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¿Es la desnutrición influencia del bajo rendimiento escolar? Un estudio aplicado a los estudiantes de noveno grado de la Unidad Educativa "Juan José Flores", año lectivo 2022-2023, Sigchos Ecuador

Is malnutrition an influence on low school performance? A study applied to ninth grade students of the "Juan José Flores" Educational Unit, school year 2022-2023, Sigchos Ecuador

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Palabras claves:
Nutrición, rendimiento escolar, sobrepeso, estudiantes, factores.

Resumen

Introducción: La desnutrición es la deficiencia de alimentos ingeridos por el organismo, debido a una dieta inapropiada y tiene influencia en el bajo rendimiento escolar de los estudiantes. **Objetivo:** el objetivo general de este estudio es investigar la influencia de la desnutrición en el bajo rendimiento escolar de los estudiantes. **Metodología:** el diseño de investigación fue de campo con carácter explicativo, y con un enfoque cuantitativo, por cuanto este enfoque utiliza los análisis estadísticos. **Resultados:** Los resultados de esta investigación discrepan de la hipótesis planteada, pues los datos muestran que el interés académico, asimilación y retención de conocimientos por parte de los estudiantes analizados no están vinculados en lo absoluto a la desnutrición. **Conclusión:** la desnutrición no es la causa principal del bajo rendimiento escolar del grupo estudiado. Según las estadísticas de IMC/EDAD, este grupo podría desarrollar en un futuro sobrepeso y obesidad. Además, una de las posibles causas que se considera para el bajo rendimiento es el desinterés y la falta de responsabilidad de los estudiantes en el cumplimiento de las actividades académicas. **Área de estudio general:** Educación. **Área de estudio específica:** Dificultad de aprendizaje. **Tipo de estudio:** revisión bibliográfica y de campo.

Keywords: Nutrition, school performance, overweight, students, factors.

Abstract

Introduction: Malnutrition is the deficiency of food ingested by the body, due to an inappropriate diet and has an influence on the poor school performance of students. Objective: The general objective of this study is to investigate the influence of malnutrition on students' poor school performance. Methodology: The research design was field with an explanatory character, and with a quantitative approach, since this approach uses statistical analysis. Results: The results of this research disagree with the hypothesis proposed, since the data show that the academic interest, assimilation and retention of knowledge by the analyzed students are not linked at all to malnutrition. Conclusion: malnutrition is not the main cause of poor school performance in the group studied. According to BMI/AGE statistics, this group could develop overweight and obesity in the future. In addition, one of the possible causes considered for poor performance is students' lack of interest and lack of responsibility in fulfilling academic activities. General Area of Study: Education.

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Specific area of study: Learning difficulty. Type of study: literature and field review.

Introduction

This study delves into the underlying reasons for students' poor academic performance. Teachers were surveyed to obtain their professional opinions on the subject, which revealed discrepancies between students' self-perceptions of their academic performance and teachers' evaluations. In addition, students' responses pointed to a lack of interest in their schooling. Furthermore, a screening of nutritional status (BMI/age) using the WHO AnthroPlus software over a six-month period indicated a medically diagnosed overweight status. This article will discuss these results in detail, with the aim of shedding light on the complex interaction between students' perceptions, teachers' perspectives and nutritional factors that influence academic performance.

Because there is research suggesting a relationship between malnutrition and a lower level of intellectual performance, this study was carried out from this perspective, with the aim of demonstrating that eating habits and the perception that students have of their own study and learning process can significantly influence their academic results.

The aim of this study is to investigate the reasons for the poor academic performance of students. For this purpose, nutritional status was assessed medically using the WHO AnthroPlus software program over a period of 6 months. Teachers were surveyed to obtain their professional opinion on the matter. In addition, students were surveyed to obtain their views.

Quantitative research, observation and analysis of results, surveys were applied to teachers and students to contrast their perspectives on academic performance. Although students perceived themselves as having satisfactory performance, teachers' comments often contradicted this, indicating a discrepancy. In addition, the nutritional status of students was analysed over 6 months using the WHO AnthroPlus software, revealing an age-adjusted BMI suggesting overweight, the latter being reflected in results and conclusions. This comprehensive approach aims to clarify the complex interaction between perception of academic performance, school attitude and nutritional status of students.

