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NUTRITIONAL FACTORS INFLUENCING SCHOOL PERFORMANCE: A REVIEW OF THE LITERATURE BETWEEN 2020-2025

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Abstract
This systematic review analyzes recent scientific literature (2020-2025) related to nutritional factors that affect academic performance. The direct relationship between adequate nutrition and improved academic results is widely recognized in the scientific community; however, this study seeks to identify the specific nutritional elements with the greatest impact on academic performance. Fifty studies from specialized academic databases were reviewed to examine, among other aspects, the common nutritional deficiency in children and adolescents, the effects of consuming ultra-processed foods versus balanced diets, and the key role of school feeding programs. The results showed that general nutritional status (obesity, overweight, and malnutrition), eating habits, School Feeding Programs (SFPs), nutrition education, and physical activity are the main factors that influence student academic performance from a nutritional perspective. The most relevant conclusion was that nutrition is directly related to learning and that it is therefore necessary to comprehensively address existing deficiencies in this regard.
Keywords: school nutrition, academic performance, essential nutrients, cognition, school meal programs

INTRODUCTION

The relationship between nutrition and school performance is a topic that continues to arouse research interest, especially territories where educational quality and socioeconomic deprivation are common (Santos Holguín & Barros Rivera, 2022). Food plays a crucial role in the physical development of children and adolescents, in addition to directly affecting their cognitive and emotional development (Luna Hernández et al., 2018). In this order of ideas, clearly understanding how nutritional factors affect academic performance is essential to design comprehensive and effective educational policies.

As can be seen successively, there are many studies that have shown that there is a positive and significant correlation between adequate nutrition and students' academic performance. However, the full understanding of this relationship involves much more than the acceptance of simple direct causality. It is therefore crucial to identify and understand those specific nutritional elements that exert the greatest influence on cognitive abilities related to learning, such as memory, attention, and speed in processing information (Sagñay Llinin & Ocaña Noriega, 2023). As these specific aspects are deepened, new questions arise that enrich the academic and social discussion on the subject.

The relevance of the issue addressed gains strength in a scenario in which eating patterns have undergone important changes. The growing prevalence of diets rich in ultra-processed foods, saturated fats, and refined sugars poses new challenges to education systems and public health (Louzada et al., 2020). On the other hand, the implementation of

school balanced diet programs, a potentially effective response to mitigate these problems, deserves particular analysis due to its socio-educational implications (Micha et al., 2020).

Concern about the effect of food on education is not new; however, the recent COVID-19 pandemic once again highlighted the problem by showing how socioeconomic conditions, including limited access to healthy food, directly impacted the academic performance of millions of students around the world (Sagñay Llinin & Ocaña Noriega, 2023). In this order of ideas, the subsequent review focuses on answering a central problematizing question, namely, what are the specific nutritional factors that affect students' school performance? The above question not only seeks to reaffirm the importance of nutrition, but also to specify which particular elements of it have a direct and determining influence on the fundamental cognitive skills involved in school learning.

The aim of the study, therefore, is to analyse recent scientific evidence on the specific nutritional factors that impact school performance. To fulfill this purpose, a comprehensive review of studies published between 2020 and 2025 was carried out, in order to provide an updated perspective that is useful for researchers, teachers, health professionals, and policymakers interested in improving academic performance through nutritional interventions.

The precise identification of the aforementioned factors will allow us to expand the theoretical and scientific knowledge of the field, and offer solid empirical bases for decision-making in public policies (Micha et al., 2020). It also has the potential to guide the design of effective school programs that value healthy eating as a comprehensive pedagogical and public health strategy. Consequently, it is hoped that the findings of this review will contribute to the formulation of educational and food interventions tailored to the real needs of school communities, especially the most vulnerable.

METHODOLOGY

A systematic review model was proposed in which a detailed search was carried out in databases in which relevant works related to the topic of interest were isolated, which, in turn, were subclassified to obtain a clear overview of the current research situation. The study has a mixed approach, in which quantitative elements, associated with the numerical characterization of the documents addressed, and qualitative elements, related to their content, are valued. A systematic review of recent studies published between 2020 and 2025 was carried out that will address the nutritional factors incident in cognitive function and, therefore, in student academic performance.

For this purpose, recognized and specialized databases such as Dialnet, Scielo and Google Scholar, as well as institutional repositories, were consulted, following the methodological recommendations of Higgins et al., to guarantee rigor in the selection and analysis of the documents. The words "nutrition", "academic performance" and "learning" (KEY: "NUTRITION" + "ACADEMIC PERFORMANCE" + "LEARNING") were used as key search predictors, according to the methodological proposal for thematic reviews proposed by Petticrew and Roberts.(2022)(2021)

Initially, a first general filter based on titles, abstracts and direct thematic relevance was applied, within the framework of Snyder's proposal, for narrative reviews. Subsequently, specific inclusion criteria were established: explicit focus on nutritional factors directly related to cognition or academic performance and that the populations studied were clearly identified as students in educational contexts. The exclusion criteria were addressed in contrast, so that articles that did not address nutritional factors related to cognition or academic performance ascribed to student populations were not considered. After applying these methodological filters, a data composed of fifty (50) documents was isolated, with the typology of scientific articles, systematic reviews and meta-analyses predominating.(2020)

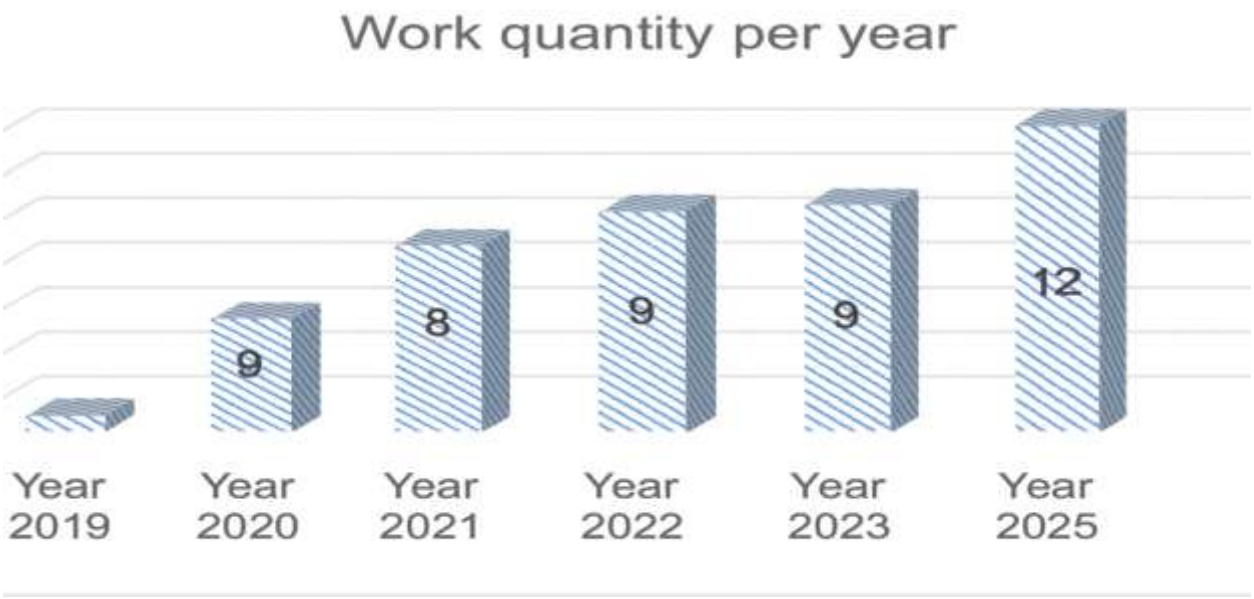
The grouping of the data collected was carried out through a detailed thematic analysis in which the orientations of Braun and Clarke were followed, in this way it was possible to systematically organize the contributions by clearly defined emerging categories. Finally, the analysis was structured in differentiated thematic sections in order to provide, subsequently, a solid discussion and well-structured conclusions in accordance with the methodological guide proposed by Torraco. The themes characterized were: those associated with nutritional factors and those associated with academic performance with their respective nodes.(2021)(2021)

RESULTS

The systematic review carried out allowed us to identify highly transcendental and representative works of the topic addressed. Its consideration constitutes a fundamental contribution to future educational and nutritional interventions aimed at optimizing academic performance, especially in socioeconomic scenarios in which vulnerability is a reality. The proposals, the details of which are described below – first in a general way and then in a particular way – highlight the imperative need to establish comprehensive policies on school nutrition as an educational and social priority. The

data reviewed below provide an overview of the bibliometric characteristics of the studies considered. With regard to their time range, most of the cataloged studies (24%) were published in 2024, which accounts for a current research interest in the topic addressed (see Figure 1).

