Journal of Biomedical Sciences and Health
e-ISSN: 3047-7182 | p-ISSN: 3062-6854
Available online at ejournal.unkaha.ac.id/index.php/jbsh

OPEN ACCESS

Vol. 3, No. 1, 2026 DOI: 10.34310/jbsh.v3.i1.292 Pages 9-16

Original Research

The Relationship Between Gender and Students' Knowledge and Attitudes Towards Healthy Snack Selection in Semarang City Public Elementary Schools

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ABSTRACT

Background: The habit of eating snacks at school is part of the diet of elementary school students who need attention related to their nutritional quality. Knowledge and attitude are often considered determining factors in choosing healthy snacks. **Objective:** This study aims to analyze the relationship between gender and students' knowledge and attitudes towards choosing healthy snacks at Semarang City State Elementary School. **Methods:** Quantitative study with cross-sectional design. The sample consisted of 74 students taken from 21 State Elementary Schools in Semarang City using quota sampling techniques. Data was collected through a structured questionnaire and analyzed using Chi-Square statistical tests. **Results:** The univariate analysis showed that the majority of respondents were female (59.5%), had good knowledge (89.2%), and had good attitudes (41.9%). The results of the bivariate analysis showed no relationship between gender and knowledge of healthy snack selection (p value= 1.00) and no relationship between gender and attitudes towards healthy snack selection (p value = 0.196). **Conclusion:** Gender is not a distinguishing factor in students' knowledge and attitudes towards healthy snacks. This suggests that school health interventions should focus more on strengthening the physical environment and the availability of healthy snacks in schools, regardless of gender.

Keywords: Gender; Knowledge; Attitude; Healthy Snacks; Elementary School

Received: 19 January 2026 | **Accepted:** 17 February 2026 | **Published:** 19 February 2026

Cite this article: Mulyawati, I., Zulfa, N., & Sudrajat, A. (2026). The Relationship Between Gender and Students' Knowledge and Attitudes Towards Healthy Snack Selection in Semarang City Public Elementary Schools. *Journal of Biomedical Sciences and Health*, *3*(1), 9-16. https://doi.org/10.34310/jbsh.v3.i1.292

1. INTRODUCTION

The phenomenon of snack consumption in the school environment in general has become an inseparable part of the daily lives of elementary school students. In Indonesia, the contribution of energy from snack foods to the daily intake of school-age children can reach 20% to 35% (Khomsan, 2010). However, the high frequency of this snack often cannot be accompanied by a guarantee of food safety and adequate nutritional quality for children's growth and development. This heavy reliance on street food carries worrying health implications if quality control is not monitored. This problem reaches a critical point at the primary school level, where children are identified as the most vulnerable group to digestive disorders and long-term risks such as malnutrition.

Improving nutritional literacy among schoolchildren is a global agenda outlined in the FAO's School-Based Nutrition Education program to reduce the double burden of malnutrition. In Indonesia, the government is implementing this commitment through a health promotion program involving community health centers (Puskesmas) in every elementary school. Theoretically, adequate nutritional knowledge is a key prerequisite for students to identify harmful food additives (BTP) and avoid excess calorie intake. However, at the local level, as observed in Semarang City, the effectiveness of this program still faces significant challenges. Despite various outreach efforts, the trend of unhealthy snack consumption in elementary schools in Semarang remains high, indicating that knowledge transfer has not fully transformed into behavioral awareness.

The city of Semarang, as one of the big cities in Central Java, has the characteristics of a school environment surrounded by a variety of street vendors with very high accessibility and easy to find. Although education about healthy snacks has been integrated into the curriculum and activities such as School Health Enterprises (UKS), students' consumption patterns still tend to be influenced by factors beyond their cognitive knowledge. This inconsistency between the level of knowledge and action raises fundamental questions about the effectiveness of conventional nutrition education at the elementary school level (Prawesti, D. et al. 2020).

This study aims to analyze the relationship between gender and students' knowledge and attitudes towards healthy snack selection in State Elementary Schools in Semarang City. The research question of this study is whether gender serves as a differentiating factor in students' nutritional knowledge and snack selection attitudes. Understanding this relationship is important for designing targeted, evidence-based health interventions that are appropriate regardless of student gender. The results of this study are expected to provide a new perspective for education and health policymakers in Semarang City in designing intervention strategies that not only focus on cognitive aspects, but also on school environment modification.