Development

Bad eating habits influence the intellectual development and physical performance of the person, affecting their quality of life. According to(Alvarez, 2019)Malnutrition is a disease caused by poor micronutrient intake and absorption problems. A rich intake of essential nutrients could prevent this disease, which can manifest at any stage of life and

most frequently in childhood. Having timely information allows us to pay attention to our eating habits.

Malnutrition affects both the organic and psychological aspects.(Pollitt, 2002)supports the definition used by UNICEF, classifying malnutrition into three types: acute, chronic and global. Identifying these three types of nutritional imbalance is essential to understand the degree of impairment in intellectual development and performance capacity. (Martorell, 2007).

Health entities categorize this disease in relation to its degree of affectation. According to(Zamora Cevallos and others, 2019), around 200 million individuals belonging to the child population are affected by chronic malnutrition, which means that throughout their lives they will face the consequences of this disease. Also, around 13% of children who suffer from acute malnutrition need rapid procedures and permanent medical care.

Chronic malnutrition (low height for age) is defined as long-term and severe episodes that affect the individual's overall development throughout his or her life; while acute malnutrition (low weight for height) is defined as recent episodes that require the individual to receive medical attention and treatment for recovery.

Malnutrition is a handicap, and the effects can be expected in the short or long term. According to(Alvarez, 2019), due to a poor food consumption, the health of newborns begins with difficulties in their organism, and they tend to be born with a weight below the ideal, this effect being the cause of neonatal deaths, another preponderant factor is the delay in linear development in early childhood, difficulties in intellectual development(Paredes and others, 2019), academic performance, and also suffer from nutritional deficiency diseases including diabetes and cardiovascular diseases.

This nutritional deficiency disease can appear from conception, worsen in early childhood, and cause irreversible damage throughout life. According to(Santi-León, 2019)Malnutrition shows its short and long-term effects; the first can cause infant death by directly affecting their growth and intellect and the second affects healthy life and professional performance.

In this sense, its effects are irreparable and currently, due to inadequate intake of nutrients, it is affecting the performance and academic achievement of schoolchildren.

Poor childhood nutrition

It refers to a clinical condition that can be caused by different factors. As mentioned by Longhi et al., (2018), this medical condition in humans occurs as a result of insufficient food consumption or, in turn, it can also be caused by metabolic problems of the

individual, which meets a condition of temporality, that is, a long period, generating repercussions on the normal functioning of the organism. Malnutrition, characterized by a diet that does not provide the necessary nutrients for the cells of the human body to carry out their functions, can cause various situations that affect the health, well-being and even the learning process of the human being.(Lema et al., 2021) (Reyes and others, 2019).

Consequently, to this the(World Health Organization, 2024), created the Anthro software in 2007, which is a computer program designed to track growth and motor development in children, both individually and in populations up to 5 years of age. Its most current version, WHO AnthroPlus, collects growth information on school-aged children and adolescents up to 19 years of age. It incorporates the WHO Child Growth Standards from 0 to 5 years for the three applicable indicators, ensuring continuity. The default language of the software is English, but users have the option to change to French, Spanish, and Russian.

Consequences of malnutrition in early childhood

Malnutrition, especially in the early years of life, can have negative repercussions in adult life.(Pollitt, 2002), describes that in the short term, malnutrition can cause low weight, short stature, anemia, among other problems; while, in the long term, other conditions can arise such as short stature in adulthood, less muscle mass, limited work capacity and a high risk of metabolic and chronic diseases, such as obesity, hypertension and diabetes, among others. Therefore, the effects of childhood malnutrition are mainly manifested in the health aspect.(Longhi et al., 2018).

However, there are also direct effects on other areas of human development. In this sense,(Smulski, 2019), points out that malnutrition during childhood can have repercussions on the cognitive development of the individual, as it affects the functioning of the organism in the period in which cognitive abilities are developed, thus producing a slow development of intellectual functions, which is harmful, since it can produce irreversible changes in brain development. For this reason, malnutrition can have a negative impact on human learning by affecting the development of cognitive abilities that are involved in the teaching-learning process.

