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Daily Milk Consumption of Public High School Students in Cilegon City

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ABSTRACT. *Milk consumption as an important source of nutrition for adolescents is still a concern in Indonesia, especially among public high school students in Cilegon City. This study aims to analyze students' daily milk consumption patterns and evaluate whether their intake meets recommended nutritional standards. A total of 372 students were selected proportionally from five public high schools in Cilegon City, namely SMAN 1 Cilegon, SMAN 2 KS Cilegon, SMAN 3 Cilegon, SMAN 4 Cilegon, and SMAN 5 Cilegon. The sampling was conducted using the Cluster Random Sampling method with the Slovin formula, and data collection was carried out through a digital questionnaire. The results showed that 60 percent of students consumed less than 200 ml of milk per day, while 11 percent did not consume milk at all. The average daily consumption was 123.078 ml with a 95 percent confidence interval ranging from 111.093 to 135.063 ml. These findings confirm that the majority of students do not meet the recommended daily milk intake. Considering the nutritional value of milk in supporting adolescent growth, this situation requires immediate attention. Educational programs and policy interventions are needed to improve milk consumption through school-based nutrition efforts. Integrating milk into school meals and increasing awareness through sustained education can help build healthier habits among students.*

Keywords: consumption; education; milk; nutrition; students

INTRODUCTION

Milk is a livestock product that is high in nutrition, so it can meet national nutrition targets. Milk is very synonymous with healthy food and is rich in protein content (Hamzah et al., 2022). Milk is a food source of high nutritional value because it contains various macro and micronutrients needed by the body. Macronutrients in milk, such as protein, fat, and carbohydrates, play a role in growth and development. Micronutrients such as calcium, vitamin D, and various other minerals support bone health and metabolism Compared to other foods with similar nutritional content, such as red meat, sea fish, and nuts, milk offers a source of vitamins and minerals at a more affordable price but still has a high nutritional value (Cimmino et al., 2023). Protein in milk even represents one of the best protein qualities whose value is comparable to animal protein in meat. The high water content in milk is around 87%, making milk the main solvent for important nutrients such as protein and minerals (Hamzah et al., 2022).

Regular consumption of milk can help fulfill daily nutritional needs. This is especially beneficial for children and adolescents who are in the growth period because at that stage, the body needs optimal nutritional intake to support physical and cognitive development. Milk also contains antibodies, such as immunoglobulins, that are beneficial in increasing the immune system of growing children (Hasibuan et al., 2024). Giving milk regularly, especially at breakfast or lunchtime, can be a simple but effective strategy in improving children's nutritional status. The type of milk recommended for consumption is unflavored (plain) liquid milk because it has a more complete nutritional content than other types of

milk. The recommended daily consumption for adults is one glass (200 ml), while for children it is at least two glasses (400 ml) to maintain bone health and prevent nutritional deficiencies (Hidayat & Anggraeni, 2021).

Although milk has many benefits, the reality is that the consumption level in Indonesia is still relatively low when compared to other countries. Badan Pusat Statistik (BPS) noted that in 2019, milk consumption in Indonesia only reached 16.23 liters per capita per year. This figure is far below the average milk consumption in developed countries such as the United States or countries in Europe. This low consumption is influenced by limited access, relatively expensive prices, and a lack of public awareness of the benefits of milk. In addition, the distribution of dairy products in rural areas is still limited, making it difficult for people to get milk regularly. This low consumption is a major challenge in efforts to improve the nutritional quality of the community.

The government is promoting a free lunch program for students as an effort to improve student nutrition. This program is an opportunity to increase milk consumption as part of a balanced diet. By including milk in the lunch menu, students are expected to get additional important nutrients that support growth and learning concentration. Milk contains the main minerals such as calcium and iron which play an important role in the formation of bones, muscles, and the circulatory system. Calcium is the most abundant mineral in the body, where around 99% is stored in bones and teeth, so it is very important for the optimal growth of the body skeleton (Yuliandri et al., 2023). Meanwhile, iron functions in the formation of red blood cells and hemoglobin which is responsible for transporting oxygen throughout the body, including the brain (Widia, 2023). According to the research of Chen et al. (2022), adequacy of iron has been proven to increase children's intelligence scores because enough oxygen in the brain supports the learning process and concentration.

