Childhood malnutrition in patients aged 0 to 9 years attending the Miraflores Health Center in Ecuador

Desnutrición infantil en pacientes de 0 a 9 años de edad que acuden al Centro de Salud Miraflores en Ecuador

Daniel J. Alarcón[1]* iD ✉, Daniel A. Briones[1] iD, Isaac E. Intriago[1] iD

Mario A. García[1] iD, Lissette B. Villavicencio[2] iD

[1]*Carrera de Medicina, Universidad San Gregorio de Portoviejo, Manabí, Ecuador.*
[2]*Unidad Educativa Cristo Rey, Portoviejo, Manabí, Ecuador.*

*Corresponding author

ABSTRACT

Child malnutrition is a public health issue that affects children's growth and development, particularly in vulnerable communities. This study aimed to analyze nutritional conditions and associated factors in children aged 0 to 9 years attending the Miraflores Health Center in Manabí, Ecuador. A cross-sectional, descriptive, and observational study was conducted from May to September 2024 with a non-probabilistic convenience sample of 52 caregivers. Data collection involved structured surveys and an interview with healthcare personnel. Findings revealed poor dietary quality among children, characterized by high intake of carbohydrates and dairy products, and low consumption of fruits and vegetables. Most caregivers also showed limited knowledge of child nutrition. These results underscore the need to strengthen educational and community-based interventions that promote healthy eating practices from early childhood.

Keywords: child malnutrition, child nutrition, nutritional education, public health.

RESUMEN

La desnutrición infantil es un problema de salud pública que afecta el crecimiento y desarrollo de los niños, especialmente en comunidades vulnerables. El objetivo de este estudio fue analizar las condiciones nutricionales y los factores asociados en niños de 0 a 9 años que asisten al Centro de Salud Miraflores, en Manabí, Ecuador. Se llevó a cabo una investigación transversal, descriptiva y observacional entre mayo y septiembre de 2024, con una muestra no probabilística por conveniencia de 52 cuidadores. Se aplicaron encuestas estructuradas y una entrevista a personal sanitario. Los resultados evidenciaron deficiencias en la calidad de la alimentación infantil, marcada por un consumo elevado de carbohidratos y lácteos, junto a una baja ingesta de frutas y verduras. Asimismo, se detectó un nivel limitado de conocimiento nutricional en la mayoría de los cuidadores. Estos hallazgos ponen de manifiesto la necesidad de fortalecer las intervenciones educativas y comunitarias que promuevan prácticas alimentarias saludables desde las primeras etapas de vida.

Palabras clave: desnutrición infantil, alimentación infantil, educación nutricional, salud pública.

INTRODUCTION

Childhood malnutrition constitutes one of the main challenges to global public health, severely affecting children's physical, cognitive, and social development. According to the World Health Organization (2024), nearly 45% of deaths in children under five are related to nutritional disorders. This problem is predominantly concentrated in developing countries, where factors such as poverty, food insecurity, and limited access to health services exacerbate its impact.

Childhood malnutrition remains a critical problem in Latin America, significantly affecting child growth and development. In the region, the prevalence of chronic malnutrition varies widely across countries, with some nations showing alarming rates exceeding 40% in vulnerable populations. Factors contributing to this problem include food insecurity, limited access to health services, lack of nutrition education, and socioeconomic inequalities. Recent studies have identified that, despite public health policy efforts, malnutrition continues to disproportionately affect indigenous and rural communities, where access to adequate food is more limited (Durán et al., 2022).

Ecuador is no stranger to this problem: the prevalence of chronic malnutrition in children under five reaches 23.2%, with rural and peri-urban areas being the most affected due to adverse socioeconomic conditions and difficulties in accessing nutritious food and drinking water (Balladares et al., 2023).

The community of Miraflores, situated in a peri-urban area of Manabí province, serves as a microcosm of this problem. With a population of approximately 3,573 people, 625 of whom are children between the ages of 0 and 9, this community faces limitations in health infrastructure, access to basic services, and economic resources, which contribute to the development of childhood malnutrition. Although specific epidemiological data for Miraflores are not available, the social and economic characteristics of the region suggest that the prevalence of malnutrition could be comparable to or even higher than the national average.

Regarding the consequences of malnutrition, it is essential to highlight that during childhood and preschool age, there may be a delay in growth and psychomotor development, as well as an increased risk of morbidity with long-term adverse effects. These effects may include a decrease in the capacity to perform physical work and in intellectual performance in school age,

adolescence, and adulthood, which can affect the individual's ability to generate income, perpetuating the cycle of poverty and inequality in vulnerable communities (Cortez & Pérez, 2023).