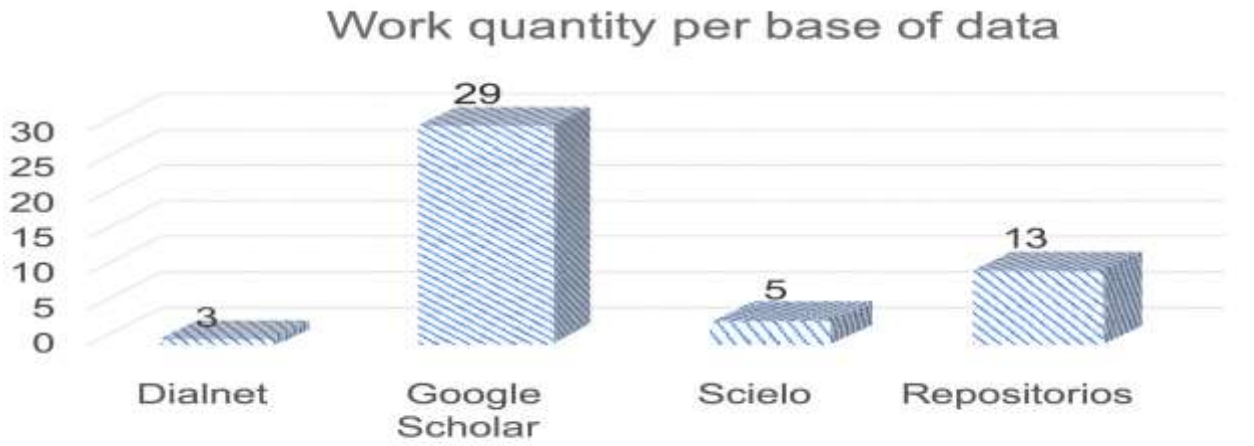
Figure 1 *Number of jobs published per year*



Note. Source: own elaboration (2025).

On the other hand, in terms of their origin, the works were isolated, mainly in the Google Scholar database (58%), as can be seen in Figure 2. Other important sources of contribution were the institutional repositories and the indexing databases Scielo and Dialnet.

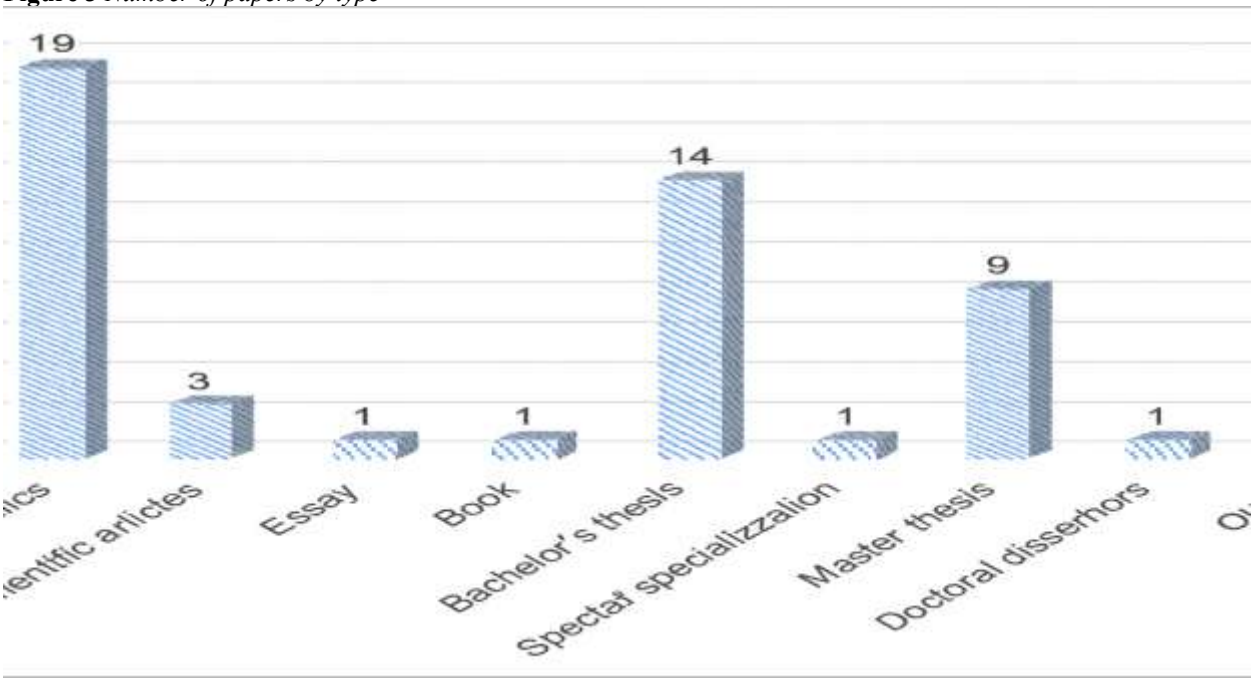
Figure 2 *Number of jobs per isolation database*



Note. Source: own elaboration (2025).

Finally, Figure 3 graphically describes the grouping of the documents consulted by their particular typology. In this case, a clear predominance of scientific articles (38%) was identified, followed by professionally relevant undergraduate projects (28%) and, to a lesser extent, research theses derived from master's degrees.

Figure 3 *Number of papers by type*



Note. Source: own elaboration (2025).

However, as far as their content is concerned, the keyword analysis made it possible to identify the nodes of interest described in Figure 4, with a general correlation towards the "Nutrition" node.

Figure 4

Characterized thematic nodes

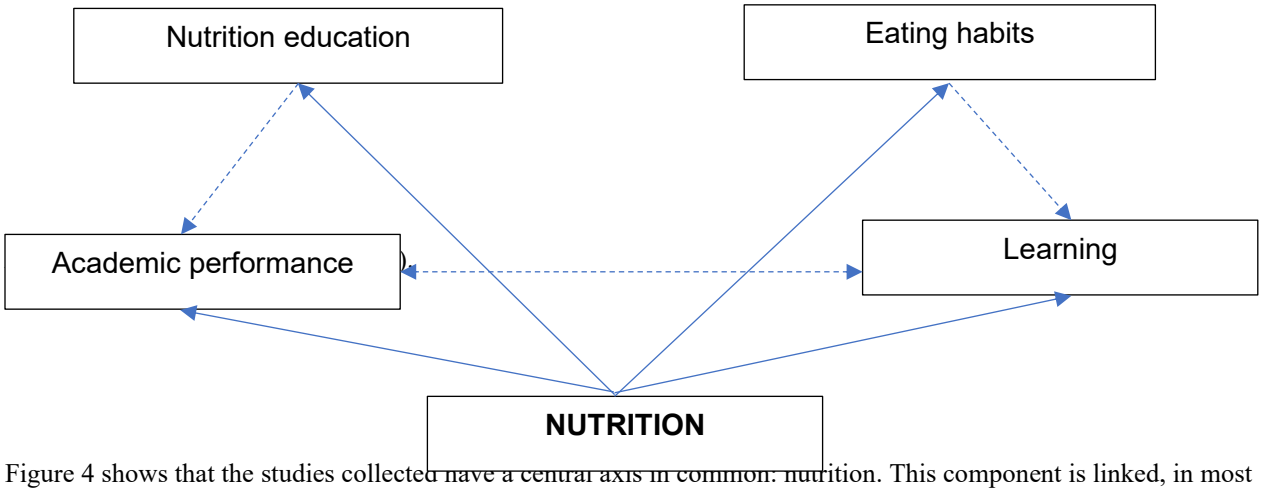


Figure 4 shows that the studies collected have a central axis in common: nutrition. This component is linked, in most cases, to two key variables: academic performance and learning processes. In this sense, the literature reviewed states that an adequate diet not only provides essential nutrients for physical development, but also favors sustained attention, working memory, and motivation in the school context. Several studies identify a positive correlation between

adequate levels of micronutrients (iron, zinc and B vitamins) and better results in standardized reading and mathematics tests.