In short, malnutrition that infants may suffer, even before birth and during the first years of life, can have negative repercussions in the areas of health, physical development, growth, cognitive, affective, social and emotional development of the human being.

Malnutrition during school can represent an imminent risk to comprehensive child development. According to(Smulski, 2019)It is considered that childhood malnutrition in the first years of life affects the normal development of the cognitive area, decreasing the

subject's intellectual capacity, as well as physical and mental capacity, since the first years of life are essential for the growth and specialization of brain functions. In this way, school processes are affected, due to the nutritional status of students.

In this sense, the school as a fundamental educational entity must assume the social role of promoting and strengthening nutritional education, not only for students, but also for their families and the community, to prevent and reduce the rates of child malnutrition.

Low IQ

The IQ refers to a specified measure for the level of intelligence, so it is important to first understand the concept of intelligence. According to(Arias, 2013), refers to intelligence as a property or quality of the human being in which thought and language complement each other to favor the adaptive processes of people in their physical and social environment. From this perspective, intelligence is conceived as a brain ability that allows one to think, reflect and express oneself.

In this sense(Acosta et al., 2022), indicate that low IQ refers to a certain score obtained in tests or scales of intelligence measurement, generally less than 70 points, these deficiencies may be related to neurodevelopmental disorders. That is, they indicate a low level of development of intelligence skills in the person, causes of malnutrition, and difficulties in learning..

Causes of learning difficulties

In his studio(Fourneret & Da Fonseca, 2019), interpret that learning difficulties can originate from neurological or sociocultural aspects, which influence the skills of cognition, social integration and language. Therefore, these difficulties or disorders originate during the physical, physiological and emotional development of the student.

Poor academic performance

According to(Ocaña Noriega & Sagñay Llinin, 2020), studies based on iron deficiency in children determine a low level of development, while in adolescents it shows a lower intelligence quotient. Conclusively, in both cases there is a low level of performance and cognitive development, as a consequence of a nutritional imbalance.

So too(Santi-León, 2019)indicates that research has linked malnutrition to academic performance, the effects of which occur in the short or long term as long as the condition prevails, causing learning difficulties in schoolchildren. From this point of view, it is determined that the development of cognitive and interrelation skills are affected by this disease.

School lag

Academic delay is understood as a situation that can occur in the student population, in which students fail to acquire the learning and performance necessary to pass a certain educational level. As mentioned(Diez & De Pena, 2022), educational lag is mainly characterized by lower than expected academic performance, which can be caused by various reasons, such as excessive absenteeism, inequality in the level of development of each student, among others. From this perspective, it is considered an educational phenomenon that can occur due to different causes and in different contexts.

For its part(Roman C, 2013), describes that this phenomenon of school failure mainly affects vulnerable social groups, that is, students who come from families with low economic income, whose socioeconomic situation generates vulnerability and exclusion in the educational system, thus increasing the chances that these students fail to acquire the necessary learning and fail the school year. Therefore, school failure can be directly related to certain conditions of the student's family and social environment, which can even generate more serious problems such as dropping out of school.

School dropout

School dropout, for its part, corresponds to an educational problem in which there is a complete abandonment of the educational system by the student. According to(Hernández Miranda and others, 2021), the term desertion means to leave, therefore, when referring to school desertion we are talking about the student dropping out of school, that is, when they make the decision to completely abandon their studies. Abandoning their training process, therefore, has great repercussions both in their present and future life, since a lower educational level deprives the person of job opportunities in the current social context.

From the perspective of(Lopez Callirgos, 2017)There are different situations that can cause students to drop out of school, mainly grouped into five categories, such as psychological, socio-environmental, economic, organizational and interactional causes. These increase the possibility of the student having to abandon his or her studies completely.

Risk factors that influence poor academic performance

According to several experts such as(Pier, 2019),indicate that the risk factors that until the mid-2010 to 2020 decade influenced poor academic performance were; health conditions in boys and girls, malnutrition, constant change of teachers, economic income level of parents, previous school performance and the presence of males around them, however, recent research adds factors such as the fact that student values are not promoted

in families, not maintaining good self-esteem and even self-regulation of activities that are not part of the school system.