2. METHODS

2.1 Study Design

This study employed an analytical study design with a cross-sectional approach. This design was used to analyze the relationship between the independent variable, namely gender (sex), and the dependent variables, which included knowledge and attitudes about healthy snack selection in the school environment.

2.2 Participants

The study was conducted in Semarang City, involving 21 public elementary schools as research locations. The sampling technique used was quota sampling, where the researcher determined a quota of respondents that must be met to ensure representation in each school. The respondents obtained were 74 upper-grade students. Upper-grade students were considered key informants, having sufficient literacy to answer the knowledge and attitude instruments independently without parental assistance, thus minimizing subjective bias.

2.3 Interventions/Procedures

The initial stage of the research includes the management of research permits to the Semarang City Office and the Semarang City Health Office. The research was carried out in 21 schools where the research was located with the assistance of sanitarians from the local health center as enumerators. After permission was

obtained, the researcher provided an explanation of data confidentiality to the respondents. Data was collected through filling out questionnaires independently by students with guidance from researchers and sanitarians to minimize misunderstandings in the statement items, considering that the respondents were at the basic education level. This research was conducted for 2 months, from August to September 2024.

2.4 Data Collection

The research data used were primary and secondary data. Primary data came from a questionnaire designed to determine respondents' identities, knowledge, and attitudes regarding snack food selection. The questionnaire consisted of 15 questions using a Likert scale that had been tested for validity and reliability. Secondary data included reports from the Semarang City Health Office regarding foodborne disease cases

2.5 Statistical Analysis

The data processing process was carried out through editing, coding, and tabulating stages. Data analysis included univariate analysis and bivariate analysis. Univariate analysis examined the distribution of gender frequencies, as well as the categorization of students' knowledge levels and attitudes towards snack selection. Bivariate analysis was used to test the relationship between gender and students' knowledge and attitudes. The statistical test used SPSS software, and because the data were nominally categorical, this study applied the Chi-Square statistical test with a 95% confidence level. The results of this analysis aimed to determine whether there is a significant difference in knowledge and attitudes between male and female students.

3. RESULTS

Table 1 shows the frequency distribution of the respondents by gender, consisting of 30 male students (40.5%) and 44 female students (59.5%). Regarding knowledge of healthy snack selection, the majority of students (66 respondents or 89.2%) had good knowledge, while 8 respondents (10.8%) lacked knowledge. Furthermore, the distribution of attitudes toward healthy snack selection showed that 31 respondents (41.9%) had a good attitude, 30 respondents (40.5%) had an adequate attitude, and 13 respondents (17.6%) had a poor attitude.

Table 1. Univariate analysis results

Research Variables	n = 74	Percentage (%)
Gender		
Male	30	40.5
Female	44	59.5
Knowledge of Types of Healthy Snacks		
Know	66	89.2
Do not know	8	10.8
Attitude Towards Healthy Snack Selection		
Good	31	41.9
Enough	30	40.5
Less	13	17.6

Figure 1 illustrates the univariate distribution of three research variables. The gender distribution shows a higher proportion of female respondents (59.5%, n=44) compared to male respondents (40.5%, n=30), reflecting the actual composition of the sampled schools. With regard to knowledge, the vast majority of students (89.2%, n=66) demonstrated awareness of healthy snacks, indicating that nutritional education programs in Semarang City elementary schools have been effectively reaching students. In terms of attitude, the distribution was relatively balanced between good (41.9%, n=31) and adequate (40.5%, n=30) categories, with only a small proportion showing poor attitudes (17.6%, n=13). This pattern suggests that while knowledge levels are high, positive attitudes have not yet been fully consolidated among all students.