In this context, it is essential to generate scientific evidence to characterize the nutritional status of children in Miraflores, identify associated risk factors, and design effective intervention strategies. The objective of this study was to analyze nutritional conditions and associated factors in children aged 0 to 9 years attending the Miraflores Health Center in Manabí, Ecuador.

METHODOLOGY

This study employed a quantitative, cross-sectional, descriptive, and observational design. The purpose of this study was to determine the prevalence of childhood malnutrition and explore associated factors in the community of Miraflores, located in the 24 de Mayo canton, Manabí province, Ecuador. The research was conducted between May and September 2024.

The target population consisted of 625 children aged 0 to 9 years who attended the Miraflores Health Center during the study period. Non-probability convenience sampling was employed for sample selection, resulting in a final sample size of 52 participants, determined by the availability and informed consent of caregivers.

The following inclusion criteria were established: (i) children aged 0 to 9 years whose legal caregivers voluntarily agreed to participate by signing an informed consent form; and (ii) permanent residence in the community of Miraflores. The exclusion criteria were: (i) children with serious chronic illnesses or metabolic conditions that influenced their nutritional status; (ii) those receiving specialized nutritional treatment; and (iii) caregivers who did not adequately complete the data collection instrument. Forms with incomplete or inconsistent information were considered for elimination.

Data collection was conducted through structured surveys addressed to the children's caregivers, designed to identify eating habits, meal frequency, food groups consumed, breastfeeding practices, and level of knowledge about child nutrition. Experts in public health and child nutrition previously validated the surveys. Additionally, a semi-structured interview was conducted with a Primary Health Care Technician (TAPS) from the 24 de Mayo Health Center to complement the epidemiological information on malnutrition in the community.

The data were coded and organized into analytical matrices using Microsoft Excel. The

statistical analysis was descriptive, calculating absolute and relative frequencies. The results were presented in tables and graphs for ease of interpretation. No inferential tests were applied due to the exploratory nature and small sample size.

This study was conducted in compliance with the ethical principles established in the Declaration of Helsinki. The confidentiality, anonymity, and voluntary participation of participants were guaranteed at all times. Participation was preceded by the signing of an informed consent form by the children's legal guardians.

RESULTS AND DISCUSSION

Table 1 shows the proportion of children with and without malnutrition in this community. To obtain the prevalence of this data, an interview was conducted with the Primary Health Care Technician (TAPS) at the 24 de Mayo Health Center. The table shows the absolute frequency and percentage of children with and without malnutrition. Of a total of 625 children evaluated, 12 cases of childhood malnutrition were identified, equivalent to 1.9% of the study population. In contrast, 613 children (98.1%) showed no signs of malnutrition.

Table 1. Prevalence of child malnutrition in the Miraflores community in Manabí, Ecuador

Prevalence of malnutrition	Absolute frequency	Percentage
Cases of child malnutrition	12	1.9
Children without malnutrition	613	98.1
Total	625	100

Although the percentage of malnutrition detected is relatively low (1.9%), this figure is still significant from a public health perspective, as malnutrition in childhood is directly linked to growth retardation, cognitive impairment, and increased vulnerability to infectious diseases. The Miraflores community faces socioeconomic challenges that could impact child nutrition.

The results obtained in the Miraflores community indicate that the prevalence of childhood malnutrition is 1.9%, a considerably lower figure compared to recent studies on chronic childhood malnutrition in Ecuador. Alcocer & Masaquiza (2024) analyzed ICD in children under 24 months of age and found that 14 children in their sample presented indicators of chronic childhood malnutrition, evidencing a significantly higher incidence. These cases included six boys and eight girls with short stature or severe stature, reflecting the complexity of this problem. On the other

hand, Bonilla & Noriega (2023) showed that ICD has been a persistent problem in Ecuador since 1993, with an increase from 24.8% in 2014 to 27.2% in 2018 among children under 2 years of age.

Table 2 shows the distribution of different infant feeding methods in the Miraflores community. Data were obtained through a survey of caregivers of children participating in the study. 59.6% of the surveyed population (31 people) opted for a mixed feeding, combining breastfeeding and formula. 28.8% (15 people) practiced exclusive breastfeeding, while only 11.5% (6 people) exclusively used formula.