In addition, milk also contains vitamin B12 which plays a role in maintaining nerve function and small blood vessels in the brain and helps maintain homocysteine levels to remain normal, thus supporting the cognitive function of the brain, namely the ability to receive, store, process, and remember information and solve problems (Zhang, 2019). Providing milk in this program can help students get better nutritional intake and create a healthier and more competitive generation. This program can also be an effective nutrition education tool for school-age children. Increasing access to and consumption of milk will be a long-term investment in the development of superior human resources (Suryana & Azis, 2025) Therefore, this study aims to examine the daily milk consumption patterns among public high school students in Cilegon City and to assess whether their intake meets the recommended nutritional standards. The findings are expected to provide insights that support nutritional interventions and inform future school-based food policies.

MATERIALS AND METHODS

1. Sampling Method

This study employed the Cluster Random Sampling method to obtain a representative sample of students from five public high schools in Cilegon City. According to Fadhillah et al. (2024), cluster sampling is advantageous due to its ease of implementation and cost-effectiveness, especially in reducing field survey expenses. However, this method also has limitations, such as greater variability between clusters and potential difficulty in accurately interpreting data. These weaknesses may influence the precision of results, particularly if the clusters differ significantly in characteristics. Despite these limitations, cluster sampling was

considered suitable for this study due to logistical and population-based factors.

2. Population and Sample Size Determination

The population of this study consisted of students from five public high schools in Cilegon City, namely SMAN 1, SMAN 2 KS, SMAN 3, SMAN 4, and SMAN 5. The total student population across all schools was 5,146 students. The sample size was determined using the Slovin formula, which considers population size and a margin of error of five percent. Based on this calculation, the required minimum sample was 372 students. This sample size was deemed sufficient to represent the overall population proportionally. The final sample distribution was organized into a table for clarity and reference.

3. Determining Sample Distribution per School

The sample was distributed proportionally based on the number of students enrolled in each school. Schools with larger student populations received a greater share of the sample to maintain representativeness. For example, SMAN 1 and SMAN 2 KS, having the highest student populations, contributed nearly a quarter of the sample each. This proportional allocation helped ensure fairness and accuracy in the analysis of milk consumption patterns. The final sample distribution was organized into a table for clarity and reference.

Table 1. Number of samples for each school

School	Samples
SMA N 1 Cilegon	98
SMA N 2 KS Cilegon	99
SMA N 3 Cilegon	67
SMA N 4 Cilegon	49
SMA N 5 Cilegon	59
Total	372

4. Data Collection Technique

Data collection was conducted through a digital questionnaire using Google Forms distributed to students in each school. Every student in the population had an equal chance of participating. This is in accordance with the Simple Random Sampling principle applied in each school cluster. This method is considered efficient in the data collection process. In addition, this technique ensures that the sample reflects the population distribution proportionally.

RESULT AND DISCUSSION

The following section presents the results of the study and discusses their relevance in the context of adolescent nutrition. Milk plays a vital role in supporting physical growth and metabolic functions during adolescence due to its rich nutritional composition, including protein, calcium, and vitamins (Cimmino et al., 2023). However, milk consumption among Indonesian adolescents remains far below recommended levels, reflecting gaps in both dietary behavior and public health awareness (Hidayat & Anggraeni, 2021). The results obtained from five public high schools in Cilegon City are analyzed to assess whether students' milk intake meets daily nutritional standards. This discussion also highlights the implications for nutrition education and school-based intervention programs aimed at improving students' dietary habits.

Figure 1 demonstrates a clear trend of low milk consumption among students, with most falling into the lowest intake category. This distribution shows that milk has yet to become a habitual component of students' daily diets. The dominance of minimal consumption levels suggests that adolescents in Cilegon may not perceive milk as essential to their health. This situation is particularly problematic considering that milk is a rich source of nutrients crucial for physical development during adolescence. As emphasized by Putri (2016), milk provides

protein, calcium, and various vitamins that support growth and strengthen the body.