Apart from this main link, Table 1 shows other elements that appear recurrently as support nodes: nutritional education and eating habits. These two factors function as mediators or modulators of the nutrition-learning relationship. Nutrition education refers to training programs aimed at students, teachers and families, whose objective is to promote knowledge about the importance of food groups, the reading of labels and the planning of balanced menus. Meanwhile, eating habits include specific behaviors such as the frequency of fruit and vegetable intake, the consumption of ultra-processed food and the regularity of main meals. Despite the thematic breadth, very few deviations from the five main nodes are evident. When additional themes arise—obesity, malnutrition, overweight, education itself, and skill levels—they often function as subnodes closely linked to the core of nutrition.

Table 1 *Sorting by Thematic Nodes*

Complementary theme(s)	Author(s)/Study Contribution
Academic Performance	Moreno (2023) analyzes how the School Feeding Plan influences educational quality; Durán et al. (2023), explore teachers' perceptions of the School Feeding Program; Porras and Rojas (2024) investigate the impact of the PAE on academic performance in standardized tests; Collante, Rodríguez, & Sánchez (2022), show how school snacks enhance educational results; Acosta et al. (2021) systematize evidence on the direct impact of food on early childhood school performance; González (2021), examines how nutritional status affects academic performance; Santos Holguín and Barros Rivera (2022) analyze the nutritional influence on school performance; Ceme (2021) establishes the relationship between eating habits and children's cognitive development; Pugo and Zhinin (2020) link nutritional habits with academic performance; Huamani (2021) confirms the influence of nutritional status on academic performance; García and Cristina (2024) examine the relationship between nutrition and adolescent academic performance; Sáez and Guillermo (2022) link lifestyles with university academic performance; Forero et al. (2023), analyze the relationship between eating habits and school performance in Latin America; Cantos (2020), investigates the impact of malnutrition on school performance; Ticona (2021), relates malnutrition to academic performance; Feijoo (2020) establishes the link between early malnutrition and poor school performance; Trávez et al. (2024) confirm the negative influence of malnutrition on academic performance; Santisteban (2021) identifies child malnutrition associated with learning difficulties.
Learning	Romero and Peña (2023) study the effect of healthy lunch boxes on initial school performance; León et al. (2023), synthesize literature on nutrition and learning; Fernández (2024) details the direct impact of nutritional quality on cognitive development and associates healthy habits with better performance; Cardozo and Ramírez (2025) emphasize the importance of infant feeding in early school learning; Lema (2022), explores how early food education affects cognitive development; Cruz et al. (2024), link nutrition with physical-cognitive development in preschoolers; Amaya and Agudelo (2020) highlight the impact of malnutrition on children's social development; Cortés and Pérez (2023) delve into the effects of chronic malnutrition on growth and learning; Ocaña-Noriega and Sagñay-Llinin (2020) examine the impact of malnutrition on early cognitive development; Franco et al. (2024), explore the effects of nutritional deficits in rural communities; Merchán et al. (2024), analyze the consequences of malnutrition in Latin America; Herrera (2023), relates healthy lunch boxes to cognitive development in children aged 4 to 5 years; Sagñay Llinin and Ocaña Noriega (2023) discuss the influence of malnutrition on academic performance in times of pandemic.

Complementary theme(s)	Author(s)/Study Contribution
Nutrition education	Alcívar and Ubillus (2024), promote food education to prevent child health problems; Boada and Meza (2022) propose the qualification of educational agents in nutritional factors; Lema (2022), analyzes the impact of food education on cognitive development; León et al. (2023), synthesize the effects of nutrition education on academic performance; Romero and Peña (2023) highlight the importance of healthy lunch boxes; Mendoza (2021) substantiates the relationship between good nutrition and school performance; Ceme (2021), links early food education with children's cognitive development.
Eating Habits	Almanza et al. (2023) identify the prevalence of overweight and negative habits in schoolchildren; Romero and Peña (2023) relate healthy lunchboxes to better academic performance; Fernández (2024) associates healthy eating habits with better academic performance; Cardozo and Ramírez (2025) emphasize the importance of establishing healthy habits from childhood; Sáez and Guillermo (2022) link healthy lifestyles with university academic performance; Forero et al. (2023), analyze the relationship between eating habits and school performance in Latin America; García and Cristina (2024) examine the impact of eating habits on adolescents; Santos Holguín and Barros Rivera (2022) analyze the influence of nutrition on school performance; Pugo and Zhinin (2020) link nutritional habits with academic performance; Ceme (2021) establishes the importance of healthy habits in cognitive development.

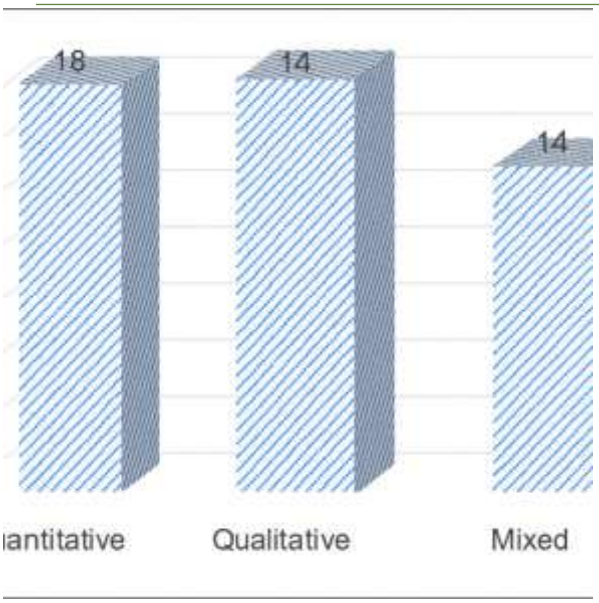
Note. Source: own elaboration (2025).

The analysis presented in Table 1 shows the robust interrelationship between nutrition and educational processes in its multiple dimensions. The studies grouped in the Academic Performance node agree that both nutritional status and institutional feeding programs have a significant impact on school performance from childhood to university. In the Learning axis, the literature underlines that malnutrition and food deficits compromise cognitive development, while adequate nutrition, especially in early stages, favors performance and socialization. The Nutritional Education node reveals a consensus on the need to train educational agents and strengthen food education as a preventive strategy and promoter of integral development. Finally, the category of Eating Habits reinforces the idea that nutritional patterns established from childhood condition both physical well-being and academic success.

In terms of methodological approaches, Figure 5 shows an almost perfect balance between qualitative and quantitative studies, each representing 36% of the total. Qualitative studies, mainly based on in-depth interviews, focus groups, and ethnographic observations, allow us to understand school actors' perceptions of food and its barriers—for example, lack of access to fresh food or the influence of fast food advertising. On the other hand, quantitative studies use standardized surveys, anthropometric measurements, and statistical analysis to establish causal or predictive relationships between nutritional variables and academic performance.

In addition, a significant proportion of research – around 28% – uses mixed methodologies.

Figure 5 *Number of jobs per focus*



Note. Source: own elaboration (2025).

It is especially interesting that the highest percentage of publications collected is concentrated in the year 2024, which shows a growing and current interest in investigating the relationship between nutrition and school performance. This concentration accounts for the topicality of the issue and the urgency and social and academic importance it acquires in contemporary scenarios. Likewise, the fact that most of the studies come from the Google Scholar search engine indicates that a large part of the scientific production on this problem is available in open sources, that is, they are available to academic, political and academic fields. Meanwhile, the methodological balance between qualitative and quantitative approaches, added to the also habitual use of mixed methods, enhances the transcendence of these results by integrating different dimensions of the nutritional-academic problem from multiple research perspectives.