Table 2. Infant feeding in the first 2 years of life

Type of feeding	Absolute frequency	Percentage
Breastfeeding	15	28.8
Formula milk	6	11.5
Mixed feeding	31	59.6
Total	52	100

These data suggest that, although breastfeeding is valued, most mothers in the community opt for a mixed approach. This pattern may be related to various factors, such as maternal return to work, perceptions of insufficient breast milk, medical recommendations, and a lack of education on exclusive breastfeeding. Exclusive breastfeeding for the first six months of life is recommended by the WHO (2024) as it provides infants with antibodies and essential nutrients, thereby reducing the risk of infections and diseases.

These results partially align with those obtained in the study by Montoya and Salinas (2023), who analyzed complementary feeding and physical-psychomotor development in children participating in the "Growing with Our Children" program. Their research revealed that 51.85% of children received adequate complementary feeding, while 48.15% had inadequate practices. Although their study did not specifically focus on the combination of feeding methods, their findings reinforce the importance of an adequate start and transition in infant feeding to prevent nutritional imbalances and malnutrition.

On the other hand, Arimijo et al. (2024) conducted a research study evaluating nutritional education among parents and caregivers of infants at two health centers in Ecuador. They found that before the intervention, 78.5% of parents had basic knowledge about complementary feeding, while after nutritional education, the percentage increased to 89.1%. This data is relevant because

it shows that caregivers' level of expertise directly impacts decisions about infant feeding. In the case of Miraflores, the predominance of mixed feeding may be influenced by a lack of education about the benefits of exclusive breastfeeding and a limited awareness of nutritional recommendations.

This is important because nearly 60% of mothers in Miraflores combine breastfeeding with formula, indicating a need to strengthen strategies that promote exclusive breastfeeding and improve access to information about its benefits. This could be achieved through health education programs and community support for breastfeeding mothers.

Table 3 illustrates the distribution of the number of daily meals received by children in the Miraflores community, as perceived by their caregivers. More than half of the respondents (55.8%, 29 people) reported that their children consume three meals a day. 19.2% (10 people) mentioned that their children receive five meals a day. On the other hand, 11.5% (6 people) indicated that their children receive two or four meals a day, while 1.9% (1 person) reported receiving only one meal a day.

Table 3. Daily feeding frequency of the infant

Daily amount of food	Absolute frequency	Percentage
One meal	1	1.9
Two meals	6	11.5
Three meals	29	55.8
Four meals	6	11.5
Five meals	10	19.2
Total	52	100

The fact that most children receive three meals a day is encouraging, as this allows for adequate basic nutrition. However, variability in the number of meals may be influenced by socioeconomic factors, caregivers' education level, and food availability. The 19.2% of children who receive five meals suggests the inclusion of snacks, which is positive if they consist of nutritious foods. However, the 11.5% who receive only two or four meals and the 1.9% who consume only one meal raise concerns about potential nutritional deficiencies or food insecurity in specific households.

These results can be compared with those of a study conducted by Alonzo et al. (2024), who analyzed the sociocultural factors influencing chronic malnutrition in children aged 1 to 3.

Their research reported that 58.18% of the children in their study consumed three meals a day, which coincides with the results obtained in Miraflores. However, the same survey identified that 5.45% of the children received only two meals a day, which demonstrates the persistence of inadequate nutritional practices in specific vulnerable populations.

Limited access to a balanced diet is a key risk factor for chronic childhood malnutrition, affecting children's physical and cognitive development. The similarity between the two studies highlights the importance of promoting nutrition education programs for caregivers to improve the frequency and quality of children's meals.

Table 4 presents the number of different food groups and classifications in the children's diet within the Miraflores community. It was found that 86.5% of respondents (45 people) reported including carbohydrates in their children's diet, which is the most commonly consumed food group. Traditional dietary patterns may influence the predominance of carbohydrates in children's diets in the region. According to a recent analysis of the energy density of typical Manabí dishes, they tend to be rich in simple carbohydrates and fats, which could explain their frequency in children's diets (Alvarado et al., 2021; Alvarado & Zambrano, 2023).