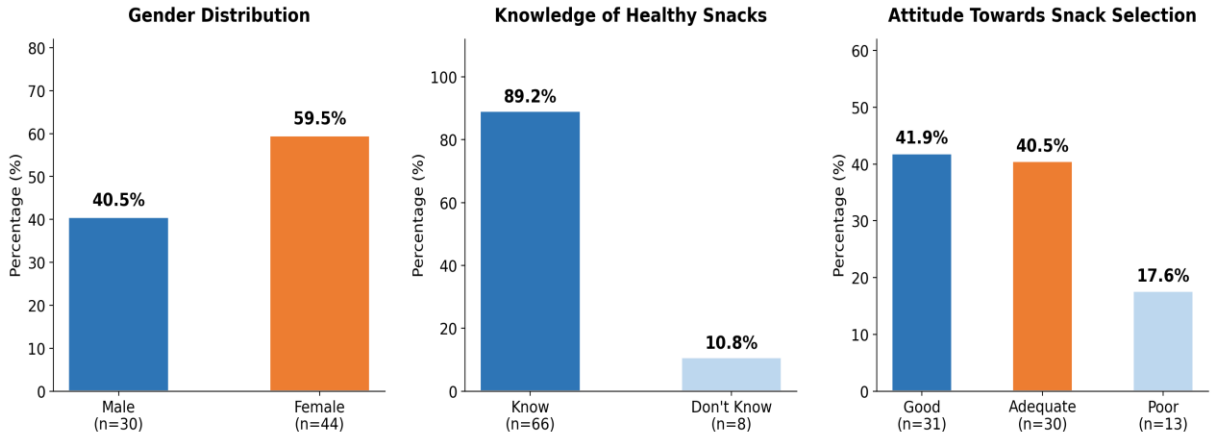

Figure 1. Univariate analysis: Distribution of research variables (n=74)

Table 2. Bivariate Analysis Results

Variable	Male (n)	Male (%)	Female (n)	Female (%)	Quantity (n)	Quantity (%)	P value
Knowledge							1.00
Know	27	36.5	39	52.7	66	89.2	
Don't Know	3	4.1	5	6.8	8	10.8	
Attitude							0.196
Good	10	13.5	21	28.4	31	41.9	
Enough	12	16.2	18	24.3	30	40.5	
Less	8	10.8	5	6.8	13	17.6	

Table 2 presents the cross-tabulation of knowledge and attitude by gender. Among the 66 respondents who had good knowledge, 27 (36.5%) were male, and 39 (52.7%) were female. Meanwhile, among the 8 respondents who lacked knowledge, 3 (4.1%) were male, and 5 (6.8%) were female. The Chi-Square test yielded a p-value of 1.00 ($p > 0.05$), indicating no significant relationship between gender and knowledge of healthy snack selection.

Regarding attitude, among respondents with a good attitude, 10 (13.5%) were male, and 21 (28.4%) were female. For those with an adequate attitude, 12 (16.2%) were male, and 18 (24.3%) were female. Lastly, for those with a poor attitude, 8 (10.8%) were male, and 5 (6.8%) were female. The Chi-Square test showed a p-value of 0.196 ($p > 0.05$), concluding that there is no significant relationship between gender and attitudes toward healthy snack selection.

Figure 2 presents the bivariate analysis comparing the distribution of knowledge and attitudes across gender groups. In the left panel (Gender vs Knowledge), both male (36.5%) and female (52.7%) students predominantly fell in the Know category, with only marginal proportions in the Dont Know category (4.1% male; 6.8% female). The near-identical proportional patterns across genders, confirmed by a p-value of 1.00, demonstrate the absence of any gender-based differentiation in nutritional knowledge. In the right panel (Gender vs Attitude), male students showed slightly higher proportions in the Poor attitude category (10.8%) compared to females (6.8%), while females dominated the good category (28.4% vs 13.5%). However, this difference was not statistically significant ($p = 0.196$),

indicating that observed variations are attributable to sampling composition rather than a true gender-based difference in attitude.

Taken together, both panels visually confirm the homogeneity of snack-related knowledge and attitudes across gender in this study sample.

