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Hygiene in primary schoolchildren and prevention of gastrointestinal diseases: Evidence from a cross-sectional study

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Abstract

Childhood hygiene plays a pivotal role in the prevention of gastrointestinal diseases; however, significant gaps in knowledge persist both within students' households and their school environments. The objective of this study was to assess the level of hygiene-related knowledge among children aged 11 to 12 years, and to analyze its correlation with gastrointestinal illnesses at the primary education level. An observational, descriptive, and cross-sectional study was conducted using a mixed-methods approach (qualitative and quantitative), involving a sample of 63 students. Data collection was carried out through a validated questionnaire, an observation guide, and a field diary. Findings revealed that 65% of the students had not experienced stomach infections, which appears to be linked to effective hygiene practices. Nonetheless, 11% of participants acknowledged not adopting any alternative hygienic measures when proper handwashing resources were unavailable. Regarding oral hygiene, only 25% of students reported brushing their teeth three times a day, while 70% did so only once or twice daily. Furthermore, 67% of the participants regularly consumed food either from the school's cooperative or through the school breakfast program. The study concludes that it is imperative to reinforce hygiene practices within the school setting, with a particular emphasis on oral hygiene, in order to promote their consistent application in students' daily lives.

Keywords: Hygiene; Gastrointestinal diseases; Children; Prevention; Children's health

1. Introduction

During the summer of 2025, a study was conducted in June on hygiene knowledge and practices to prevent gastrointestinal diseases in elementary school children in Chignautla, Puebla, Mexico. The study analyzed the relationship with gastrointestinal diseases within the Demographic Methods Course. This research was conducted at the elementary school "Benito Juárez" ("Benito Juárez" Federal elementary school) with CCT: 21DPR1216P and was prepared by the General and Community Medicine graduate team of the 2024 class at the BUAP Northeastern Regional Complex in Teziutlan.

Hand hygiene is considered an important intervention measure for pandemic public health threats, such as severe acute respiratory syndrome and avian influenza (Aiello et al., 2008). Although it is essential to get 11- and 12-year-old students to adopt various hygiene habits, such as handwashing, it can be complicated; several studies agree that this practice is one of the most effective and cost-effective ways to prevent common infectious diseases, such as gastrointestinal diseases, as indicated by Minda et al. (2024).

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Furthermore, hygiene in elementary school children is very important, as it helps us prevent gastrointestinal diseases. At this stage of life, it is essential to help them reinforce and maintain hygiene habits; Delgado et al. (2023) state that they are the leading cause of morbidity and mortality worldwide. Therefore, hygiene in childhood is a cornerstone for healthy development and disease prevention.

Most health problems affecting students can be prevented by promoting personal hygiene practices. Hand hygiene is a crucial intervention in the face of large-scale public health threats. Despite the efforts made by the institution to promote these habits, whether through informational posters, recreational activities, or related projects, obstacles still hinder their implementation, such as poor supervision, lack of knowledge about the consequences of poor hygiene, and the student's context.

The objective of this article is to examine the level of knowledge about hygiene practices among sixth-grade students at the "Benito Juarez" Federal Elementary School in the municipality of Chignautla, Puebla, and determine how these practices affect the prevention of gastrointestinal diseases. This approach is implemented through a mixed approach, including questionnaires, an observation guide, a field diary, and educational activities. The goal is not only to measure students' knowledge and awareness of hygiene but also to observe their behavior in the school environment and propose practical recommendations to help improve these habits and practices.

This analysis is based on the following research question: How do elementary school students' hygiene knowledge and practices impact their health? The prevention of gastrointestinal diseases and what strategies could be implemented to strengthen these habits? The research aims to provide useful elements for the design of more effective and context-adapted educational interventions that help prevent gastrointestinal diseases in children in the school environment.

The approach used was descriptive, as it allowed for the characterization of ideas, habits, and knowledge. A cross-sectional study with a mixed approach was conducted, as the information was collected at a single point in time, without follow-up. A complementary observational study was carried out. Recreational and educational activities were carried out, using post-diagnosis reinforcement tools, identifying both strengths and areas of opportunity. This decision was made due to the ease of understanding of the topic and the questions to be addressed. The research consisted of a total of 63 students between the ages of 11 and 12.