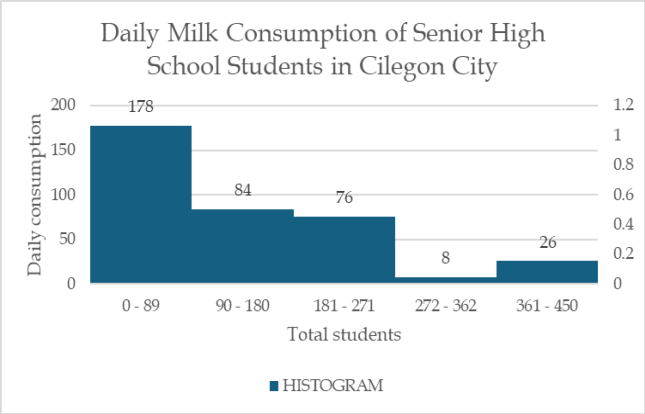

Figure 1. Daily milk consumption of senior high school students in Cilegon City

One contributing factor to this consumption pattern may be the lack of awareness among students regarding the benefits of milk for their health and cognitive performance. Without sufficient knowledge, students are less likely to include milk in their food choices or prioritize it in daily routines. The absence of consistent educational exposure about balanced nutrition in schools further reinforces this behavior. Yuliandri et al. (2023) argue that sustained nutrition education is critical to shaping positive dietary habits in adolescents. Therefore, schools play a central role in bridging this awareness gap through structured health and nutrition programs.

Improving milk consumption patterns among students requires practical, targeted interventions at the institutional level. Providing milk through daily school meals may increase students' access while encouraging regular consumption habits. This intervention has the potential to address both nutritional and academic outcomes in the long term. Asigbee et al. (2018) demonstrated that good dietary practices are positively linked to improved academic achievement. Consequently, integrating milk into school nutrition initiatives would be a strategic approach to build a healthier and more academically competitive generation.

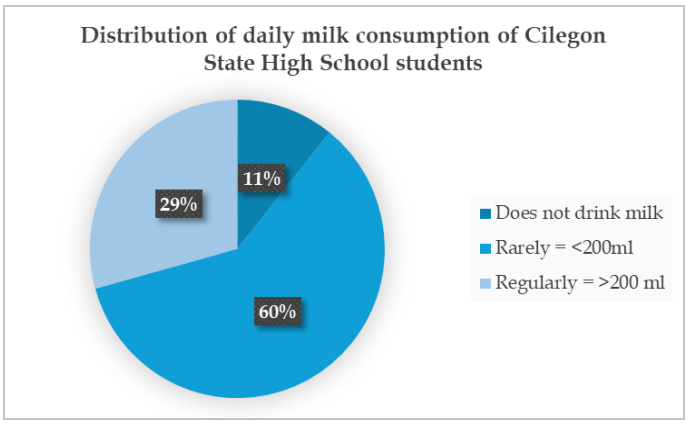

Figure 2. Distribution of daily milk consumption of Cilegon State High School students

Figure 2 reveals that a large portion of students either do not consume milk or consume it in insufficient quantities. This condition reflects a weak dietary habit that fails to

incorporate essential nutrients found in milk into students' daily intake. According to Putri (2016), milk is a critical source of macronutrients and micronutrients that support optimal growth in adolescents. The data underscores the urgent need to improve awareness of the nutritional value of milk and its role in daily dietary patterns. Addressing this issue requires more than knowledge—it requires access and consistent exposure within institutional settings.

One way to improve this pattern is through structured school-based interventions that include milk in regular meal programs. The Free Nutritious Meal (MBG) program introduced by the government is a relevant strategy to address this gap (Aji, 2025). By distributing milk directly through schools, the government can ensure equitable access and encourage consistent consumption habits among students. However, this policy must be supported with education to help students understand why milk is essential for their development. As Yuliandri et al. (2023) argue, sustained nutrition education is necessary to establish long-term behavioral changes in adolescent food choices.

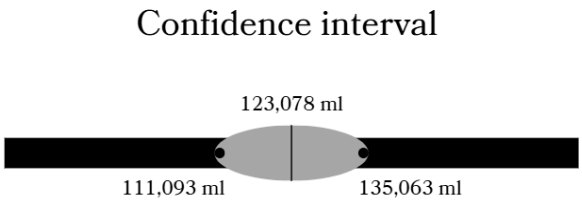

Figure 3. Confidence interval of daily milk consumption of Cilegon State High School students

The confidence interval in figure 3 demonstrates that the average milk consumption among students remains below the nutritional threshold recommended by health guidelines. Even at the upper limit of the interval, the consumption does not meet the minimum daily requirement of 200 ml for adults (Hidayat & Anggraeni, 2021). This result confirms that most students are not consuming enough milk to fulfill their nutritional needs. Such a gap in consumption may lead to long-term health issues if not addressed appropriately. Therefore, confidence interval analysis strengthens the case for intervention in adolescent nutrition programs.