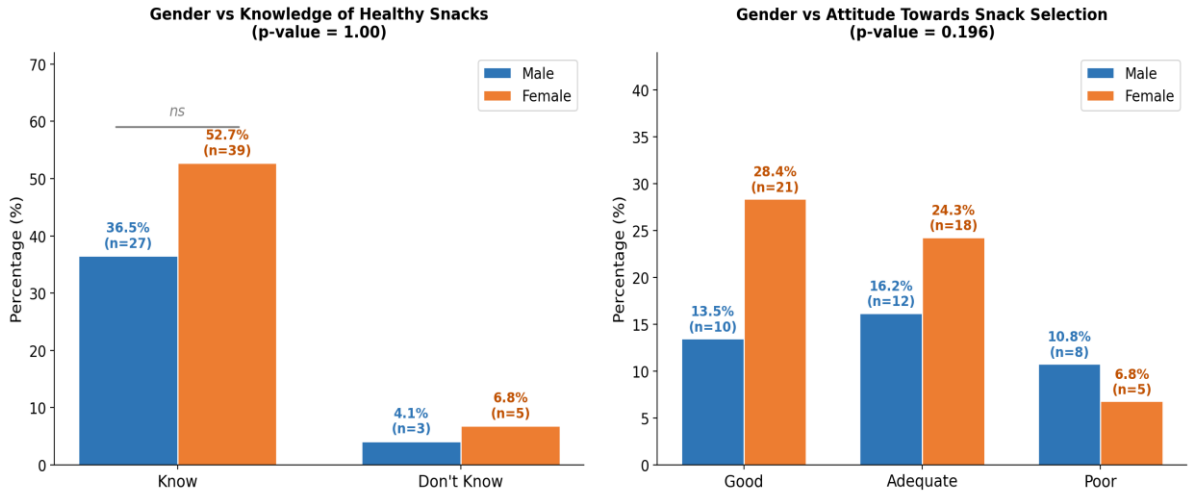

Figure 2. Bivariate analysis: Distribution of knowledge and attitude by gender (n=74))

4. DISCUSSION

4.1 Analysis of the Relationship of Sex with Knowledge

The results showed that there was no significant relationship between gender and knowledge of healthy snack selection (p-value = 1.00 > 0.05). This finding is in line with research conducted by Notoatmodjo (2014), which states that knowledge is more influenced by exposure to information, education, and experience, rather than by biological factors such as gender. At the elementary school level, materials on nutrition and health are provided uniformly through a formal curriculum, so that both male and female students have equal access to information. This is supported by research by Rachmadewi et al. (2021) conducted across multiple school sites in Indonesia, which found that students' nutritional knowledge and food choices tend to be homogeneous when the school food environment provides similar stimuli to all students, regardless of gender.

In addition to the similarity of the curriculum, the absence of a relationship between gender and knowledge can also be caused by the advancement of equal access to information technology for children in urban areas such as Semarang City. Today, male and female students have equal access to gadgets and social media that often contain information about health and lifestyle. In line with the findings of Sartika (2025), the frequency and context of snacking among urban school children in Indonesia are not significantly differentiated by gender, but rather driven by the availability and accessibility of snack vendors around the school. This reinforces the argument that in the ecosystem of modern urban society, children's dietary behaviors are no longer shaped primarily by biological sex differences, but by shared environmental conditions.

On the other hand, these findings also indicate that even though students' knowledge is already relatively high (89.2%), this knowledge does not necessarily transform into real behavioral actions. This phenomenon is supported by research by Khomsan et al. (2022), who emphasize that in elementary school-age children, external factors such as peer group influence and the visual appeal of snack packaging are much more dominant in determining purchasing decisions than gender background or knowledge. According to Lawrence Green's theory of behavior, knowledge is only a predisposing factor, while real behavior is more shaped by reinforcing factors (reinforcing factors) and enabling factors (driving factors). Therefore, even though male and female students have equal levels of knowledge, they still tend to consume less healthy snacks when the school

environment does not provide competitive healthy food options.

4.2 Analysis of the Relationship between Sex and Attitude

Based on the results of the statistical test, it was also found that there was no relationship between gender and attitude in the selection of snack foods (p-value 0.196). This suggests that the tendency or psychological response to snacking is not influenced by gender. This result is supported by Khomsan et al. (2022), who found in six public elementary schools in Indonesia that children's snack choices were primarily driven by taste preferences, visual appeal, and product accessibility rather than individual characteristics such as gender. Although some literature suggests female students tend to be more selective in food choices, in the context of school snacking environments, sensory factors such as savory taste, attractive colors, and affordability were equally strong determinants across both sexes.

The disconnect between sex and this attitude also confirms that in elementary school-age children, food preferences are more dominated by hedonic factors than functional health considerations. Research conducted by Mecheva et al. (2021) shows that male and female students have similarities in responding to the sensory appeal of snacks, such as savory taste and striking colors, which often overlook hygiene aspects. This indicates that students' positive attitudes towards healthy snacks are often "unstable" and easily change when faced with the availability of more appetizing snack products in the school area. Thus, the child's psychological tendency to choose snacks is more a reflection of the surrounding environment than the individual's gender characteristics.