It was identified that 79% knew the importance of maintaining proper personal hygiene, while 21% only partially knew it, so further guidance was required. Furthermore, only 25% understood the importance of maintaining proper personal hygiene, by brushing their teeth three times a day; compared to the above, 70% do so once or twice a day, while 5% do not brush their teeth.

Therefore, it is necessary to implement more effective measures to improve the understanding and practices of personal hygiene, particularly in relation to dental care. This area is directly linked to gastrointestinal diseases, as the mouth acts as the main channel for food to enter the digestive system. Therefore, the goal is for children to develop a solid foundation in personal hygiene, promoting a healthy transition from childhood to adolescence.

2. Justification

Delgado et al. (2023) state that acute diarrheal diseases (ADD) are the leading cause of dehydration in children and represent a significant factor in morbidity and mortality worldwide. Therefore, hygiene in childhood is a fundamental pillar for healthy development and the prevention of infectious diseases, especially gastrointestinal diseases, as these represent one of the main causes of risk in the school population. Therefore, this study examines the hygiene knowledge and practices of sixth-grade primary school students. This study is of great importance because it is at this stage that habits that directly and indirectly influence children's health are reinforced.

Even though institutional and educational efforts are made to promote appropriate habits, behaviors that may seem minimal but lead to problems for children's health continue to occur. These practices include handwashing without soap, drying hands with clothes, or insufficiently brushing teeth. These actions, which were observed in the school setting, reflect a deterioration between theoretical knowledge and the practical application of hygiene measures among sixth-grade students at the Benito Juarez Federal Elementary School in the municipality of Chignautla, Puebla.

Therefore, this research seeks to gather information and generate greater health awareness among schoolchildren. This information contributes to academic knowledge and can be used by parents, teachers, and educational staff to optimally design educational intervention strategies. These strategies can also focus on reinforcing hygiene habits through practice and daily routines, which must be adapted to the students' school and cultural context.

In this case, the study was conducted with children between 11 and 12 years old, using a mixed approach that integrates quantitative and qualitative methods, as this research offers a broad perspective on the level of awareness, the observed behaviors, and the possibilities for improvement in the school environment. Furthermore, it demonstrates the effectiveness of recreational and participatory activities as a tool to promote self-care from childhood, thus preventing potential illnesses.

3. Theoretical Framework

According to Kebie et al. [1], the concept of hygiene is defined as the action of maintaining cleanliness both personally and in the space around us, particularly to prevent the spread of disease. Hygiene consists of eliminating any microorganism that can cause disease from an environment. Furthermore, the authors mention that the lack of hygiene and inappropriate hygiene systems in schools constitute one of the main obstacles in the educational field, significantly generating harmful habits within the primary sector. Worldwide, in 2019, approximately 2.4 billion people lacked adequate sanitation, 758 million lacked access to adequate water facilities, and 673 million people still lacked sewage services, forcing them to relieve themselves in places with inadequate conditions [1].

They also state that schools with poor cleanliness and high levels of close contact between people represent highly dangerous places for children. Students face a greater risk of contracting diarrheal diseases, severe respiratory infections, and other health problems related to personal hygiene in the school environment.

Furthermore, hygiene education in the school setting plays an essential preventive role against common communicable diseases in childhood, such as gastrointestinal diseases. In this context, research by Osman et al. [2] shows that both parents and teachers recognize the value of teaching basic practices such as handwashing, proper toilet use, and personal hygiene from an early age. These actions not only strengthen children's autonomy but also directly contribute to reducing common illnesses in the school environment. Furthermore, given that children spend a significant portion of their day at school and often replicate behaviors learned at home, this space becomes a key setting for promoting healthy habits in a structured manner.

On the other hand, Li et al. [3] mention that children attending childcare centers have been reported to be 2.2 to 3.5 times more likely to experience diarrhea, a common symptom of acute gastrointestinal illnesses (AGI). Many episodes in childcare centers are related to child-to-child or child-to-caregiver transmission; however, contamination of surfaces and staff hands can also be significant factors. Survey-based research is the second main method for investigating risk factors for acute gastrointestinal illnesses (AGI) in childcare settings. These studies generally aim to measure the level of adherence to relevant regulatory standards 11-13 or the effectiveness of key hygiene interventions (such as handwashing, diaper changing, and food preparation) [3].