Economic Factors

Economic factors are of vital importance in child malnutrition, because they include low family income and extreme poverty, which results in economic discrimination. Since the availability of food for children depends on family income and government support, this factor determines the lack of these or the inability to acquire them, which affects the quality and quantity of the family basket that should contribute to the nutrition of children.(Nevárez Caldera and others, 2015)In this context, it can be said that in the province of Pichincha, the economic factor, together with the social factor, are the main causes of child malnutrition, with 26% of children affected by this problem. This shows the importance of combating one of the roots of this negative impact.

Socio-family factors

It has been proven that healthy family relationships, as well as healthy family support, are directly related to the degree of emotional well-being of the student, which has a significant impact on their level of learning and academic performance. The family relationship of adolescents is of vital importance because this is the fundamental basis of their mental health.

Most researchers agree that the family and its relationships with students are reflected in mental health, emotional and social activities that are evidenced inside the classroom, therefore, in academic performance, good emotional health, interpersonal relationships among others.(Botero Carvajal & Jiménez Urrego, 2020).

According to(Niebla & Hernandez Guzman Case, 2010)Among the factors that influence poor academic performance are family income, the academic level of parents, family expectations towards students, the cultural context and even the influences of teachers, which play an important role in the variables associated with the modus operandi of adolescents in the school environment; that is, family factors contribute to the interaction with the academic environment.

Consequences of poor academic performance

Learning Disabilities

In Ecuador, malnutrition in adolescents not only affects school performance, growth retardation and anemia affect indigenous and low-income groups, which translates into a rate of growth retardation and short stature that mostly affects young indigenous adolescents, however, rates of overweight and obesity are present in Afro-Ecuadorian adolescents.(Ramírez-Luzuriaga et al., 2020)However, due to the nature of this research,

it will focus on the approach to problems within the schooling process of adolescents in this situation.

As mentioned(Ramírez-Luzuriaga et al., 2020)In cases of extreme malnutrition, the human body is forced to focus on the activities most relevant to its survival, so that the student's energetic, biological and cognitive operations required for the correct use of learning will be relegated from the level of importance that this would have in the case of a healthy student.

The most relevant problems for adolescents with malnutrition are the conditions in the cognitive system, in the coding memory and in the educational memory; that is, students with malnutrition will have problems in the ability to encode, store and remember information.

In adolescents who are malnourished, their hearing capacity is the least affected for the types of delayed coding memory, while visual conditions have a greater impact because the brain is unable to process images correctly, meaning that coding or evocation memory is affected.

School stress

The factor most associated with school stress is violence.(Rodriguez & Monge, 2017)The personal failure of adolescents with poor intra-family relationships is not only reflected in their health, but also in their helplessness in the face of danger and suffering to which students may be subjected, since it has been proven that in many cases these adolescents have grown up believing that they are guilty of the circumstances in which they live. Although school stress is a product of malnutrition in students, there may be other causes in the social-family environment that affect this emotional and health state in students.

School stress is a repercussion of the environment in which the student finds himself. According to(Contardo Ayala and others, 2024),Stress management, as well as its prevention, is a reason for identifying, taking action, analyzing and evaluating each particular case. From the teaching staff, the execution of physical activities, specifically skating, is a highly recommended strategy for the treatment of adolescents who are in this state of physical, mental or emotional pressure.

Methodology

This research study is explanatory in nature with a field research design and a quantitative approach, since this approach uses statistical analysis. It is based on the collection, measurement of parameters, obtaining frequencies and population statistics. It poses a delimited and concrete study problem. Its research questions deal with specific issues.

The quantitative approach to analysis focuses on numerical and statistical data, which allow us to understand the phenomenon under study, so that patterns of behavior can be established and theories can be tested, from a systematic approach.(Jung, 2019).

The sample selected for this study was 40 students from the ninth years of General Basic Education parallel A and B of the Educational Unit "Juan José Flores" and 10 teachers who taught the different courses to these basic grades, during theschool year 2022-2023.