In addition, sociocultural factors in the elementary school environment tend to create uniformity of attitudes through peer interaction (peer groups). The results of Mecheva et al. (2021) revealed through food choice experiments in Indonesian primary schools that peer influence operates asymmetrically when a peer chooses an unhealthy snack; other students are significantly more likely to follow, regardless of gender. In 21 SDN Semarang City, social interaction between male and female students that occurs intensively during break hours allows the transfer of the same snack habits. In line with the findings of Rachmadewi et al. (2021), the availability of snacks in canteens and street vendors around the school serves as a uniform stimulus for all students, thereby forming a homogeneous attitude pattern without significant differences between male and female students.

4.3 Homogeneity of Snack-Selection Behavior

The insignificance of the relationship in this study indicates that children's perception of snacks in Semarang City is universal among students. The absence of this difference can be caused by the phenomenon of "Peer Influence" or peer influence. According to Mecheva et al. (2021), who conducted food choice experiments in urban Indonesian primary schools, elementary school-age children demonstrate a strong tendency to conform to peer snack choices, particularly when peers choose unhealthy options. If the play group consumes a certain type of snack, then other students are likely to follow without considering their personal knowledge or attitude.

In addition, the availability of snacks around the 21 schools that were the location of the study tended to have the same characteristics, so the stimulus received by male and female students did not show significant differences. This uniformity of perception is also strengthened by the condition of the school environment in Semarang City, which tends to be homogeneous in serving types of snacks. Based on the results of observations in 21 schools where the research was located, the variety of food offered by street vendors and school canteens had similar taste and appearance characteristics. These findings are in line with the research of Rachmadewi et al. (2021), which states that the limited choice of healthy foods in the school canteen environment creates a normalization of low-nutrition snacks. When the environmental stimuli received by male and female students are identical, then their psychological responses and selection patterns will lead to the same point, so that gender differences no longer appear as a significant differentiating factor in statistical analysis.

Furthermore, the absence of this relationship confirms that snacking behavior in elementary school-age children is more situational than individual predisposition. Rachmadewi et al. (2021) found that in Indonesian school environments, the factors of accessibility and affordability of foods in school canteens were able to negate the influence of individual-level variables, including gender, on students' dietary behavior. This is further supported by Khomsan et al. (2022), who emphasized that the universal snacking patterns observed among Indonesian school children are shaped primarily by the physical environment and vendor characteristics around schools rather than students' cognitive knowledge. Thus, the insignificance of the relationship in this study proves that intervention strategies are not enough to target individual education, but must touch the level of environmental policies to break the chain of unhealthy snacking behavior collectively.

4.4 Study Limitations

This study has several limitations that should be acknowledged. The sample size of 74 students recruited across 21 different elementary schools implies a very small representation (approximately 3 to 4 students) per school. Consequently, the findings may not fully capture the specific environmental nuances of each school and should be generalized with caution. Future studies with larger sample sizes and proportional representation per school are recommended to provide a more comprehensive understanding of students' snacking behaviors.

5. CONCLUSION

Based on the results of research and discussion on the relationship between gender and knowledge and attitudes in choosing healthy snacks in elementary school students in Semarang, it can be concluded that the majority of students demonstrated a high level of knowledge about healthy snacks (89.2%) and showed attitudes towards snack selection that were predominantly in the good to adequate category. This indicates that basic nutritional literacy has been well conveyed in the school environment. There is no significant relationship between gender and students' knowledge about healthy snacks, confirming that nutritional knowledge is homogeneous and not determined by gender differences. Similarly, there is no significant relationship between gender and students' attitudes towards healthy snack selection, as male and female students exhibited comparable attitudinal patterns regarding snack choices at school.

ACKNOWLEDGEMENT

The authors express their deepest gratitude to the parties who have supported the implementation of this research: the Semarang City Education Office, which has provided permits and facilities in the data collection process, all respondent students who have been willing to take their time and participate honestly in this research, and colleagues who have provided criticism and suggestions for the perfection of this article.

Hopefully, the results of this research can make a positive contribution to the development of school health programs, especially in the Semarang City area.

CONFLICT OF INTEREST

The author reports no conflict of interest.

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