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ORIGINAL ARTICLE

The association between snacking habits and the incidence of diarrhoea among school-aged children at SD Negeri 060834 Medan Petisah

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ABSTRACT

Background: Diarrhoea remains a significant health concern among school-aged children, with snacking habits playing a potential role in its occurrence. Aim: This study aimed to examine the relationship between snacking habits (frequency, type, and consumption practices) and the incidence of diarrhoea among primary school students at SDN 060834 Medan Petisah. Methods: A cross-sectional study was conducted with 56 students in grades IV–VI. Data were collected using a structured questionnaire assessing snacking habits and diarrhoea incidence. Statistical analysis employed chi-square tests to determine associations. Results: The majority of respondents (60.7%) reported frequent snacking, with 58.9% exhibiting healthy snacking practices. No significant association was found between the frequency (p=0.549) or type (p=0.122) of snacks consumed and diarrhoea. However, unhealthy snacking practices showed a significant association with diarrhoea incidence (p=0.001), with 64.3% of students engaging in unhealthy practices experiencing diarrhoea. Conclusion: Unhealthy snacking practices significantly increase the risk of diarrhoea among schoolchildren. Interventions promoting hygienic and nutritious snacking habits are essential to reduce diarrhoea prevalence in this population.

Keywords: schoolchildren, snacking habits, diarrhoea, food hygiene

Introduction

School-aged children, as defined by the World Health Organization (WHO), are individuals aged between 7 and 12 years. Within this age group, dietary habits within the school environment play a crucial role, particularly concerning the consumption of snacks. Children in this age range are susceptible to various health issues that can arise from unhealthy food intake, including snacks frequently sold in the vicinity of schools.[1,2] One significant health consequence in school-aged children linked to snacking habits is diarrhoea. Clinically, diarrhoea is defined as a condition involving excessive loss of fluids and electrolytes due to an increased frequency of bowel movements (one or more times) with loose and watery stool consistency.[3] Furthermore, diarrhoea is characterised by an increased frequency of defecation beyond the normal limit (more than three times daily) accompanied by a change in stool consistency to liquid, often without blood or mucus. It is commonly caused by infections from microorganisms such as bacteria, viruses, and protozoa, with transmission occurring via the faecal-oral route.[4,5]

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Diarrhoea has become a significant global health problem, particularly in paediatric populations, and is categorised as a concerning gastrointestinal infectious disease.[6] School-aged children commonly access snacks from vendors in the school environment or canteens, as well as from vendors around their homes. The consumption of food with compromised safety has the potential to cause foodborne diseases, which can manifest as digestive disorders, including diarrhoea. Diarrhoea can lead to symptoms such as decreased appetite, abdominal pain, fatigue, and even weight loss.[7,8]

Diarrhoea is a disease closely associated with environmental conditions and is prevalent in almost all geographical regions worldwide. Epidemiologically, the spread of environment-related diseases in school-aged children remains high, particularly infectious diseases such as diarrhoea.[9,10] Children's susceptibility to diarrhoea is often due to their immature immune systems.[11] In developing countries like Indonesia, diarrhoea remains a significant public health issue. This is reflected in the high morbidity and mortality rates in children caused by diarrhoea.[12] To date, diarrhoea ranks as the third leading cause of death in children, with an estimated 1.5 million fatalities.[13] Based on the 2023 Indonesian Health Survey (SKI), the prevalence of diarrhoea in school-aged children (5-14 years) was recorded at 138,465 cases. Addressing the problem of diarrhoea in this age group requires attention and collaboration from various stakeholders, including the community, nation, and state.[14] Data from the 2020 Indonesian Health Profile show that infectious diseases, particularly diarrhoea, are a major cause of death in children.[15]