Linked to this, the software used for the study was WHO AnthroPlus, a tool designed for the global application of the WHO 2007 Reference for monitoring the growth of school-aged children and adolescents aged 5 to 19 years. The default language of the software was Spanish.

Within the framework of the methodology employed in this study, the use of the relevant indicators provided by the WHO AnthroPlus software was implemented. This approach was carried out over a period of six months with the purpose of comprehensively assessing and understanding the nutritional status, with the Body Mass Index for Age (BMI/AGE), of the aforementioned students. The software allowed for accurate and standardized monitoring of the anthropometric data collected, thus providing a comprehensive assessment of the nutritional health of the students during the aforementioned period. This methodological approach will significantly support the reliability and validity of the results obtained in relation to the nutritional status of the student population under study.

It should be noted that the results generated byWHO AnthroPluswere monitored from March 14, 2023, to September 15, 2023. These data were subsequently analyzed by highly trained health professionals, so that the interpretation of these results played a decisive role in the analysis of the data and in the subsequent presentation of the results.

Results

The results of this research reveal that, in the national government's school snack program during the 2022-2023 school year, seven participants believe that the PAE program benefits the physical and intellectual development of students by providing nutrients and maintaining vitality in classes. In contrast, three teachers believe that the snack does not provide nutritional benefits due to the presence of sweeteners and preservatives in food.

Regarding the comprehension and acquisition of knowledge that teachers have observed in 9th grade students with respect to the subjects they teach, the results show that six teachers rate the level of comprehension and acquisition of knowledge as good, that is, the range of scores is between 7 and 8 points. While the other teachers rate it as very good and average. The respondents have stated that the criterion for this rating is based on the score obtained in both written and oral lessons.

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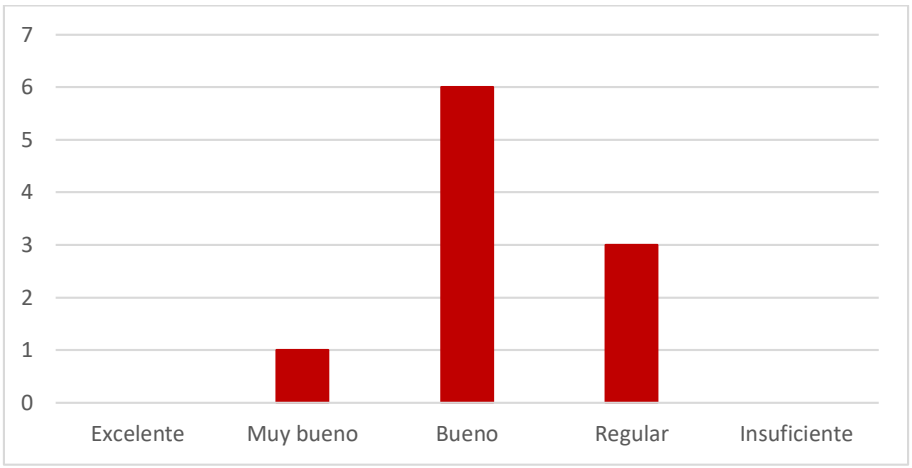
Figure 1

Understanding and acquiring knowledge



Note:teachers' perspective on the level of understanding and knowledge acquisition observed in 9th EGB students with respect to their subject.

Likewise, 9NO EGB teachers, in response to the survey, unanimously agree that good health has a positive impact on students' academic performance. All respondents emphasize that good health is essential for concentration and dedication to schoolwork. In addition, they point out that an adequate diet with nutritious products favors attention in class, improving both physical and mental state, contributing 100% to educational performance and future academic success. In conclusion, a diet rich in vitamins and nutrients is perceived as key to successful development in the academic field.

Indeed, how could this problem be solved so that their performance improves? The following figure presents the solutions proposed by teachers to improve students' academic performance. The four main options are: methodological strategies, talks and training, study habits and tutorial action plans. Most teachers who teach multiple subjects to 9th EGB prefer to use active methodological strategies, including gamification and motivation, as a solution to low performance. To a lesser extent, some choose talks and training for parents to improve eating habits and the selection of nutritious foods. Finally, the least selected options are study habits and tutorial action plans.

