitudes, and behaviors related to food selection. The relatively diverse composition of respondents based on age and grade level provides a representative overview of the condition of school adolescents in this study.

Table 1.  
Respondent characteristics (n= 408)

Respondent characteristics	f	%
Age		
14 years old	7	1.7
15 years old	209	51.2
16 years old	176	43.1
17 years old	15	3.7
18 years old	1	0.2
Gender		
Male	169	41.47
Female	239	58.67
Weight		
<40	38	9.3
40-50	202	49.5
51-60	126	30.9
>60	42	10.3

### Respondents' Knowledge Level on Healthy Eating Concepts and Food Additives

The results of the descriptive analysis indicated that the majority of respondents had a good level of knowledge regarding the concepts of healthy food and food additives. Respondents were generally able to accurately explain the definition of healthy food, identify the benefits of consuming healthy food for overall health, and distinguish between permitted and prohibited food additives. These findings suggest that, cognitively, most adolescents possess adequate basic understanding of balanced nutrition principles and food safety. This level of knowledge serves as an initial foundation for developing awareness of the importance of selecting safe and healthy foods within the school environment.

### Attitudes and Behaviors Toward Safe Food Selection

Although the respondents' level of knowledge was generally good, the findings revealed that not all respondents demonstrated attitudes and behaviors consistent with their understanding. Some respondents still tended to choose foods based on taste, price, and convenience rather than

considering food safety and nutritional value. This indicates a gap between cognitive aspects (knowledge) and actual behavioral implementation. In other words, good knowledge does not automatically translate into consistent decision-making regarding safe food selection.

Table 2.

Results of the test on the relationship between knowledge and attitudes and behavior in choosing safe food among school adolescents.

	Positive Attitudes and Behavior	Negative Attitudes and Behavior	Total	P value
Knowledge of Healthy Eating Concepts	326	7	333	
Lack of Knowledge of Healthy Eating Concepts	58	17	75	0.00

The results of the bivariate analysis showed a statistically significant relationship between knowledge level and attitudes and behaviors toward safe food selection among school adolescents. Respondents with higher levels of knowledge tended to exhibit more positive attitudes toward healthy foods and were more selective in choosing foods. Conversely, respondents with lower knowledge levels were less likely to consider safety and health aspects when selecting foods. That knowledge plays an important role in shaping adolescents' attitudes and behaviors toward food safety, although it is not the sole determinant in the food choice decision making process. The findings of this study indicate that most school adolescents possess a good level of knowledge regarding healthy eating concepts and food additives. Respondents were generally able to accurately identify the definition and benefits of healthy food, as well as distinguish between permitted and prohibited food additives. This suggests that, cognitively, adolescents have been exposed to adequate nutrition and food safety information.

Recent global evidence supports this finding. The World Health Organization (2022) emphasizes that strengthening nutrition literacy among adolescents is a key strategy in preventing diet-related non-communicable diseases. Increased access to school-based nutrition education and digital health information has contributed to improved awareness of healthy eating practices. Similarly, UNICEF (2023) reports that adolescents today have greater exposure to health and nutrition information compared to previous generations, although behavioral translation remains inconsistent. Despite the generally good knowledge observed in this study, not all respondents demonstrated positive attitudes and safe food selection behaviors. A proportion of adolescents continued to prioritize taste, affordability, and convenience over nutritional value and food safety. This gap between knowledge and behavior is consistent with contemporary health behavior frameworks, which recognize that knowledge alone is insufficient to drive sustained behavior change. A systematic review published in *Nutrients* (2022) found that although nutrition knowledge among adolescents was positively associated with healthier dietary patterns, environmental factors such as food availability, peer influence, and marketing exposure significantly moderated this relationship. Furthermore, a 2023 study in *Frontiers in Nutrition* reported that adolescents' food choices are strongly influenced by sensory preferences and social contexts, even when awareness of health risks is present.

The bivariate analysis in this study demonstrated a statistically significant relationship between knowledge levels and attitudes and behaviors toward safe food selection. Adolescents with higher knowledge levels were more likely to exhibit positive attitudes and selective food choice behaviors. This finding aligns with recent empirical evidence indicating that nutrition literacy plays a

foundational role in shaping adolescents' dietary decision-making processes, although supportive environmental and policy-level interventions are necessary to strengthen behavioral outcomes. The present study reinforces the importance of integrating nutrition education with structural and environmental strategies within school settings. Strengthening food labeling literacy, regulating the availability of ultra-processed snacks in schools, and implementing peer-led health promotion programs may help bridge the gap between knowledge and actual behavior.

## CONCLUSION

These findings suggest that knowledge plays a significant role in shaping adolescents' attitudes and behavioral tendencies toward safe food selection. However, knowledge alone is not sufficient to ensure consistent healthy behavior. Therefore, continuous and context-based nutrition education is necessary to promote sustainable behavioral change among school adolescents.

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