Table 4. Food groups included in the infant's diet

Food group	Absolute frequency	Percentage
Fruits	20	38.5
Vegetables	35	67.3
Carbohydrates	45	86.5
Proteins	25	48.1
Dairy	40	76.9
Processed foods	10	19.2
Sausages	12	23.1
Carbonated drinks	3	5.8

Dairy products are the next most common, present in 76.9% (40 people), followed by vegetables, which are consumed by 67.3% (35 people) of the children. As for fruits, their consumption is 38.5% (20 people). Low consumption of fruits and vegetables can affect the antioxidant capacity of children's diets, compromising their defense mechanisms against oxidative stress, a topic widely discussed in recent literature on redox balance in the diet (Forbes-Hernández et al., 2020). The tendency toward diets lacking fruits and vegetables is not limited to childhood.

Studies with young university-aged populations have demonstrated suboptimal levels of antioxidant quality in the diet, suggesting a persistence of poor eating habits from early stages (Forbes-Hernández et al., 2021).

Three people (5.8%) indicated that their children consume carbonated beverages. On the other hand, 19.2% (10 people) mentioned that their children consume processed foods, while 23.1% (12 people) include sausages in their children's diet. The inclusion of sausages in children's diets is a cause for concern due to their high sodium and saturated fat content, as well as additives such as sodium nitrite, the use of which has been the subject of technological reformulations aimed at improving nutritional quality and reducing health risks. Studies, such as those by García et al. (2011), have proposed partially replacing nitrite with biopolymers, such as chitosan, showing positive effects on product quality without compromising food safety.

These results are consistent with the study conducted by Solorzano et al. (2020), who analyzed micronutrient intake in children aged 6 to 24 months in Ecuador. Their research revealed that 42% of the reviewed studies reported significant deficiencies in the intake of essential nutrients, including iron, vitamin A, and folic acid, which have a direct impact on child growth and development. Furthermore, the study highlights the importance of increasing access to micronutrient-rich foods, as many diets in the country lack variety and primarily focus on staple foods with low nutritional value.

Likewise, the study by Rodríguez et al. (2024) reinforces these findings, highlighting that the lack of access to nutritious foods and the prevalence of monotonous diets in the child population are associated with an increased risk of anemia and chronic malnutrition. In their analysis of children treated at the Rocafuerte Health Center in Manabí, they found that diets high in carbohydrates and low in protein and vegetables are associated with lower physical development and a higher incidence of metabolic diseases.

Table 5 presents the level of knowledge that caregivers in the Miraflores community have about nutritional recommendations, revealing that 37.7% of respondents (20 people) reported being familiar with dietary recommendations for their children. In comparison, 60.4% (32 people) indicated that they are not familiar with these guidelines.

Table 5. Nutritional knowledge of the caregiver towards the infant

Level of knowledge	Absolute frequency	Percentage
Aware of nutritional recommendations	20	37.7
Not aware of nutritional recommendations	30	60.4
Total	52	100

These critical results suggest that most caregivers lack adequate information about child nutrition, which can negatively impact children's nutrition and development. A lack of nutrition education can lead to poor diets, lower consumption of essential foods, and increased dependence on ultra-processed products.

The study by Barreno-Sánchez et al. (2020) showed that children's poor nutrition is not only due to a lack of access to healthy foods but also to inadequate nutritional education among caregivers. This pattern is similar to what was observed in Miraflores, where a lack of knowledge about dietary recommendations could be affecting the quality of children's nutrition.

On the other hand, the study by Montoya and Cumbicus (2024) showed that 70% of parents had inadequate knowledge about child nutrition, which was reflected in inappropriate feeding practices. In this context, the Miraflores community has higher levels of expertise compared to this study; however, a considerable proportion of caregivers remain inadequately informed. The lack of nutritional education contributes to the maintenance of poor eating habits, which in the long term can lead to malnutrition and dietary deficiencies in children. Early nutritional deterioration can impact the quality of life in later stages of life, as observed in older adults with a history of chronic childhood malnutrition, where functional capacities and autonomy are compromised (Angulo et al., 2024).