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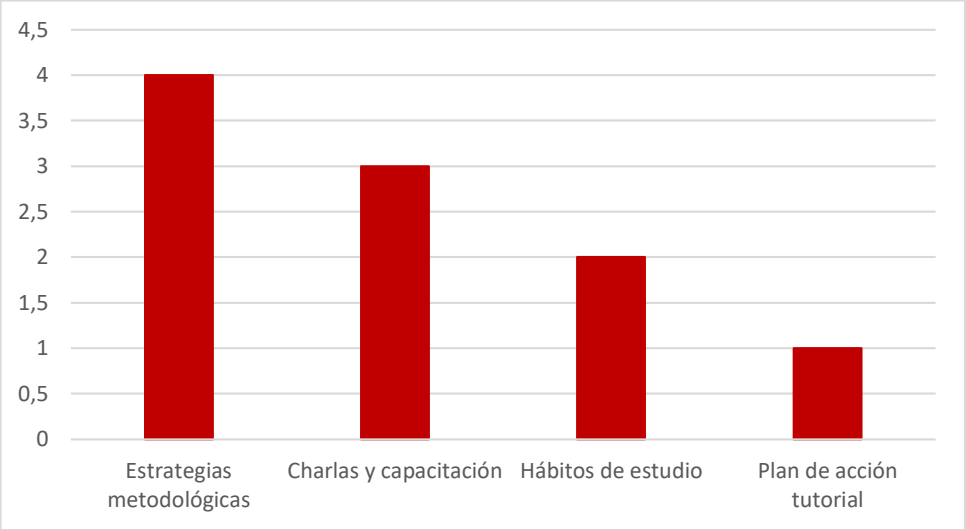
Figure 2

Solution to the problem



Note: Solutions from a teaching perspective, so that students can improve their academic performance.

At the same time, the analysis of the results of the survey of Ninth Grade Students of the "Juan José Flores" educational unit during the 2022-2023 school year reveals the following:

The study reveals that 60% of students eat three meals a day, being the most common option, while 20% opt for four meals, and 18% eat two meals a day. Regarding daily meat consumption, 55% include it in one meal, 25% in two, 12% in three, and 8% do not eat it. Regarding the type of breakfast, 32% choose strained meat, followed by 28% who prefer milk/eggs, and 25% opt for coffee/aromatic water. In addition, 57% include vegetables in their lunch or snack, 20% consume proteins, 13% choose carbohydrates, and 10% prefer fruits. These results highlight significant dietary patterns among students, offering valuable insights to improve nutritional habits; however, the results rule out the presence of malnutrition in the sample studied.

Table 1

Foods that students consume in their daily lives

Alternatives	Frequency	Percentage %
1 time a day	1	2%
2 times a day	7	18%
3 times a day	24	60%

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Table 1

Foods that students consume in their daily lives (continued)

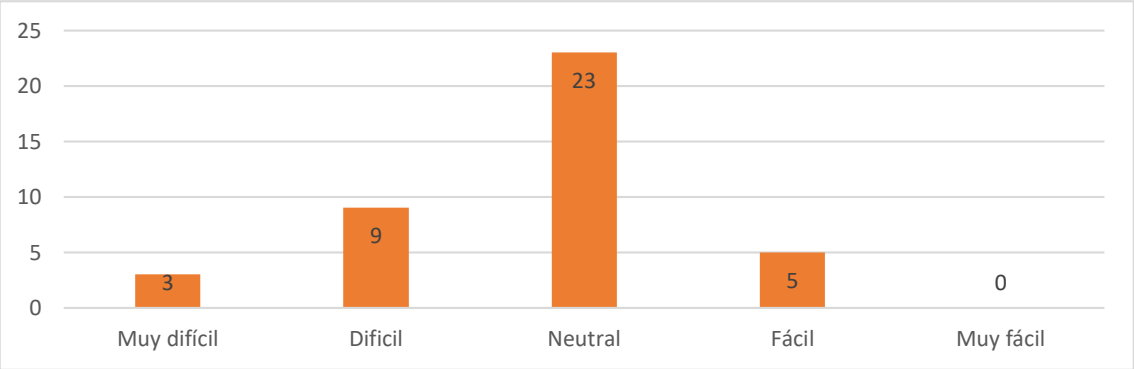
Alternatives	Frequency	Percentage %
4 times a day	8	20%
5 times a day	0	0%
Total	40	100%

Note: Data taken from the survey applied to ninth grade students of the "Juan José Flores" Educational Unit, school year 2022-2023.