On the other hand, the clear predominance of the typology of scientific articles in the data suggests a rigorous and systematic assessment in the research of the phenomenon studied, which consolidates an interesting empirical base that reinforces its scientific validity and practical applicability. However, from the thematic point of view, the review revealed that nutrition appears as a widely agreed central axis, closely linked to academic performance and learning. The importance of nutrition education and healthy eating habits complements this comprehensive vision. The thematic consistency observed in the reviewed documents, with few deviations, increases the solidity and practical relevance of the conclusions reached. Finally, the complementary themes that became evident in the search (malnutrition, malnutrition, obesity, school food programs, physical condition and socioeconomic factors) allow us to clearly identify specific areas of educational and social intervention. The wide presence of Latin American studies highlights the regional relevance and the urgent need to address these nutritional factors in the territory.

Regarding the particular thematic classification of the aforementioned documents, Table 2 offers a detailed grouping of the complementary areas and the studies addressed that are specifically focused on the analysis of the nutritional factors that affect student academic performance.

Table 2 *Classification by complementary themes associated with nutritional factors*

Complementary theme(s)	Author(s)/Study Contribution
School canteen; School Feeding	Medina and Mosquera (2022) show how food influences school performance in transition students. Velázquez et al. (2022) evaluate the quality of the school feeding service by identifying critical aspects and areas for improvement. Calisto and Díaz (2019) question the nutritional adequacy of the JUNAEB program in Chile and its impact on early cognitive development.

Complementary theme(s)	Author(s)/Study Contribution
	Dias et al. (2023): Assesses food acceptability according to social diversity in Brazil.
	Salguero (2022) highlights post-COVID-19 food safety and quality management strategies in Tolima.
Feeding	Romero and Peña (2023) study the effect of healthy lunch boxes on initial school performance.
	León et al. (2023) synthesize existing literature on nutrition and academic performance.
	Fernández (2024) details the direct impact of nutritional quality on cognitive development.
	Fernández (2024) associates healthy eating habits with better academic performance.
	Cardozo and Ramírez (2025) emphasize the critical importance of infant feeding for early school learning.
	Lema (2022) explores how early food education affects children's cognitive development.
Malnutrition	Altamirano and Hetz (2024) explore cultural beliefs about childhood obesity in Mapuche and non-Mapuche communities.
	Merchán et al. (2024) analyze comprehensive consequences of child malnutrition in Latin America.
	Ocaña-Noriega and Sagñay-Llinin (2020) examine the effects of malnutrition on early cognitive development.
	Franco et al. (2024) explore the effects of nutritional deficits on school performance in rural Latin American communities.
Physical activity; Physical Condition	Montealegre (2022) demonstrates a relationship between nutritional status, physical condition, and university academic performance.
Overweight; Obesity	Almanza (2023) identifies the prevalence of overweight and obesity in schoolchildren and negative eating habits in Mexico.

Note. Source: own elaboration (2025).

As can be seen in Table 1, there are five (5) relevant thematic axes that allow us to describe, in the light of the literature consulted, the nutritional factors incident in student academic performance. These five thematic axes are: school feeding, food as a general core, malnutrition, physical condition/activity and overweight/obesity.

School Feeding

Regarding this topic, Medina and Mosquera (2022) provide evidence on how programs attached to the education system have a direct positive impact on the academic performance of students in the transition stage. In their work, they identified improvements in specific aspects such as attention, memory, and overall academic results, which can be subscribed, in a way, to the provision of a balanced diet. The results show the strategic importance of school feeding from the initial stages of the educational process.

Velázquez et al. (2022), on the other hand, provide a detailed critical analysis of the quality of school food service. In their work, they point out weaknesses in the selection and nutritional composition of the food supplied, insufficient training of the personnel in charge and shortcomings in infrastructure, observations that allow them to propose specific recommendations aimed at optimizing the program, namely, improving the selection of suppliers, ensuring the constant training of personnel and rigorous supervision of the process of preparation and distribution of food.

From another critical perspective, Calisto and Díaz (2019), through an exhaustive analysis of the JUNAEB program in Chile, raise serious questions about the real effectiveness of the menus provided in schools. The authors point out

that these do not always meet the nutritional requirements necessary for adequate cognitive development in young children, an evaluation that suggests the need to reformulate such programs, considering specific needs of child growth and development. In parallel, Dias et al. (2023) present an evaluation focused on food acceptability in Brazilian school programs, taking into account the cultural and social diversity of the context. This study clearly demonstrates how incorporating cultural food preferences substantially improves student acceptance.

Finally, Salguero (2022) examined food safety and quality management in the post-COVID-19 era in Tolima, a process through which he identified new needs in terms of sanitary protocols and food safety measures. The cited work highlights how the pandemic prompted significant modifications in the way school food services are managed and continuously emphasized the fact that greater rigor in the management and distribution processes is key to protecting the health of beneficiary students.

Feeding

However, with regard to food as a general process, Romero and Peña (2023) specifically addressed the positive impact that healthy lunch boxes have on initial academic performance. The study highlights the crucial importance of children receiving nutritious food during the school day to ensure optimal and sustained academic performance, all from the accompaniment of home. For their part, León et al. (2023) provide a synthesis of the existing literature on nutrition and academic performance, in a work in which they consolidated extensive evidence on how a balanced and nutritious diet improves general academic performance, especially in cognitive terms.

Fernández (2024), in line with the above, details in depth the direct impact of a high-quality nutritional diet on children's cognitive development and academic performance. Their work provides robust evidence that healthy eating habits established early lead to better academic outcomes and promote essential skills for continuous learning.

Meanwhile, Cardozo and Ramírez (2025) complement the vision stated above by pointing out that a balanced diet from early childhood is essential to achieve effective learning and guarantee successful academic performance in the long term. Lema (2022) deepens the aforementioned concept by pointing out the imperative need to offer early food education and to prove that educational interventions focused on nutrition generate lasting benefits in cognitive development and contribute to maintaining healthy habits throughout life.

Malnutrition

In response to the thematic line of malnutrition, Altamirano and Hetz (2024) explore cultural beliefs regarding childhood obesity in Mapuche and non-Mapuche communities, an exercise that allowed them to reveal how these perceptions influence family eating practices and, therefore, children's nutritional status. The study highlights the critical need to design culturally adapted nutritional interventions to ensure real effectiveness in specific contexts. On the other hand, Merchán et al. (2024) conducted a comprehensive review of the comprehensive consequences of child malnutrition in Latin America, and highlighted, among other things, its adverse impact on various aspects of child development, including cognitive and emotional.

Meanwhile, Ocaña-Noriega and Sagñay-Llinin (2020) specifically examined how malnutrition negatively impacts early cognitive development, specifically on critical learning skills. Franco et al. (2024) complement this perspective, by exploring how nutritional deficits directly harm school performance in rural Latin American contexts. Their study highlights the urgency of implementing early interventions to prevent and mitigate the persistent negative effects of malnutrition.

Activity/Fitness

Regarding the topic of activity/physical condition, the study by Montealegre (2022) stands out, which offers a comprehensive view of the positive relationship between nutritional status, adequate physical activity, and academic performance in university students. Their research indicates that the harmonization of balanced nutrition and regular physical activity significantly enhances academic performance by improving physical, mental, and emotional aspects. The cited study highlights the need for comprehensive programs that simultaneously address these factors to maximize educational outcomes.

Overweight/Obesity

Finally, in relation to overweight, Almanza (2023) evaluates its prevalence among Mexican schoolchildren and links this phenomenon directly to inappropriate eating habits, characterized by the high consumption of processed products and sugary drinks. These conclusions clearly highlight how the problems referred to generate important limitations in academic performance due to the decrease in concentration, physical endurance and general health of the affected students. The research insists on the urgent importance of implementing effective educational and preventive interventions from early stages, aimed at promoting healthy eating habits and active lifestyles.

However, with regard to academic performance as the most prevalent topic, Table 3 shares the complementary topics and the studies addressed that focus on its analysis.