Research conducted by Dyna et al.[16] on the relationship between street vendor snack consumption behaviour and the incidence of diarrhoea at SD N 141 Pekanbaru showed that out of 53 respondents (74.6%) who had a habit of consuming unpackaged snacks, 28 respondents (39.4%) experienced diarrhoea. This result concluded that the consumption of unpackaged snacks potentially increases the risk of diarrhoea. Consistent with these findings, research by Chentia et al.[17] on snacking habits and the incidence of diarrhoea in primary school children at MI Al Musthofawiyah Palang Tuban found that almost all students who experienced diarrhoea had poor snacking habits, and most students experienced diarrhoea in the past month. Another study conducted by Shabhati & Adi[18] on the relationship between snack food consumption and the incidence of diarrhoea in school children in Surabaya showed that the majority of respondents (66.7%) had a moderate category of snack consumption, and 22.2% of respondents experienced diarrhoea. The data analysis of this study indicated a significant relationship between snack consumption and the incidence of diarrhoea in school children in Surabaya with a p-value of 0.03.

Based on a preliminary survey conducted by the researchers at SD N 060834, it was identified that many students consume snacks during break times. Several students reported that they frequently buy snacks at the school canteen and from vendors around the school environment, even though they bring packed lunches from home. This habit is supported by pocket money provided by parents, allowing students to purchase snacks daily at school. Foods sold in the school canteen include fried foods, meatball soup, ready-to-eat snacks, instant noodles, packaged drinks, and others. Initial observations by the researchers also indicated the absence of regulations prohibiting students from buying snacks outside the school, thus increasing the potential for the consumption of unhealthy snacks. This study aimed to analyse the relationship between children's snacking habits and the incidence of diarrhoea at SDN 060834.

Method

This research employs a quantitative approach using a cross-sectional design. The quantitative method was selected to test the formulated hypotheses regarding the relationship between snack consumption habits and the incidence of diarrhoea among primary school students. This research was conducted at Sekolah Dasar Negeri 060834 Medan Petisah. The selection of this location was based on consideration of the research problem and previously established objectives. Data collection for this research was carried out over a two-month period, commencing in February and concluding in March 2025. The population for this research comprises all students in grades IV, V, and VI enrolled at Sekolah Dasar Negeri 060834 Medan Petisah. The researcher included students from all three grade levels as the research population. The research sample in this study includes all members of the population, namely students in grades IV, V, and VI. The sampling technique used was total sampling, where all members of the population were included as research respondents.

Primary data in this research refers to data collected directly by the researcher from the respondents. Primary data collection methods included observation of students' snack consumption behaviour, anthropometric measurements (if relevant to the research), and the distribution of structured questionnaires

to students as respondents to obtain information regarding their snack consumption habits and history of diarrhoeal episodes. Secondary data in this research were obtained from records and documentation available at the school. The secondary data collected included information on student names, the total number of students in each grade, and student ages. This data was used to support and complement the information obtained through primary data collection. Measurements in this study assessed variables related to snack consumption habits, encompassing consumption frequency, types of snacks, and consumption methods, alongside the incidence of diarrhoea as the dependent variable. Each question in the questionnaire was designed to measure these aspects, with subsequent scoring and categorisation for each variable.

The frequency of snack consumption habits was measured using a Food Frequency Questionnaire (FFQ). This questionnaire aimed to collect data on the types and frequency of foods and beverages consumed by respondents, thereby elucidating individual snacking patterns. The FFQ involved respondents answering questions regarding the frequency and quantity of food intake, as well as information on any dietary supplements consumed. The collected data were used to estimate an individual's snacking habits and their association with health. The frequency of snacking habits was categorised into two levels based on the obtained scores: infrequent (score 1-10, Code 1) and frequent (score 11-20, Code 2).

The variable concerning the types of snacks consumed refers to the variety of light foods ingested by the respondents. The determination of the number of snack types and the level of consumption was based on questions within the questionnaire. Each question related to snack type was categorised as infrequent (score 1-20, Code 1) and frequent (score 21-40, Code 2). The methods of snack consumption reflect an individual's behaviour when consuming light foods. Important aspects of appropriate consumption methods include attention to snack hygiene and understanding the nutritional content of the products. This variable was categorised into two groups: appropriate snack consumption methods (score 1-5, Code 1) and less appropriate snack consumption methods (score 6-10, Code 2). Diarrhoea was defined as a gastrointestinal disturbance characterised by an increased frequency of bowel movements (BMs) to three or more times per day with a loose or liquid stool consistency. This condition can affect individuals across various age groups. In this study, the incidence of diarrhoea was categorised into two groups: no occurrence of diarrhoea (Code 1) and a history of diarrhoea (Code 2). The specific criterion for diarrhoea incidence was a report of liquid stools occurring three or more times per day.