Although the importance of hygiene in the school curriculum is recognized, its effective implementation faces several barriers. Osman et al. [2] point out that the lack of teacher training, the lack of teaching resources, and cultural and economic differences between families make it difficult to consolidate this knowledge in everyday school life. These difficulties are especially noticeable in socially vulnerable contexts. Therefore, the study emphasizes the need to promote comprehensive health education that integrates efforts between schools and families, in order to ensure consistent and effective teaching of essential hygiene practices from childhood.

It is important to mention that hand hygiene, healthy food preparation, and menstrual hygiene are examples of hygienic practices and behaviors that contribute to preserving health and preventing the spread of diseases [4]. Regarding food hygiene, Minda [5] states that the lack of awareness about food hygiene is causing the proliferation of microbial contaminants in a variety of foods, rendering them unhealthy and unsafe for consumption. The consumption of unsafe and unhygienic food exposes people to the possibility of developing multiple diseases, both chronic and acute, including diarrhea, cancer, heart problems, kidney disease, and birth defects.

Another important point to consider is that mentioned by Soe et al. [4], who mentions that diarrhea is the third most common cause of death in infants, accounting for 9% of deaths in children under five years of age worldwide in 2021. Diarrhea is represented by the presence of three or more Intestinal excrement of a liquid or semi-liquid consistency occurs within a 24-hour period. This condition can persist for several days, causing dehydration and a decrease in mineral salts, essential for health. The main cause of death associated with diarrhea is due to the rapid decrease in the necessary and essential amount of fluids in the individual [4].

Furthermore, these authors affirm that diarrhea occurs more frequently in situations where there are inadequate conditions of hygiene, cleanliness, and access to water for drinking, cooking, and even bathing. Several studies have

shown a correlation between drinking water and diarrhea in children. Likewise, appropriate health facilities are crucial to reduce the risk of diarrhea during childhood. Therefore, López-Luengo [6] conducted a study that analyzes and highlights the importance of including lessons about microorganisms in primary education. This should not only focus on scientific data but also on teaching about the connection between hygiene and health. Related to this, the risk of children developing diarrhea is linked to the way caregivers wash their hands. Access to handwashing facilities with soap and water in the home has been recognized as crucial for monitoring hygiene on a global scale [4]. Furthermore, they mention that children living in homes with adequate hygiene conditions were approximately three times less likely to suffer from diarrhea during childhood, compared to those living in homes with insufficient or even nonexistent handwashing facilities. This finding underscores the vital importance of hand hygiene in preventing diarrhea in children [3].

Arriola et al. [7] conducted research on the impact of enteroparasitosis, analyzing the role of health education in promoting health in children and their families. It is estimated that in Latin America, more than 40 million preschoolers are exposed to a type of intestinal parasite. It is added that parasitosis in children affects their intellectual and physical development. It highlights the importance of school health education and how it can effectively contribute to the control and prevention of parasitosis, as the school community and parents can avoid these diseases and their consequences by gaining knowledge about them.

The study was conducted on a population of 350 children aged 3, 4, and 5 from the state kindergarten in the La Perla-Callao district. This was achieved by taking stool samples from children and administering questionnaires to parents. Arriola et al. [7] found that of the 120 stool samples collected, the presence of some type of parasite was confirmed in 65 samples. Resulting in clear deficiencies in basic sanitation conditions, water quality, and hygiene in the community. Similarly, it emphasizes that this issue should be considered a public health and educational priority for prevention, calling for effective school health programs that include education and periodic health screenings.

Finally, Román et al. [8] mention that, in the city of Hermosillo, in the state of Sonora, Mexico, a program was created to prevent intestinal parasites. The program discovered that children ages 0 to 14 need more attention to hygiene and mental health because they have weaker immune systems and live in unhealthy environments. The authors mention that, in the absence of hygiene, morbidity increases; taking the necessary measures can reduce it by up to 45%. They emphasize that poverty is a factor of vulnerability to infections, since a certain degree of poverty can hinder the full development of a person's abilities.