Table 3
Classification by complementary topics associated with academic performance

Complementary theme(s)	Author(s)/Study Contribution
School canteen; School Feeding	Moreno (2023): Analyzes how the School Feeding Plan influences the quality of education in Tunja. Durán et al. (2023): Explores perceptions of physical education teachers about the School Feeding Program, highlighting strengths and weaknesses. Porras and Rojas (2024): Investigates the direct impact of the PAE on academic performance in Colombian standardized tests. Collante, Rodríguez, & Sánchez (2022): Evidence of how school snacks enhance educational outcomes in Colombia.
Feeding	Acosta et al. (2021): Systematizes evidence on the direct impact of food on early childhood school performance. Durán et al. (2023): Relates nutritional factors to academic performance in a university context. González (2021): Examines how nutritional status affects overall academic performance. Santos Holguín and Barros Rivera (2022): Analyzes the nutritional influence on specific school performance in an educational institution. Ceme (2021): Establishes a direct relationship between eating habits and children's cognitive development. Pugo and Zhinin (2020): Links nutritional habits with academic performance in Ecuadorian schoolchildren. Huamani (2021): Confirms the influence of nutritional status on specific school academic performance. García and Cristina (2024): Examines the relationship between nutrition and adolescent academic performance. Sáez and Guillermo (2022): Link lifestyles with university academic performance. Forero et al. (2023): Analyze the general relationship between eating habits and school performance in Latin America.
Growth and development	Merchán et al. (2024): Evidence of how malnutrition limits comprehensive child development in Latin America. Cruz et al. (2024): Directly links nutrition with physical-cognitive development in Ecuadorian preschoolers. Amaya and Agudelo (2020): Highlights how malnutrition negatively affects children's social development in Medellín. Cortés and Pérez (2023): Delves into how chronic malnutrition affects child growth and development.
Malnutrition	Cantos (2020): Investigates the specific impact of malnutrition on school performance. Ticona (2021): Directly relates malnutrition to academic performance in Peruvian schoolchildren.

Complementary theme(s)	Author(s)/Study Contribution
	Feijoo (2020): Establishes a link between early malnutrition and poor preschool school performance.
	Trávez et al. (2024): Confirms the negative influence of malnutrition on adolescent academic performance.
	Santisteban (2021): Relates child malnutrition to specific initial learning difficulties.

Note. Source: own elaboration (2025).

School Feeding

In this case, on the topic of school feeding, the work of Moreno (2023) stands out, who analyzes how the School Feeding Plan (PAE) directly influences the quality of education in Tunja. The study identifies specific improvements in aspects such as student attention and participation in classes, and demonstrates how adequate nutrition improves concentration and overall performance. For Moreno (2023), it is extremely important to monitor the nutritional and logistical quality of the program, so that it can be ensured that the expected benefits translate into concrete learning results.

For their part, Durán et al. (2023), from another methodological perspective, explore specific perceptions of physical education teachers about the PAE, and identify strengths and weaknesses. The analysis reveals that, although there are clear strengths related to improving students' physical and academic performance, critical weaknesses such as logistical and organizational problems persist, as well as deficiencies in the variety and quality of food provided.

In contrast, Porras and Rojas (2024) provide strong evidence of the direct impact of the PAE on academic performance in Colombian standardized tests. Through a rigorous comparative analysis, the authors show that students who are beneficiaries of the PAE obtain significantly superior results in these tests. Porras and Rojas (2024) highlight that an adequate diet improves essential cognitive functions such as memory, reasoning, and processing speed.

Finally, Collante et al. (2022) complement this vision by demonstrating that school snacks, as an integral component of the EAP, significantly enhance educational outcomes in Colombia. The aforementioned study expressly states that well-balanced snacks, in addition to contributing to better academic performance, reduce school absenteeism and improve the climate in the classroom, which results in a more productive learning environment.

Feeding

Regarding the topic of food, Acosta et al. (2021) systematize detailed evidence on the direct impact of food on early childhood school performance. Their review of the scientific literature clearly establishes that balanced and sufficient nutrition is essential for early cognitive development, because it especially impacts the ability to concentrate, sustained attention and learning. Durán et al. (2023), meanwhile, relate nutritional factors to academic performance in university contexts; Thus, they manage to demonstrate that students with balanced diets have better academic results compared to those who have poor eating habits.

On the other hand, González (2021) delves into how nutritional status directly influences overall academic performance. The author highlights that malnutrition, both due to deficiency and excess, has substantial negative consequences on learning. Likewise, Santos Holguín and Barros Rivera (2022) offer a specific analysis of how nutrition influences academic performance in a particular educational institution, a proposal through which they are able to demonstrate significant improvements in academic performance when specific nutritional interventions are implemented.

For Ceme (2021), on the other hand, there is a clear direct relationship between healthy eating habits and children's cognitive development, so early interventions to consolidate beneficial eating patterns are critical. In line with this, Pugo and Zhinin (2020) provide specific evidence from the Ecuadorian context that links healthy nutritional habits with significantly higher academic performance in schoolchildren. Huamani (2021) confirms the positive influence of adequate nutritional status on specific school academic performance and highlights how effective feeding programs generate consistently higher academic results.

García and Cristina (2024) express themselves in similar terms, specifically examining the relationship between nutrition and adolescent academic performance, and conclude that effective nutritional interventions during this crucial stage of development generate sustained academic improvements. Sáez and Guillermo (2022) complement the aforementioned vision by clearly linking healthy lifestyles with better university academic results. For the authors, a comprehensive healthy lifestyle includes balanced nutrition and regular physical activity. Finally, Forero et al. (2023) present a general analysis of how appropriate eating habits positively influence school performance in Latin America.

The authors point out the need for educational policies that integrate the promotion of healthy eating as a central strategy to improve the quality of education.

Growth and development

Regarding the topic of growth and development, Merchán et al. (2024) offer robust evidence on how malnutrition limits comprehensive child development in Latin America. In their work, they identify specific consequences, such as delays in physical growth, learning disabilities, and social and emotional difficulties, that directly affect future academic performance. For their part, Cruz et al. (2024) directly link adequate nutrition with optimal physical-cognitive development in Ecuadorian preschoolers, and insist on the importance of effective feeding programs that contribute to preventing developmental delays and optimize early learning.

For Amaya and Agudelo (2020), malnutrition negatively affects children's social development in Medellín and generates intergenerational cycles of educational poverty and social exclusion. While Cortés and Pérez (2023) go even deeper, by analyzing how chronic malnutrition specifically affects children's physical growth and cognitive development. For these authors, the negative effects persist in the long term and limit future educational and employment opportunities.

Malnutrition

Finally, regarding the malnutrition line, Cantos (2020) specifically investigates how malnutrition negatively impacts school performance and explains that malnourished students show notable academic difficulties compared to their well-nourished peers. Ticona (2021), on the other hand, confirms this direct relationship between malnutrition and poor academic performance in Peruvian schoolchildren, and points out the urgent importance of effective nutritional interventions to reverse the negative consequences characterized.

Likewise, Feijoo (2020) clearly establishes the link between early malnutrition and poor academic performance in preschoolers, while Trávez et al. (2024) confirm the negative influence of malnutrition on adolescent academic performance. In addition, Santisteban (2021) offers an additional analysis from which he specifically identifies how child malnutrition is associated with particular difficulties in early learning, including problems with attention, memory, and language development.

DISCUSSION

The results obtained throughout the systematic review carried out clearly reveal that nutritional factors have a determining influence on school performance, but they do so from a multifactorial and interdependent logic, which forces us to transcend linear explanations. Far from being a simple cause-effect between diet and academic performance, the studies analyzed suggest that the aforementioned relationship is mediated by cultural, institutional, physiological, emotional and economic aspects. In this sense, the subsequent discussion seeks to expose the empirical validity of this relationship, its scope, tensions and possibilities within the framework of educational and health policies with a rights-based perspective.