The limited intake found within this statistical range reflects a deeper issue in the dietary habits of students. Milk is widely recognized for its role in supporting growth due to its high protein content and health benefits (Hamzah et al., 2022). Beyond macronutrients, milk also supplies essential micronutrients that contribute to bone strength and metabolic regulation (Cimmino et al., 2023). Failure to meet recommended intake levels suggests that students are not receiving these benefits consistently. As a result, the integration of milk into school nutrition policies becomes increasingly urgent.

CONCLUSION

The daily milk consumption of public high school students in Cilegon City does not meet the recommended nutritional standards. The average intake was 123.078 ml per day, indicating a general pattern of underconsumption. This highlights the need for improved school-based nutritional strategies to increase daily milk intake among students.

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organization

related to the material discussed in the manuscript. Conflicts of Interest should be stated in the manuscript.

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REFERENCES

Aji, W. T. 2025. Makan Bergizi Gratis di Era Prabowo-Gibran: Solusi untuk Rakyat atau Beban Baru?. *Naafi: Jurnal Ilmiah Mahasiswa*, *2*(2), 215–226

Asigbee, F. M., Whitney, S. D., & Peterson, C. E. 2018. The link between nutrition and physical activity in increasing academic achievement. *Journal of School Health*, *88*(6), 407-415.

Badan Pusat Statistik. 2019. Konsumsi Susu Indonesia 2019. Jakarta: Badan Pusat Statistik.

Chen, Z., Yang, H., Wang, D., Sudfeld, C. R., Zhao, A., Xin, Y., Chen, J. C., Fawzi, W. W., Xing, Y., Dan Li, Z. 2022. Effect Of Oral Iron Supplementation On Cognitive Function Among Children And Adolescents In Low And Middle Income Countries: A Systematic Review And Meta-Analysis. *Nutrients*, 14(24), 1-11.

Cimmino, F., Catapano, A., Petrella, L., Villano, I., Tudisco, R., & Cavaliere, G. 2023. Peran Mikronutrien Susu dalam Kesehatan Manusia. *Front. Biosci. (Landmark Ed)*, 28(2), 1-16.

Fadhillah, A. S., Rahmaniah, M., Putri, S. D., Febrian, M. D., Prakoso, M. C., & Nurlaela, R. S. 2024. Sistem Pengambilan Contoh Dalam Metode Penelitian. *Karimah Tauhid*, 3(6), 7228-7237.

Hamzah, B., Yulianti, K., & Rosidah, U. 2022. Kajian-Kajian Pengolahan Susu dan Kualitasnya Yang Berasal dari Hewan Ruminan (Kerbau, Sapi, Kambing, dan Unta). Indralaya: Unsri Press.

Hasibuan, E. V., Sipayung, R. R., & Etty, C. R. 2024. Optimalisasi Pemahaman Ibu Yang Memiliki Bayi Usia 0-6 Bulan Melalui Pendidikan Kesehatan Tentang Susu Formula di Klinik Pratama Paberna. *Journal Abdimas Mutiara*, 5(1), 240-247.

Hidayat, S. I., & Anggraeni, E. D. 2021. Mencermati Konsumsi Susu Dan Beberapa Faktor Yang Mempengaruhi. *SEMAGRI*, 2(1). 97-107.

Putri, E. 2016. Kualitas protein susu sapi segar berdasarkan waktu penyimpanan. *Chempublish Journal*, 1(2), 14-20.

Suryana, E. A., & Azis, M. 2025. Kebijakan Publik Berkelanjutan Untuk Tata Kelola Yang Lebih Baik: Program Makan Bergizi Membangun Manusia Unggul Untuk Indonesia Emas 2045. Lombok Tengah: Pusat Pengembangan Pendidikan dan Penelitian Indonesia.

Widia, A. P. 2023. Hubungan Asupan Vitamin B12, Folat, dan Zat Besi Dengan Perkembangan Kognitif Pada Anak Usia 3-6 Tahun Dengan Perilaku Picky Eating. Skripsi. Program Studi Gizi, Fakultas Psikologi Dan Kesehatan, Universitas Islam Negeri Walisongo.

Yuliandri, L. A., Rahmah, U. I. L., Widianingrum, D., Somanjaya, R., Imanudin, O., & Falahudin, A. 2023. Meningkatkan persepsi remaja terhadap susu melalui edukasi kandungan gizi susu di Kabupaten Majalengka.*BERNAS: Jurnal Pengabdian Kepada Masyarakat*, *4*(1), 795-801.

Zhang, J. 2019. Cognitive Functions of the Brain: Perception, Attention and Memory. *IFM Lab Director*, 1-33.