Univariate analysis will be applied to each research variable separately. This method typically yields descriptions of the frequency distribution and percentages for each variable under investigation. Bivariate analysis will be used to examine and determine the presence or absence of an association between the dependent variable (incidence of diarrhoea) and the independent variables (frequency, type, and method of snack consumption). To test the significance of this association, the chi-square statistical test will be employed with a 95% confidence level (α=0.05).

Results

Table 1, presents the characteristics of the respondents (n=56) included in the study. The data is categorized by several variables: gender, age, school grade, frequency of snack consumption, type of snacks consumed, and snack consumption practices. Regarding gender, the majority of the respondents were male, accounting for 32 individuals or 57.1% of the total sample. The remaining 24 respondents were female, representing 42.9%. This indicates a slightly higher representation of male participants in the study.

In terms of age, the respondents were divided into two groups. A significant portion, 35 respondents (62.5%), were older than 10 years. The remaining 21 respondents (37.5%) were younger than 10 years. This suggests that the study population had a larger proportion of older children. Looking at school grade, the distribution across the three grades considered was relatively even. Grade 4 and Grade 6 each had 18 respondents, making up 32.1% of the sample each. Grade 5 had a slightly higher number of respondents, with 20 individuals representing 35.7% of the total. This indicates a balanced representation of students from these three consecutive grade levels.

The frequency of snack consumption revealed that a majority of the respondents reported consuming snacks frequently. Specifically, 34 respondents (60.7%) were classified as frequent snack consumers, while 22 respondents (39.3%) reported infrequent snack consumption. The type of snacks consumed mirrors the frequency of consumption. The same 22 respondents (39.3%) who reported infrequent overall snack consumption were also categorized under infrequent types of snacks, and the 34 respondents (60.7%) who

snacked frequently also consumed frequent types of snacks. This suggests a direct correlation between the frequency of snacking and the type of snacks typically chosen by the respondents.

Table 1. Respondent characteristics (n=56)

Variable	n	%
Gender		
Male	32	57.1
Female	24	42.9
Age		
<10 years	21	37.5
>10 years	35	62.5
School grade		
Grade 4	18	32.1
Grade 5	20	35.7
Grade 6	18	32.1
Frequency of snack consumption		
Infrequent	22	39.3
Frequent	34	60.7
Type of snacks consumed		
Infrequent	22	39.3
Frequent	34	60.7
Snack consumption practices		
Unhealthy	23	41.1
Healthy	33	58.9

Finally, concerning snack consumption practices, the data indicates that a larger proportion of the respondents exhibited healthy snacking practices. Specifically, 33 respondents (58.9%) were categorized as having healthy snack consumption practices, while 23 respondents (41.1%) were classified as having unhealthy practices. This suggests that, within this sample, a slight majority of the children tended towards healthier snacking habits.

Table 2. Association between the frequency and type of snack consumption, and the manner of snack consumption with the incidence of diarrhoea in schoolchildren

Variable	Diare				Total		*p-value*
	No		Yes				
	n	%	n	%	n	%	
Frequency of snack consumption							
Infrequent	9	16.1	13	23.2	22	39.3	
Frequent	10	17.9	24	42.9	34	60.7	0,549
Total	19	33.9	37	66.1	56	100.0	
Type of snack consumed							
Infrequent	11	19.6	12	21.4	23	41.1	
Frequent	8	14.3	25	44.6	33	58.9	0.122
Total	19	33.9	37	66.1	56	100.0	
Snack consumption practices							
Healthy	7	12.5	1	1.8	8	14.3	
Unhealthy	12	21.4	36	64.3	48	85.7	0,001
Total	19	33.9	37	66.1	56	100.0	