First, the findings regarding school feeding programs show a dual picture: on the one hand, there is robust evidence that supports their positive impact on learning and school retention; on the other hand, there are also limitations in its implementation that could reduce its effectiveness. Thus, studies such as those by Moreno (2023) and Porras and Rojas (2024) reveal significant improvements in standardized tests, levels of attention and school attendance among students benefiting from the School Feeding Plan (PAE), data corroborate what Micha et al. (2020) propose, who state that school feeding programs can improve cognitive performance if they guarantee coverage, nutritional quality and cultural acceptability.

However, other studies, such as those by Velázquez et al. (2022) and Calisto and Díaz (2019), denounce irregularities in the quality of the food supplied, as well as logistical failures and the limited inclusion of cultural criteria in menus. The existing tension allows us to identify a structural problem; Many times, school feeding programs are designed from a technocratic logic that prioritizes nutrition and logistics, but neglects affective, identity, and pedagogical variables. The review points out that truly effective school feeding must be culturally relevant, emotionally meaningful, nutritionally balanced, and logistically viable.

On the other hand, it was corroborated that the eating habits established from childhood play a preponderant role in this regard. Romero and Peña (2023), Fernández (2024) and Lema (2022) agree that the early establishment of a healthy diet influences physical and cognitive development, and also affects the acquisition of emotional and social skills associated with school success. The internalization of habits such as regular fruit consumption, sugar reduction, and respect for structured eating schedules is linked to a greater capacity for self-regulation, sustained attention, and willingness to learn. Along these lines, the idea that food education cannot be relegated to the field of public health exclusively, but must be an integral part of the school curriculum, is reinforced.

One of the most significant contributions of the review is the identification of direct negative effects associated with malnutrition, both due to deficiency (malnutrition) and excess (overweight and obesity). In this sense, the work of Merchán et al. (2024), Ocaña-Noriega and Sagñay-Llinin (2020), and Almanza (2023) allows us to understand that nutritional extremes have similar consequences in terms of cognitive impairment. While chronic malnutrition affects neuronal development, prevents the consolidation of executive functions and is associated with poor school performance, being overweight affects the energy available for learning, generates drowsiness, decreases self-esteem and, consequently, increases school demotivation.

The adverse effects, moreover, present a clear and logical socioeconomic pattern: they are more frequent in contexts of structural poverty, where access to a balanced diet is limited by factors of income, infrastructure, family education and food culture. Therefore, any intervention policy must have an intersectional orientation that simultaneously considers income levels, territory, ethnicity, and age.

Physical activity appears in several studies as a modulating factor that enhances the effects of a good diet. The work of Montealegre (2022) shows that students with regular routines of moderate physical activity have a better general state of health and also obtain better academic results, consolidate study habits and show greater resilience in the face of school stress; In this way, a comprehensive view of the student is obtained, in which the body and mind interact constantly. In this order of ideas, the most effective educational interventions are those that manage to articulate a healthy diet with body dynamics, adequate rest and emotional containment.

Another relevant aspect that emerged in the light of the review is the mainstreaming of the problem at all educational levels. While most studies focus on basic education, some, such as those by Durán et al. (2023) and Sáez and Guillermo (2022), show that eating habits also have a clear impact on academic performance at the university level. The observation implies that food education must be continuous, not limited to children, and that universities must also include food welfare strategies for their students and promotion of safe nutritional lifestyles.

From the theoretical perspective, the findings dialogue with Bronfenbrenner's theories of ecological human development, which postulate that learning is mediated by multiple systems (microsystem, mesosystem, exosystem and macrosystem), within which nutrition figures as a transversal component of the microsystem (close relationships such as the family, the school and the student's body). In other words, nutrition is a variable in the child's immediate environment that interacts with his or her biology and culture to facilitate or hinder his or her learning. This is an interpretation that strengthens the argument that food policies must be articulated with pedagogical policies in a framework of comprehensiveness.(1979)

With regard to the methodological design of the studies reviewed, the predominance of quantitative and mixed approaches is notorious, which allows a clear numerical characterization of the phenomenon. However, the scarce presence of qualitative methodologies (for example, school ethnographies or phenomenological studies) is striking, which could provide a richer vision of how students experience their relationship with food, the body and learning. The aforementioned methodological gap represents an opportunity for future research that wants to investigate the symbolic and emotional dimension of eating in school contexts.

Likewise, few studies incorporate the gender dimension in the analysis, despite the fact that there is strong evidence —although not sufficiently developed in the sample reviewed— that eating practices, body perception and academic performance can be mediated by stereotypes and gender roles. Also in this case, the omission could be addressed in future research so as not to reproduce biases and to design inclusive strategies that consider the diversity of students.

A common aspect in most studies is the view of the student as a passive agent in feeding programs, which contrasts with current pedagogical trends that promote student participation in decision-making processes. Reasonably incorporating student voice in menu selection, program evaluation, and food campaign building could significantly increase menu ownership, while strengthening food self-awareness and promoting active citizenship from school.

The review also highlights the urgent need to strengthen teacher training in food, nutrition and integral development, since teachers are key actors in the detection of signs of malnutrition, in the promotion of healthy habits, and in the integration of the subject in various subjects, not only in those assigned to the areas of Natural Sciences. However, initial and continuous training in these subjects is, in general, insufficient; Therefore, it is necessary to move towards a teacher training curriculum that includes nutrition as part of the training in socio-emotional and citizenship competencies, regardless of the main area of specialty of each teacher.

Finally, the studies reviewed allow us to understand that the impact of nutrition on school performance cannot continue to be evaluated exclusively from indicators of weight or calories consumed. It is necessary to move towards more complex evaluation frameworks that also consider indicators of well-being, school motivation, self-esteem, participation in class and affective ties with the educational environment, so that nutrition ceases to be a peripheral component and becomes a structural dimension of the right to education.

CONCLUSIONS

Based on the systematic review developed and the critical analysis of recent studies published between 2020 and 2025, it is concluded that the relationship between nutrition and school performance is direct, significant and is crossed by multiple dimensions that make this interaction a complex phenomenon that is based on different causes. The evidence collected shows that an adequate, balanced and culturally relevant diet has a positive impact on students' cognitive abilities, especially in functions such as attention, memory, concentration, information processing speed and motivation towards learning. The aforementioned effects are observed both at the initial and basic education levels, as well as in the university context, which reaffirms the need to think of food as an educational right throughout the entire training cycle.

In this regard, school feeding programs – such as the School Feeding Plan (PAE) in Colombia – are a strategic tool to guarantee equitable access to healthy food in scenarios of socioeconomic vulnerability. The research reviewed indicates that students benefiting from the aforementioned programs show measurable academic improvements, reduced absenteeism, greater participation in class, and a more favorable attitude towards school. However, its implementation faces problems in the nutritional quality of the food, the cultural acceptability of the menus, the training of the personnel in charge of its execution and logistical efficiency. Therefore, the strengthening of school food policies with monitoring, evaluation and continuous improvement mechanisms are relevant strategies to guarantee their real impact on the educational process.

The studies reviewed mostly favor quantitative and mixed approaches, which has made it possible to construct accurate diagnoses and objective measurements on the relationship between diet and academic performance. However, there is a scarce presence of qualitative research that delves into the experiences, meanings and perceptions that students attribute to their daily diet in school contexts. The aforementioned methodological absence limits the comprehensive understanding of the phenomenon, especially in relation to the symbolic, affective and cultural dimensions of the act of eating. Consequently, a relevant opportunity arises for future research that, from an ethnographic or phenomenological perspective, provides more complex views on how the link between body, food and learning is configured in the student experience.

One of the key conclusions that emerges from the analysis is that eating habits established from an early age play a decisive role in the cognitive, emotional and social development of children and adolescents. The promotion of healthy lunch boxes, food education within the school curriculum and the involvement of families in the formation of positive habits are practices that, sustained over time, have a favorable impact on academic performance. It is also emphasized that food should not be considered only as a biological aspect, but as a social, cultural and pedagogical practice that requires interdisciplinary and articulated approaches between the education, health and social protection sectors.