4. Methodology

4.1. Study Design

A cross-sectional, observational, and mixed-methods study was conducted. The objective of the research was to determine students' knowledge and the hygiene practices implemented by sixth-grade students in an elementary school to prevent gastrointestinal diseases. This approach allowed for the collection of both quantitative and qualitative data, integrating a structured questionnaire and participatory activities in order to obtain a more complete view of the topic.

This was an observational study because no variables were manipulated, nor were there any interventions that would have altered students' behaviors. Their responses and behaviors were recorded as they occurred in their school context. In addition, recreational and educational activities were conducted, using a reinforcement tool after the diagnosis.

The descriptive approach was used, as it allowed for the characterization of children's ideas, habits, and knowledge about personal hygiene, identifying both strengths and areas for improvement. This was a cross-sectional study because the information was collected at a single point in time, with no subsequent follow-up. This allowed for a timely and representative overview of hygiene knowledge and practices within that specific context.

4.2. Population and Sample

The research was conducted at the “Benito Juárez” Federal Elementary School in the municipality of Chignautla, Puebla, during the 2024-2025 school year. Participants were selected using convenience (non-probability) sampling, selecting students from two sixth-grade groups. This decision was made due to the ease of understanding of the topic and the research questions. The sample consisted of a total of 63 students between the ages of 11 and 12.

4.3. Instruments

Three instruments were used for this research: a multiple-choice questionnaire, an observation guide, and a field diary.

The multiple-choice questionnaire was specifically designed to explore sixth-grade elementary school students' knowledge of hygiene. The questionnaire consisted of 10 questions, divided into three main areas: personal hygiene, food hygiene, and prevention of gastrointestinal diseases. The questions were designed to facilitate their completion.

The main objective of this instrument was to gather specific information about what students know about hygiene, with the intention of identifying possible areas for improvement in their daily habits. This instrument was developed by all members of the research team, taking into account the school context, the age of the participants, and the most relevant topics related to hygiene. Before its final administration, a pilot test was conducted with five students from the same school. This allowed for necessary adjustments and ensured that the questions were clear, understandable, and appropriate for the children's educational level. The questionnaire was administered in person in the classrooms of the two sixth-grade groups of the elementary school. In total, 63 questionnaires were administered, which took approximately 10 minutes per student to complete.

Furthermore, both an observation guide and a field diary were conducted to gather information not obtained from the questionnaires. The objective of the questionnaires was to gather more specific qualitative information on personal, group, and general hygiene within the institution. The observation guide covered student performance and observations regarding each category applied. Furthermore, the field diary provided important information for conducting an analysis of the school context and identifying strengths and weaknesses at the school.

4.4. Procedure

The survey was conducted on June 9, 11, and 13, 2025, focusing on the topic of hygiene knowledge and practices to prevent gastrointestinal diseases in elementary school children.

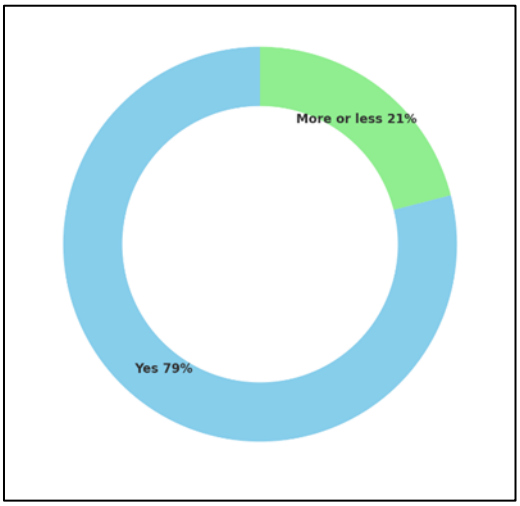
Figure 1 Memory Game Application. Sixth-grade students from the Federal Elementary School “Benito Juárez” conducting a memory game activity to provide feedback on what they have learned about hygiene habits

A 10-item questionnaire was conducted. It was piloted with five students from both groups before being administered. Once the pilot results were obtained, the questionnaire was modified. The research team was divided into two teams of three members to expedite data collection. Once the instrument was modified, it was administered to the participants after collecting the informed consent forms signed by the student's guardian. Once the data were collected, they were captured.