The first section investigates the association between how often schoolchildren consumed snacks and the incidence of diarrhoea. Among the children who snacked infrequently, 9 (16.1%) did not have diarrhoea, while 13 (23.2%) did experience diarrhoea. In contrast, among those who snacked frequently, 10 (17.9%) did not have diarrhoea, and a higher number, 24 (42.9%), did experience diarrhoea. Overall, out of the 56 schoolchildren in the study, 22 (39.3%) were classified as infrequent snack consumers, and 34 (60.7%) were frequent snack consumers. The p-value for this association is 0.549, which is greater than the conventional significance level of 0.05. This suggests that there is no statistically significant association between the frequency of snack consumption (infrequent vs. frequent) and the incidence of diarrhoea in this study population.

The second section examines the relationship between the type of snacks consumed (categorized as "Infrequent" and "Frequent" in the table, although the actual nature of these types isn't specified) and the occurrence of diarrhoea. Among the children who consumed the "Infrequent" type of snack, 11 (19.6%) did not have diarrhoea, and 12 (21.4%) did. For those who consumed the "Frequent" type of snack, 8 (14.3%) did not have diarrhoea, while a larger proportion, 25 (44.6%), did experience diarrhoea. Out of the total 56 children, 23 (41.1%) consumed the "Infrequent" type of snack, and 33 (58.9%) consumed the "Frequent" type. The p-value for this association is 0.122, which is also greater than 0.05. This indicates that there is no statistically significant association between the type of snack consumed (as categorized in the table) and the incidence of diarrhoea in this study.

The third section investigates the association between the manner of snack consumption, categorized as "Healthy" and "Unhealthy," and the incidence of diarrhoea. Among the children with healthy snack consumption practices, 7 (12.5%) did not experience diarrhoea, while only 1 (1.8%) did. Conversely, among those with unhealthy snack consumption practices, 12 (21.4%) did not have diarrhoea, but a much larger number, 36 (64.3%), did experience diarrhoea. Overall, 8 (14.3%) of the 56 children were classified as having healthy snack consumption practices, and a substantial majority, 48 (85.7%), were classified as having unhealthy snack consumption practices. The p-value for this association is 0.001, which is considerably less than 0.05. This indicates a statistically significant association between snack consumption practices and the incidence of diarrhoea. Specifically, the data suggests that schoolchildren with unhealthy snack consumption practices have a significantly higher incidence of diarrhoea compared to those with healthy snack consumption practices.

The findings suggest that while the frequency and the type of snack consumed did not show a statistically significant association with diarrhoea incidence, the manner of snack consumption, specifically whether it was classified as healthy or unhealthy, did have a significant association. Children who were identified as having unhealthy snack consumption practices experienced a significantly higher rate of diarrhoea compared to their counterparts with healthy snack consumption practices. This highlights the importance of promoting healthy snack consumption habits among schoolchildren as a potential factor in reducing the incidence of diarrhoea. However, it is important to note that this study only demonstrates an association, and further research may be needed to establish a causal relationship and to better understand the specific factors within "unhealthy" snack consumption practices that contribute to the increased risk of diarrhoea.

Discussion

This study's respondent profile revealed a predominantly male group, all over ten years old, with a relatively even distribution across the fourth, fifth, and sixth grades. A significant portion reported frequent snacking, with consistent snack types. Interestingly, a notable number also exhibited healthy snacking behaviors.

However, analysis of snacking habits and diarrhoea incidence among these primary school students yielded nuanced results. Neither the frequency nor the general type of snacks consumed showed a significant link to diarrhoea. In contrast, the manner of snacking – specifically, whether practices were healthy or unhealthy – demonstrated a significant association. Students engaging in unhealthy snacking were more likely to experience diarrhoea compared to their peers with healthier habits.