On the other hand, malnutrition – in its various manifestations – continues to be a structural problem that affects the academic performance of students, especially in rural environments and in historically marginalized populations. The studies analyzed show how the lack of essential nutrients in critical stages of development negatively impacts physical growth, learning capacity, self-esteem and social interaction. In contrast, excess calories and the habitual consumption of ultra-processed foods and sugary drinks are associated with physical and mental health problems that also interfere with school performance. The evidence reinforces the urgency of comprehensive public policies that promote food justice and universal access to adequate food.

On the other hand, it was identified that regular physical activity acts as a modulating factor that enhances the positive effects of a good diet on academic performance. In this sense, educational models that integrate body movement, sports and recreation practices with healthy eating habits achieve better results in terms of student well-being, emotional resilience and academic achievement. It is, of course, a two-way relationship between body and mind that confirms the relevance of thinking about nutrition in dialogue with other dimensions of integral development and within a cross-cutting perspective.

Finally, the review allows us to affirm that school nutrition cannot continue to be treated as an accessory or marginal element within educational policies, but, on the contrary, must be assumed as a priority axis in the design of healthy and equitable school environments. Ensuring that all students have access to food that supports their integral development is a necessary condition to comply with the principles of quality, equity and permanence that underpin the right to education. Similarly, it is necessary to strengthen teacher training in issues related to nutrition, eating habits, mental health and socio-emotional development, as well as to encourage student participation in decision-making related to their school feeding. Only through sustained, articulated and culturally sensitive interventions will it be possible to consolidate an education that truly promotes meaningful learning, integral well-being and equity from the nutritional base.

➢ REFERENCES

- Acosta P, Loor Justillo E, Pasquel M, Quelal M. (2021). Systematic Review: Nutrition and its Impact on School Performance in Early Childhood Children. *UNEMI PSYCHOLOGY*,*9*(16), 141-152.https://doi.org/10.29076/issn.2602-8379vol9iss16.2025pp%pp
- Alcívar Rodríguez, M. G., & Ubillus Saltos, PhD, D. S. P. (2024). Food education for the prevention of health problems in children in early education. *Scientific Journal Sinapsis*, *24*(1). https://doi.org/10.37117/s.v24i1.1021
- Almanza, O., Castillo, O., Ríos, C., & Aleman, S. (2023). Prevalence and trend of overweight, obesity and consumption of unrecommended foods in schoolchildren in northern Mexico. *Mexican Journal of Pediatrics, 90(3),* 133–141. https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0004-06222023000300214
- Altamirano, N., & Hetz, E. (2024). Beliefs about childhood nutrition and obesity in caregivers of Mapuche and non-Mapuche schoolchildren. *Chilean Journal of Nutrition, 51*(1), 12–21. https://doi.org/10.54624/2024.37.1.002
- Amaya, S., & Agudelo, K. (2020). *The incidence of malnutrition and malnutrition in the social development of children with 30 families in the city of Medellín* [Degree project, Corporación Universitaria Minuto de Dios]. https://repository.uniminuto.edu/server/api/core/bitstreams/2047e7a9-38ee-40ff-9548-a1f9fbcbe5b4/content
- Boada, A., & Meza, D. L. (2022). *Pedagogical proposal for the qualification of educational agents on nutritional factors that affect early childhood learning* [Master's thesis, Universidad La Gran Colombia]. https://repository.ugc.edu.co/server/api/core/bitstreams/2e5e844a-523d-41c2-85fc-01eebc4abc38/content
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. Sage Publications.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Calisto, P., & Díaz, M. (2019). *JUNAEB in municipal schools: Does it provide adequate food for the cognitive development of first-cycle students?* [Master's thesis, Universidad Mayor]. http://repositorio.umayor.cl/xmlui/handle/sibum/7505
- Cantos, A. (2020). *Malnutrition and its impact on school performance* [Degree project, Catholic University of Cuenca]. https://dspace.ucacue.edu.ec/server/api/core/bitstreams/563a91c2-a458-4377-a20d-48a1c69617ef/content
- Cardozo, I., & Ramírez, C. (2025). *Infant feeding, its importance in school learning* [Research work to obtain the Bachelor in Education, University of Cundinamarca]. http://hdl.handle.net/20.500.14268/185
- Ceme, V. (2021). *Eating habits and their impact on the cognitive development of children at the Emilio Rivas Huerta School 2020–2021* [Degree project, Technical University of Cotopaxi]. http://repositorio.utc.edu.ec/handle/27000/7730
- Collante, S., Rodríguez, C., & Sánchez, F. (2022). *The power of a snack. School feeding and its educational effects in Colombia* [Working Paper]. https://doi.org/10.57784/1992/58369
- Cortez, D., & Pérez, M. (2023). Chronic child malnutrition and its effects on growth and development. *Cuban Journal of Pediatrics, 95*(2), 120–128. https://doi.org/10.26820/reciamuc/7. (2).April.2023.677-686
- Cruz, P., Valdiviezo, M., Mora, J., Abad, M., & Jiménez, A. (2024). Food and learning: strategic allies of physical-cognitive development in children from preschools in Machala-Ecuador. *Journal of Research in Social and Human Sciences, 3*(6), 2635–2660. https://doi.org/10.59282/reincisol.V3(6)2635-2660
- Dias, L., Jucá, L., Solans, A., Bacurau, L., Lima da Silva, V., Magnus, V., Gómez, A., & Francescato, E. (2023). Food acceptability according to sociodiversity in school canteens in Brazil. *Journal of School Feeding, 73*(2), 89–101. https://doi.org/10.37527/2023.73.2.002
- Durán, J., Galvis, L., & Giraldo, K. (2023). *Perception of teachers in charge of the area of physical education in relation to the School Feeding Program (PAE) in the public schools of Bucaramanga* [Degree Project, Technological Units of Santander]. http://repositorio.uts.edu.co:8080/xmlui/handle/123456789/3496
- Duran, S., Naula, V., & Morocho, C. (2023). Relationship between nutritional factors and academic level in students of the Universidad Regional Autónoma de Los Andes. *Student Gazette, 2*(1), 45–55. https://revgacetaestudiantil.sld.cu/index.php/gme/article/view/135/284
- Feijoo, Y. (2020). *Influence of malnutrition on school performance in preschool ages* [Undergraduate project, National University of Tumbes]. https://repositorio.untumbes.edu.pe/bitstream/handle/20.500.12874/2644/TRABAJO%20ACADEMICO%20-%20FEIJOO%20CARRILLO.pdf