Based on the results obtained, three educational activities were conducted. A memory game with images was played. Related to healthy habits, the goal was to provide feedback to the students at the end of the game by implementing and highlighting the importance of what they could observe in the images. The topic of proper handwashing was divided into two activities. Group A participated in the practice, and Group B participated in an experiment called “Pepper Runs Away,” where it was simulated that pepper is the germs we constantly carry on our hands. These germs are eliminated by using soap and properly washing hands. A discussion about tooth brushing was also held, appropriate for their age. Finally, students were asked to draw pictures about hygiene, accompanied by a tip. At the end, each student received a toothbrush and was thanked for their participation in the research.

5. Results

The results obtained from the research instruments and fieldwork are presented below.

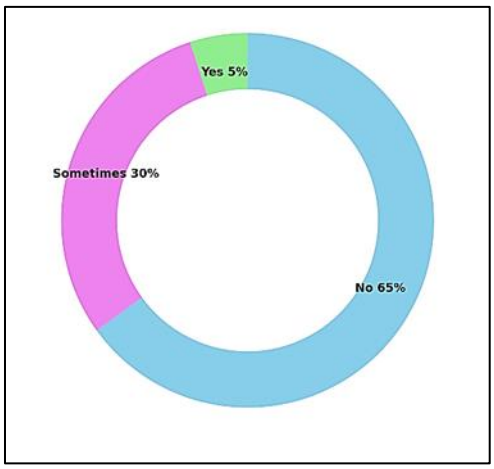


Note: 79% of students state they do know why it is important to maintain good personal hygiene, while the remaining 21% state they only have a vague understanding of it. This represents a significant percentage of students who need further guidance on this topic.

Figure 2 Knowledge about the importance of personal hygiene

In relation to the above, if students were to develop an illness of this type and share utensils, such as plates, glasses, or cutlery, this could present a serious problem, as there would be multiple transmissions.

The results obtained regarding knowledge about the importance of personal hygiene showed that 79% of students stated that they did know why good personal hygiene is important, while the rest stated that they had a poor understanding of it. This indicates that most students have a basic understanding of proper hygiene practices to prevent disease. However, observations conducted during the intervention showed that of the total number of students, only 62% wash their hands before and after eating and after using the bathroom, while 32% only practice these practices occasionally, and the remaining 6% practice them almost not at all. This demonstrates that, although most students have a basic understanding of proper hygiene practices, they do not apply them sufficiently or frequently, which could lead to a predisposition to acute gastrointestinal illnesses.



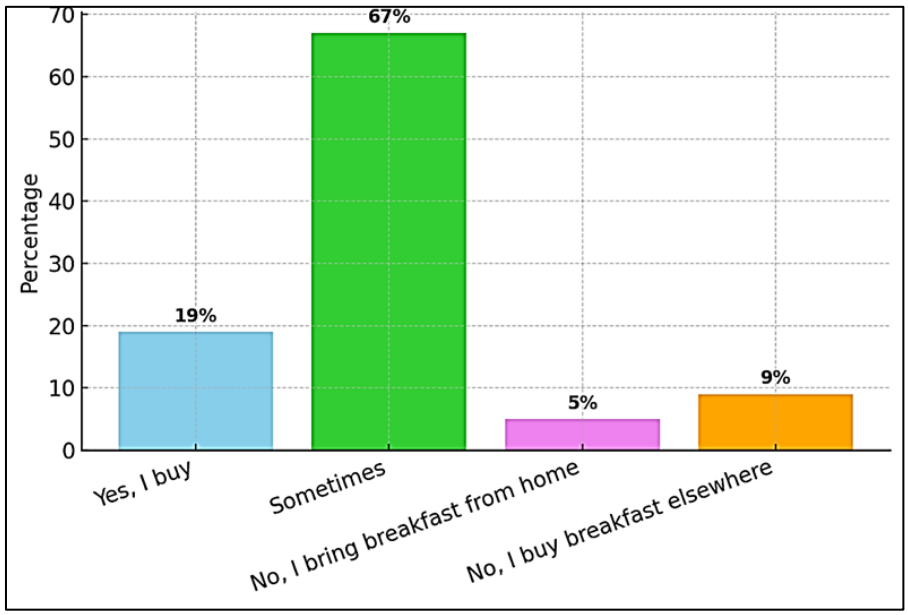
Note: 65% of students state that they do not share utensils such as glasses, plates, bottles, or cutlery with any of their classmates. 30% mention that they share these utensils occasionally, while 5% indicate that they do share them constantly, which represents a risk of disease transmission among students at the institution.