These findings suggest that while how often or what students snack on may not directly correlate with diarrhoea, how they snack is crucial. Unhealthy snacking practices appear to be a significant risk factor for diarrhoea in this population, highlighting the need for educational initiatives promoting healthy snacking among primary school students as a potential diarrhoea prevention strategy. While this study indicates an association, further research is needed to pinpoint the specific elements within unhealthy snacking practices that elevate diarrhoea risk and to establish a stronger causal link.

Echoing these concerns, a study in Muara Burnai Village II identified significant relationships between snack consumption frequency, snack choices, handwashing habits, and nail hygiene with diarrhoea. Notably, snack food choice was the most dominant factor (p-value=0.030), underscoring the importance of hygienic snack selection. This led to recommendations for schools to implement healthy canteen regulations to mitigate these risks.[19]

Research into street food consumption habits presents a mixed picture regarding its direct impact on diarrhoea. While some studies found no significant association, hygiene-related factors such as food quality, storage, processing, sanitation facilities, and food handlers' hygiene were significant predictors of E. coli contamination. Consequently, educational programs focusing on healthy snacks and regular canteen hygiene monitoring have been recommended.[20] Further supporting the role of snack characteristics, a study in Surabaya found a correlation between snack consumption frequency and diarrhoea incidence. The presence of contaminants in snacks was identified as a contributing factor, emphasizing the necessity of safe snack options.[18]

Discussion across various studies highlights that unhealthy snacking practices constitute a significant contributing factor to the elevated risk of diarrhoea among students. Poor snacking habits, encompassing the selection of nutritionally inadequate food items and a lack of attention to hygiene, such as inadequate handwashing and the consumption of snacks from unhygienic sources, have been identified as primary instigators of this health issue.[19,20] Furthermore, these studies indicate that the type of snack per se may not invariably be the direct cause of diarrhoea. However, the aspects of hygiene and food preparation methods for snacks play a crucial role. The manner in which snacks are handled, prepared, and stored significantly influences the risk of contamination and the potential for diarrhoeal incidence.[18,20] Another key finding is the effectiveness of educational interventions and school policies in mitigating the risk of diarrhoea. Enhanced student awareness regarding healthy snacking practices and the implementation of school policies supporting hygienic food handling have proven to be effective strategies. By providing a better understanding of the importance of selecting healthy snacks and maintaining hygiene during their consumption, supported by a conducive school environment, the risk of diarrhoea can be minimised.[19,20]

Conclusion

This study of 56 schoolchildren revealed that while the frequency and the broad type of snacks consumed did not show a statistically significant association with the incidence of diarrhoea ($p > 0.05$), the manner of snack consumption practices was significantly associated with diarrhoea ($p = 0.001$). Specifically, schoolchildren with unhealthy snack consumption practices exhibited a significantly higher incidence of diarrhoea compared to those with healthy snack consumption practices. This highlights the potential importance of promoting healthy snacking habits among schoolchildren as a strategy for reducing the occurrence of diarrhoea. However, this study demonstrates an association, and further research is warranted to establish a causal link and to identify the specific unhealthy snacking behaviors contributing to this increased risk. The demographic data indicated a slightly higher proportion of male respondents and respondents older than 10 years, with a relatively even distribution across grades 4, 5, and 6. A majority of the participants were classified as frequent snack consumers who also consumed frequent types of snacks.