Regarding the initial level of study, it is observed that 40% began in preparatory education, 30% in early education and 27% in the MIES Children's Center. Regarding school performance, 50% consider their performance as "good", 37% rate it as "very good", and only 5% describe it as "excellent". Regarding motivation to learn, 37% have a "very good" motivation, 32% describe it as "good", and 20% as "excellent". Regarding the understanding of content in class, 58% indicate a "neutral" understanding, while 13% find it "easy" to understand and remember the content. These results offer a detailed view of the academic and motivational level of the students. Regarding the impact of food and rest on learning, 65% believe that adequate food and rest would improve their learning.

Figure 3

Understanding the contents in class



Note: Student response to the question, How do you find it to understand and remember the content learned in class?

The results also suggest that, although the majority have regular eating habits and adequate rest, there are areas for improvement, especially in the understanding of content in class and the level of motivation. The connection between a balanced diet and academic performance is highlighted by the majority of respondents. In connection with this, the results are presented.of nutritional status (BMI/AGE)Data obtained from WHO AnthroPlus software, monitored from March 14, 2023 to September 15, 2023, were subjected to exhaustive interpretation by highly trained health professionals.

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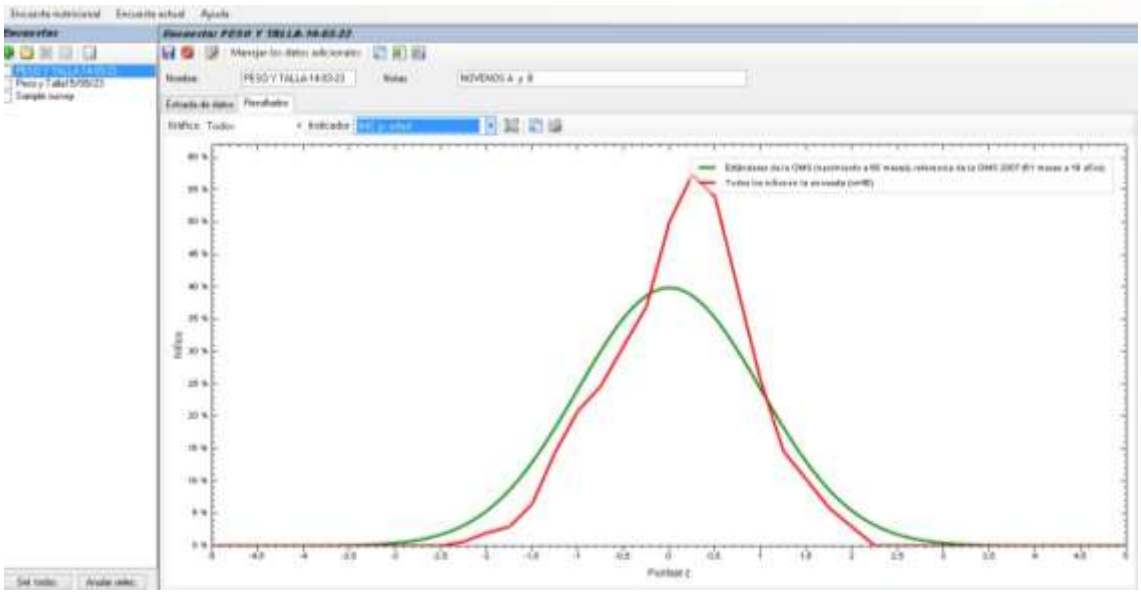
Figure 4

Initial nutritional status (BMI/AGE) of students



Note: Initial nutritional status (BMI/AGE) of ninth-year students "Juan José Flores" Educational Unit in the 2022-2023 school year, theMarch 14, 2023.