Figure 3 Sharing utensils among classmates

Furthermore, through the field diary, it was possible to notice that the staff serving in both the cafeteria and the school cooperative do not comply with adequate sanitation conditions, since the same staff who distribute and prepare the

food tend to be the same ones who receive the money, without washing their hands prior to doing so. This could lead to infections not only among students but also among the staff who handle food at the institution.

Figure 4 Work team, members of the 2024 Class of the Bachelor's Degree in General and Community Medicine of the Northeastern Regional Complex of the Benemerita Universidad Autonoma de Puebla (BUAP). (From left to right, top) Marisol García Luna, Gina Juliet Ortiz González, (from left to right, bottom) Valeria Martínez Palestina, Monserrat Martínez Lucas, Jesús Landero Pérez, and Paola Rojas Balderas



Note: 67% of students indicate they sometimes eat breakfast at the school cooperative, while 19% state they always buy their breakfast there. The remaining 9% indicate they do not buy at the cooperative but buy elsewhere, and the remaining 5% mention they bring their breakfast from home.

Figure 5 Food consumption in the school cooperative

Likewise, 65% of the students surveyed stated they had not experienced any stomach illness in the past two months, while 24% of students suffered from a gastrointestinal illness during this period. The remaining 11% of students do not recall having any symptoms during this period. Therefore, these figures are similar to those for handwashing, since the 62% of students who practice proper handwashing is close to the 65% of students who have not had a gastrointestinal illness in the past two months. This indicates that handwashing and basic hygiene habits truly have an impact on the health of participants.

Furthermore, if we focus specifically on students' knowledge of basic hygiene, it can be seen that 70% of respondents report having average to poor dental hygiene, as they brush their teeth between one and two times a day, while 25% do so three times a day. The remaining 5% do not. Therefore, it can be deduced that the majority of students have basic knowledge but do not perform optimally. Therefore, it is essential to provide students with proper guidance regarding these practices, since this 5% could be exposed to chronic gastrointestinal disease, as mentioned by Yano et al. (2021). Poor oral health has been associated with an increased risk of various types of cancer, including gastrointestinal cancer, mentioning only one problem associated with improper tooth brushing.

These results emphasize the close relationship between daily hygiene practices and students' overall health status. The fact that gastrointestinal illness prevalence aligns with the proportion of students practicing proper handwashing suggests a protective effect of these behaviors. However, the persistence of poor dental hygiene and inadequate alternatives to handwashing highlights gaps that could have long-term implications if not addressed. Strengthening both individual responsibility and institutional support is therefore critical to reduce preventable health risks and to promote sustainable hygiene habits among schoolchildren.

Below is a table with all the results obtained through the aforementioned questionnaire:

Table 1 Results obtained through a survey applied to sixth-year students

Topic	Percentages / Responses	Interpretation
Sex	56% boys, 44% girls.	Slight male predominance in the sample.
Age	52% are 11 years old, and 48% are 12 years old.	Most students are 11 years old.
Handwashing	62% always, 32% sometimes, 6% almost never.	38% present risk practices.
Drying method	83% with towel/paper, 14% with clothes, 3% do not dry.	The last two are sources of infection.
Toothbrushing	70% 1–2 times, 25% 3 times, 5% do not.	5% are at risk of dental and gastrointestinal diseases.
Dropped food	87% throw it away, 11% clean/blow it, and 2% eat it.	13% practice risky behaviours.
Water at home	86% bottled, 6% boiled, 8% tap.	8% are exposed to health risks.
Shared utensils	85% do not share, 10% occasionally, and 5% do.	Sharing increases the risk of contagion.
Alternatives without soap/water	75% use gel, 14% use clothes, and 11% use nothing.	25% at risk due to inadequate practices.
Stomach illnesses	65% no, 24% yes, 11% don't remember.	24% have been sick recently.
Consumption at the school store	67% sometimes, 19% always, 9% elsewhere, 5% bring food.	Most consume occasionally at the school.
Personal hygiene knowledge	79% yes, 21% more or less.	Greater guidance is required for the 21%.