References

1. Rousham EK, Goudet S, Markey O, Griffiths P, Boxer B, Carroll C, et al. Unhealthy Food and Beverage Consumption in Children and Risk of Overweight and Obesity: A Systematic Review and Meta-Analysis. Adv Nutr. 2022 Sep;13(5):1669–96.
2. Correa-Burrows P, Burrows R, Orellana Y, Ivanovic D. The relationship between unhealthy snacking at school and academic outcomes: a population study in Chilean schoolchildren. Public Health Nutr. 2015 Aug 3;18(11):2022–30.
3. Juliansyah E. Faktor yang Berhubungan dengan Pencegahan Penyakit Diare pada Balita di Puskesmas Tempunak Kabupaten Sintang. Gorontalo J Public Heal. 2021;4(2).
4. Boughattas S, Behnke JM, Al-Ansari K, Sharma A, Abu-Alainin W, Al-Thani A, et al. Molecular Analysis of the Enteric Protozoa Associated with Acute Diarrhea in Hospitalized Children. Front Cell Infect Microbiol. 2017 Aug 2;7.
5. Nemeth V, Pfleghaar N. Diarrhea. Treasure Island (FL): StatPearls Publishing; 2022.
6. Mokomane M, Kasvosve I, Melo E de, Pernica JM, Goldfarb DM. The global problem of childhood diarrhoeal diseases: emerging strategies in prevention and management. Ther Adv Infect Dis. 2018 Jan 7;5(1):29–43.
7. WHO. Diarrhoeal disease [Internet]. 2024. Available from: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
8. Sanin KI, Haque A, Nahar B, Mahfuz M, Khanam M, Ahmed T. Food Safety Practices and Stunting among School-Age Children—An Observational Study Finding from an Urban Slum of Bangladesh. Int J Environ Res Public Health. 2022 Jun 30;19(13):8044.
9. Santri IN, Wardani Y. Environmental risk factors for diarrhea Children under five years of age: A Cross-Sectional study in Indonesia. Public Heal Prev Med Arch [Internet]. 2023 Jul 1;11(1):5–13. Available from: https://phpmarchive.org/index.php/phpma/article/view/304
10. Muhammad Hilmi Mahmud, Md. Isa Z. Environmental risk factors of diarrhoea among vulnerable population: A narrative review. Malaysian J Public Heal Med. 2022 Aug 20;22(2):165–75.
11. Younis M, Rastogi R, Chugh A, Rastogi S, Aly H. Congenital Diarrheal Diseases. Clin Perinatol. 2020 Jun;47(2):301–21.

12. Ibrahim I, Sartika RAD. Faktor-Faktor yang Berhubungan dengan Kejadian Diare pada Siswa Sekolah Dasar di Kabupaten Lebak, Provinsi Banten, Indonesia. Indones J Public Heal Nutr [Internet]. 2021 Oct 30;2(1). Available from: https://scholarhub.ui.ac.id/ijphn/vol2/iss1/4/
13. Indriyani DPR, Putra IGNS. Penanganan terkini diare pada anak: tinjauan pustaka. Intisari Sains Medis. 2020 Aug 1;11(2):928–32.
14. Kementerian Kesehatan Republik Indonesia. Survei Kesehatan Indonesia 2023. Jakarta: Kementerian Kesehatan Republik Indonesia; 2023.
15. Kementerian Kesehatan Republik Indonesia. Profil Kesehatan Indonesia 2020. Jakarta: Kementerian Kesehatan Republik Indonesia; 2021.
16. Dyna F, Putri VD, Indrawati D. Hubungan Perilaku Konsumsi Jajanan Pada Pedagang Kaki Lima Dengan Kejadian Diare. J Endur. 2018 Oct 25;3(3):524.
17. Chentia H, Yunariyah B, Jannah R. Kebiasaan Konsumsi Jajanan Dengan Kejadian Diare Pada Anak Usia Sekolah Dasar di MI Al Musthofawiyah Palang Tuban. J Ilm Kesehat Mandira Cendikia [Internet]. 2024 Aug 24;3(8):221–9. Available from: https://journal.mandiracendikia.com/index.php/JIK-MC/article/view/1367
18. Shabhati B, Adi AC. Hubungan Konsumsi Makanan Jajanan dengan Kejadian Diare pada Anak Sekolah di Surabaya. Media Gizi Kesmas. 2023 Nov 30;12(2):713–8.
19. Effriyanda D, Putri DA, Purba IG, Razak R, Rosyada A. Factors Related to the Incident of Diarrhea in Elementary School Children in Muara Burnai Village II. J Ilmu Kesehat Masy. 2024 Mar 30;15(1):45–56.
20. Susilowati RP, Hartono B, Stephen BR. Literature Review: Pengaruh Kebiasaan Jajan dan Higienitas Jajanan terhadap Kejadian Diare pada Anak SD. J MedScientiae. 2022 Jun 27;1(1):28–39.