Figure 4 presents the results of the nutritional status (BMI/AGE) of children in the Ninth Year A and B. As can be seen in this graph, nearly 60% of students in these courses have some type of nutritional problem related to overweight and obesity; while the remaining 40% have normal z scores (+2 to -2); however, there is a small tendency to suffer from overweight or obesity according to their z score greater than +1.5 but within the range.

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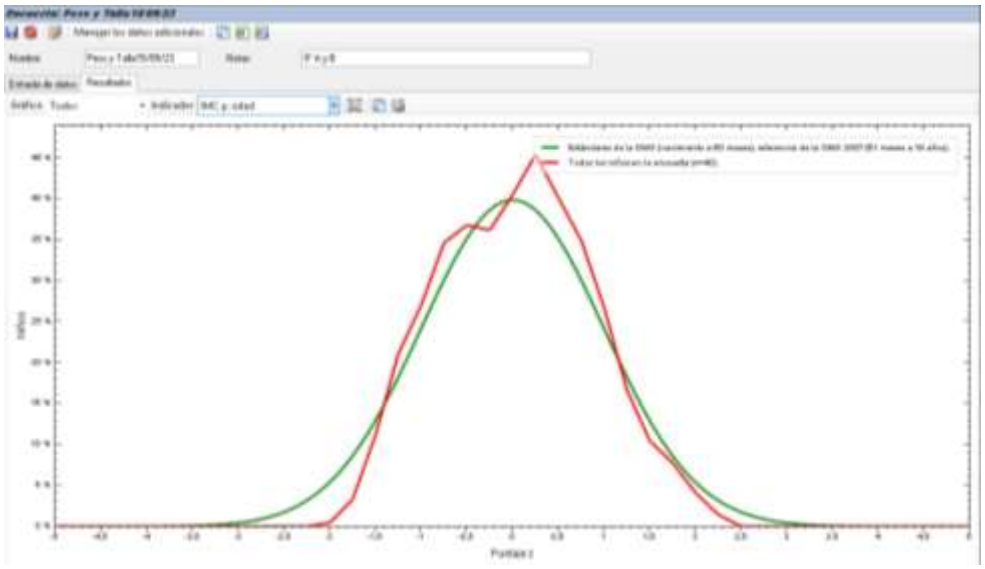
Figure 5

Final nutritional status (BMI/AGE) of students



Note:final nutritional status (BMI/AGE) of the Ninth Year students of the "Juan José Flores" Educational Unit in the 2022-2023 school year,September 15, 2023.

Figure 5 shows the results of the nutritional status (BMI/AGE) of children in the Ninth Year, parallel A and B. As can be seen in this graph, 45% of students in these courses have some type of nutritional problem related to overweight and obesity; while 35% do not have a problem with their nutritional status; however, the trend is rising and they may become overweight or obese in the future; while 20% have a normal nutritional status.

Conclusions

- In nutritional terms, it is evident that there is no malnutrition in students, which is a positive indicator for the general health of the population studied. However, the BMI/AGE analysis reveals that a considerable 45% of students are overweight or obese to some degree. In addition, 35% of the student population, although they do not currently have problems with their nutritional status, show an upward trend that could lead to the development of overweight or obesity in the future.
- Despite these nutritional aspects, a worrying discrepancy is observed in the academic performance of students, which could indicate that additional factors are influencing their school performance. Students' inherent low interest in schooling could be a contributing element, suggesting the need to address not only the physical dimensions, but also the motivational and psychosocial ones to achieve comprehensive well-being.

- Regarding motivation to learn, it is highlighted that 37% of students have a "very good" motivation, 32% describe it as "good" and 20% as "excellent". These results offer a perspective on the disposition of students towards learning, being crucial to consider how this aspect is linked to their academic performance and their general health. Finally, it is suggested that that, as regards the academic performance deficit, it is due to post-COVID cognitive sequelae in children and adolescents in this school age. Finally, the resulting data show that the academic interest, assimilation and retention of knowledge by the students analyzed are not linked at all to childhood malnutrition.

Conflict of interest

There is no conflict of interest in relation to the submitted article.

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