Note: The topic section represents a general idea of the question applied in the survey. The results reveal that while most students show awareness of hygiene practices, there are still significant risk behaviors that could compromise their health. For example, although 62% always wash their hands, a notable 38% do not maintain this practice consistently, and only 25% brush their teeth the recommended three times a day. Likewise, the fact that 8% consume untreated tap water and 25% resort to inadequate alternatives when lacking soap or water indicates persistent vulnerabilities. These findings suggest the need for continuous educational interventions and stronger institutional measures to promote consistent and safe hygiene habits.

6. Discussion

The research sought to answer the question: How do the hygiene knowledge and practices identified among elementary school students influence the prevention of gastrointestinal illnesses, and what strategies could be implemented to strengthen these habits?

The results of this research showed a clear connection between the hygiene knowledge and practices of elementary school students and the prevention of gastrointestinal illnesses. 65% of the students reported not having experienced gastrointestinal illnesses in the past two months, which coincides with the percentage of students who report practicing adequate hygiene practices, such as washing their hands before and after eating and after using the bathroom (62%). This indicates that, although the majority of students have general knowledge of hygiene practices (79%), there is still a portion of the sample that requires further guidance on these practices, especially regarding the frequent application of hygiene habits. One of the main weaknesses observed is the lack of consistency between what students know and what they actually practice. For example, while the majority claim to know the importance of personal hygiene, only a fraction practice it properly and frequently. Furthermore, 11% of students acknowledged that they take no action when they lack the necessary supplies to wash their hands, which represents a significant risk for transmitting gastrointestinal infections, especially in a community setting like school. The lack of implementation of these hygiene habits is even more evident when observing that only 25% of students brush their teeth three times a day, which shows that oral hygiene is an aspect that needs to be improved and implemented more frequently.

At the institutional level, inadequate practices were also observed in the handling of food at the school cooperative, where the same staff handles money and also prepares food, without adequate hygiene, posing a direct risk of pathogen transmission. This is especially worrying since 67% of students occasionally consume their food from this location, and 19% do so regularly.

Furthermore, observations revealed an effort to promote hygiene habits within the elementary school itself: posters are posted in different areas of the school with hygiene-related messages, and soap is available in every classroom. There are even campaigns and projects related to the prevention of gastrointestinal diseases. However, significant gaps were identified in the actual implementation of these messages. For example, sinks were visibly dirty and neglected, and bathrooms were not adequately cleaned, which can discourage students from using them and ultimately contradict the purpose of the campaigns.

Another important factor is oral hygiene: only 25% of students report brushing their teeth three times a day, and a worrying 5% do not do so at all. Although 70% of those surveyed report brushing their teeth once or twice a day, this situation reflects both a lack of compliance and follow-through at home and at school. It is important to consider that, as Yano et al. point out, (2021), poor oral hygiene can even be associated with more serious chronic diseases, such as gastrointestinal cancer, reinforcing the need for more timely action in this regard.

Furthermore, the study has limitations that must be considered. The sample is limited to a single institution and a single educational level (sixth grade), making it difficult to generalize the results to other school populations. Furthermore, although a mixed-method approach was used, the study duration was short, making it impossible to evaluate the application of the strategies implemented during long-term educational interventions.

Despite these limitations, the information obtained offers important findings. First, it is clear that there is a need to implement ongoing school hygiene education programs, with the participation of both teaching staff and parents and guardians. It is also recommended to increase supervision and hygiene in school cooperatives and ensure the constant availability of basic supplies such as water, soap, and toothbrushes.

7. Conclusion

This study revealed that, although sixth-grade students at Benito Juárez Elementary School understand the importance of personal and food hygiene, their practices remain inconsistent, especially in areas such as proper handwashing and oral care. The school's conditions, particularly the lack of restrooms and improper food handling, further limit the effectiveness of hygiene promotion campaigns. Although the research was conducted in a single school, the results reflect the need to integrate hygiene into school and family culture with the support of teachers, parents, guardians, and health organizations. By reinforcing and implementing healthy habits from an early age, this study provides evidence that can guide sustainable educational programs aimed at improving child health and fostering healthier communities.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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