- Fernández, M. (2024). *Healthy eating habits and their impact on academic performance in students in basic secondary education* [Master's thesis, Salesian Polytechnic University]. https://dspace.ups.edu.ec/bitstream/123456789/28167/1/UPS-CT011483.pdf
- Fernández, M. (2024). *The Impact of Nutritional Quality on Cognitive Development* [Final Essay on Teacher Training, Education Training Council (CFE), Uruguay]. http://repositorio.cfe.edu.uy/123456789/2948
- Forero, J., Muñoz, A., Garzón, C., & Ruiz, D. (2023). Relationship between eating habits and academic performance of children and adolescents in Latin America. *Latin American Journal of Child Nutrition, 38*(2), 97–113. https://doi.org/10.25054/01240307.3711
- Franco, E., Vargas, Y., & Parrales, I. (2024). Influence of nutritional deficits and school performance in children from rural communities in Latin America. *Polo del Conocimiento, 9*(4), 230–246. https://polodelconocimiento.com/ojs/index.php/es/article/view/8394/pdf
- García, K., & Cristina, C. (2024). *Nutritional status and academic performance in adolescents* [Degree project, Universidad Señor de Sipán]. https://repositorio.uss.edu.pe/bitstream/handle/20.500.12802/13690/Kamt%20Garcia%20Cinthia%20Cristina.pdf
- González, N. (2021). *Nutritional status and its influence on academic performance*. Editorial Académica Española.
- Herrera, V. (2023). *The healthy lunch box in the cognitive development of children from 4 to 5 years old at the Pekelandia Early Education Center, City of Riobamba* [Degree project, National University of Chimborazo]. http://dspace.unach.edu.ec/handle/51000/12185
- Higgins, J., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M., & Welch, V. (Eds.). (2022). *Cochrane handbook for systematic reviews of interventions* (Version 6.3). Wiley. https://training.cochrane.org/handbook
- Huamaní, R. (2021). *Influence of nutritional status on the academic performance of students at school No. 22320 – Parcona, 2020* [Master's thesis, Universidad Nacional San Luis Gonzaga]. https://repositorio.unica.edu.pe/server/api/core/bitstreams/a664b0cd-80d6-4882-b0ae-def7e236e951/content
- Lema, E. (2022). *Food education and its impact on cognitive development in children from 4 to 5 years of Initial Education* [Master's thesis, Technical University of Cotopaxi]. http://repositorio.utc.edu.ec/handle/27000/8867
- León, J., Sánchez, D., & Bravo, M. (2023). Impact of nutrition on academic performance: A narrative review. *Ciencia Latina Revista Científica Multidisciplinar, 7*(5), 1012–1035. https://doi.org/10.37811/cl_rcm.v7i5.8476
- López, D., Guallpa, S., & Sigüencia, M. (2021). *Health and socioeconomic factors associated with school performance in single-parent families, Gaspar Sangurima School, Santa Ana, 2021* [Specialization thesis, University of Azuay]. https://dspace.uazuay.edu.ec/bitstream/datos/11533/1/17065.pdf
- Louzada, M. L. C., Martins, A. P. B., Canella, D. S., Baraldi, L. G., Levy, R. B., Claro, R. M., Moubarac, J. C., Cannon, G., Afshin, A., & Monteiro, C. A. (2020). Ultra-processed foods and the nutritional dietary profile in Brazil. *Public Health Nutrition, 23*(5), 788–795. https://doi.org/10.1590/s0034-8910.2015049006132
- Luna Hernández, J., Hernández Arteaga, I., Rojas Zapata, A., & Cadena Chala, M. (2018). Nutritional status and neurodevelopment in early childhood. *Cuban Journal of Public Health, 44*(4), 169–185. https://www.scielosp.org/article/rcsp/2018.v44n4/169-185
- Merchán, K., Sánchez, K., & Toala, M. (2024). Impact of malnutrition on child development in Latin America: implications for health and integral development. *Medical Surgical Research, 8*(1), 3566–3586. https://doi.org/10.56048/MQR20225.8.1.2024.3566-3586
- Medina, I., & Mosquera, J. (2022). *Effects of Feeding on the School Performance of Transition Students* [Degree project, Corporación Universitaria Minuto de Dios]. https://repository.uniminuto.edu/handle/10656/16546
- Mendoza, A. (2021). Theoretical foundations that support the development of a research protocol aimed at favoring good nutrition and its impact on the school performance of 2nd grade students of the Ignacio Ramírez elementary school in Cocula, Guerrero. *Contemporary Dilemmas: Education, Politics and Values, 8*(2). https://doi.org/10.46377/dilemas.v8i2.2519
- Micha, R., Karageorgou, D., Bakogianni, I., Trichia, E., Whitsel, L. P., Story, M., Peñalvo, J. L., & Mozaffarian, D. (2020). Effectiveness of school food environment policies on children's dietary behaviors: A systematic review and meta-analysis. *PLoS ONE, 15*(5), e0232455. https://doi.org/10.1371/journal.pone.0232455
- Montealegre, D., Lerma, P., & Mazuera, C. (2022). Influence of nutritional status, level of physical activity and physical condition on the academic performance of university students. *Motor Action, 17*(2), 88–101. https://www.accionmotriz.com/index.php/accionmotriz/article/view/146/142

- Moreno, J. (2023). School feeding plan and its impact on the quality of education in Tunja, Boyacá. *Journal of the Faculty of Economic Sciences, 14*(39), 245–261. https://doi.org/10.19053/22160159.v14.n39.2023.15973
- Ocaña-Noriega, J., & Sagñay-Llinin, G. (2020). Malnutrition and its relationship in cognitive development in early childhood children. *Polo del Conocimiento, 5*(9), 204–222. https://polodelconocimiento.com/ojs/index.php/es/article/view/2044/4089
- Petticrew, M., & Roberts, H. (2021). *Systematic reviews in the social sciences: A practical guide*. Wiley-Blackwell.
- Porras, K., & Rojas, H. (2024). *Effect of the School Feeding Program (PAE) on the academic performance of students in the Saber 11 Tests of mathematics and reading in public schools in Colombia (2019 and 2022)* [Comprehensive degree project, Universidad Externado de Colombia]. https://hdl.handle.net/20.500.11839/9576
- Pugo, R., & Zhinin, L. (2020). *Nutritional habits, nutritional status and its relationship with academic performance in schoolchildren of the 'Corazón de María' Fiscomisional Educational Unit of the Biblián Canton, 2019* [Master's thesis, University of Cuenca]. https://rest-dspace.ucuenca.edu.ec/server/api/core/bitstreams/d892279a-83c7-473c-b8c6-d0c5902f1400/content
- Romero, M., & Peña, F. (2023). *Healthy lunchboxes and their relationship with school performance in children at the initial level of the integrated educational institution N° 15 - 20347 – Santa María – Huaura* [Degree project, Universidad Nacional José Faustino Sánchez Carrión]. https://repositorio.unjfsc.edu.pe/bitstream/handle/20.500.14067/7863/TESIS%20ok-DE-ROMERO-VILLARREAL-Y-CAURINO.pdf
- Sagñay-Llinin, G., & Ocaña-Noriega, J. (2023). Malnutrition and its influence on academic performance in times of pandemic. *Science Mastery, 9*(1), 335–354. https://doi.org/10.23857/dc.v9i1.3139
- Santos Holguín, S., & Barros Rivera, S. (2022). Influence of nutritional status on academic performance in an educational institution. *Journal of Health Research, 5*(13), 154–159. https://repositorio.cidecuador.org/bitstream/123456789/1678/1/Articulo_11_Vive_N13V5.pdf
- Snyder, H. (2020). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039
- Sáez, A., & Guillermo, A. (2022). *Relationship between lifestyles and academic performance in university students (case study: Uniciencia University of the city of Bucaramanga 2019)* [Doctoral thesis, Pedagogical and Technological University of Colombia]. https://repositorio.upt.edu.pe/bitstream/handle/20.500.12969/2228/Saez-Abello-Guillermo.pdf
- Salguero, D. (2022). *Food safety-quality management for a school feeding service with an emphasis on dietary diversity in the department of Tolima, Colombia in the post-COVID-19 era* [Master's project, UCIPFG]. https://www.ucipfg.com/biblioteca/files/original/2e3dba9be4c6a5636fdf7f8a0eec456c.pdf
- Santisteban, M. (2021). *Child malnutrition in the learning process of 5-year-old children at the initial level at the Educational Institution I.E N° 60244 Andrés Avelino Cáceres, Pebas, Loreto, Year 2021* [Bachelor's thesis, Enrique Guzmán y Valle National University of Education]. https://hdl.handle.net/20.500.12990/10925
- Ticona, E. (2021). *Influence of malnutrition on academic performance in first and second grade schoolchildren of I.E.P. 70613 'Tupac Amaru' Suyo, 2019* [Undergraduate project, Peruvian University of Applied Sciences].
https://repositorio.upsc.edu.pe/bitstream/handle/UPSC%20S.A.C./281/Eduviges_TICONA_AGUILAR.pdf
- Torraco, R. J. (2021). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review, 20*(3), 300–316. https://doi.org/10.1177/15344843211022730
- Trávez, G., Moreno, G., Tonato, E., & Cangui, S. (2024). Does malnutrition influence poor school performance? A study applied to ninth grade students of the "Juan José Flores" Educational Unit, school year 2022–2023, Sigchos, Ecuador. *Revista Ciencia Digital, 8*(2), 45–60. https://www.cienciadigital.org/revistacienciadigital2/index.php/exploradordigital/article/view/3084/8737
- Velázquez, R., Cardona, D., & Luna, H. (2022). Evaluation of the quality in the provision of the service of the School Feeding Program of the Nuestra Señora de Las Mercedes-Sardinata Educational Institution (Norte de Santander). *Journal of Health Sciences, 20*(1), 112–125. https://doi.org/10.22463/25909215.3584