CONCLUSIONS

Although the prevalence of childhood malnutrition in the Miraflores community (1.9%) was lower than the national average, nutritional deficiencies persist that could affect children's long-term development. Diets were characterized by a high consumption of carbohydrates and dairy products, in contrast to an insufficient intake of fruits and vegetables. This situation is exacerbated by caregivers' limited knowledge of nutritional recommendations (60.4%), highlighting the urgent need for health education interventions. A trend toward the early introduction of mixed diets and processed foods was also identified, underscoring the importance

of guiding eating habits appropriately from the earliest stages of life. While the results provide valuable information for designing public policies in vulnerable contexts, the small sample size and lack of anthropometric assessments are acknowledged as limitations. Therefore, longitudinal studies evaluating the impact of nutrition education strategies on preventing childhood malnutrition are recommended.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: Daniel J. Alarcón and Daniel A. Briones. **Data curation:** Isaac E. Intriago. **Formal analysis:** Isaac E. Intriago. **Investigation:** Daniel J. Alarcón, Daniel A. Briones, Isaac E. Intriago, Mario A. García, and Lissette B. Villavicencio. **Methodology:** Mario A. García. **Supervision:** Mario A. García and Lissette B. Villavicencio. **Validation:** Mario A. García and Lissette B. Villavicencio. **Visualization:** Daniel J. Alarcón. **Writing – original draft:** Daniel J. Alarcón, Daniel A. Briones, Isaac E. Intriago, Mario A. García, and Lissette B. Villavicencio. **Writing – review & editing:** Daniel J. Alarcón, Daniel A. Briones, Isaac E. Intriago, Mario A. García, and Lissette B. Villavicencio.

REFERENCES

Alcocer, L. J., & Masaquiza, J. P. (2024). Desnutrición crónica infantil en menores de 24 meses que acuden a un centro de salud ecuatoriano, enero–marzo 2023. *Pentaciencias*, *6*(3), 407-421. https://doi.org/10.59169/pentaciencias.v6i3.1112

Alonzo, O. M., Guerrero, A. S., & Guerrón, S. X. (2024). Factores socioculturales que influyen en la desnutrición crónica en niños de uno a tres años. *Revista Información Científica*, *103*, Article e4817. https://doi.org/10.5281/zenodo.13838766

Alvarado, J. M., & Zambrano, J. I. (2023). Tradition and nutrition: An analysis of Manabí cuisine and its impact on health and cultural identity. *Journal of Food Science and Gastronomy*, *1*(2), 25-29. https://doi.org/10.5281/zenodo.13994886

Alvarado, J. M., Zambrano, J. I., & García, M. A. (2021). Densidad energética nutricional de platos típicos manabitas. *QhaliKay*, *5*(3), 66-74. https://doi.org/10.33936/qkrcs.v5i3.3911

Angulo, A. A., Rodríguez, D., & García, M. A. (2024). Estado nutricional y calidad de vida del adulto mayor: revisión sistemática. *Revista Gregoriana de Ciencias de la Salud*, *1*(2), 165-177. https://doi.org/10.36097/rgcs.v1i2.3149

Armijo, K. G., Sánchez, M. E., Domínguez, L. D., & Villafuerte, K. E. (2024). Educación alimentaria a padres o cuidadores de infantes en dos centros de salud, Milagro-Ecuador. *Ciencia Latina*, *8*(3), 3981-3995. https://doi.org/10.37811/cl_rcm.v8i3.11606

Balladares, L. E., Rodríguez-Parrales, D. H., Delgado, J. R., & Legton-Solórzano, M. (2023). Incidencia de desnutrición en niños del Ecuador. *Polo del Conocimiento*, *8*(3), 2243–2255. https://doi.org/10.23857/pc.v8i3.5397

Barreno-Sánchez, S. T., Barrera-Palma, Z. C., Rodríguez-Chicaiza, C. E., & Jordán-Bolaños, A. I. (2020). Conocimientos y prácticas alimentarias de los cuidadores en los centros de desarrollo infantil. *Dominio de las Ciencias*, *6*(4, Noviembre Especial), 163-185. https://doi.org/10.23857/dc.v6i4.1587

Bonilla, D. L., & Noriega, V. R. (2023). Desnutrición en la primera infancia en el Ecuador. *Pentaciencias*, *5*(4), 551-562. https://doi.org/10.59169/pentaciencias.v5i4.692

Cortez, D. K., & Pérez, M. E. (2023). Desnutrición crónica infantil y sus efectos en el crecimiento y desarrollo. *RECIAMUC*, *7*(2), 677-686. https://doi.org/10.26820/reciamuc/7.(2).abril.2023.677-686

Durán, Y. E., Andrade, R. M., Aveiga, Y. L., & Molina, D. S. (2022). Análisis situacional de la desnutrición infantil a nivel de Latinoamérica. *MQRInvestigar*, *6*(3), 1205-1225. https://doi.org/10.56048/MQR20225.6.3.2022.1205-1225

Forbes-Hernández, T. Y., Betancourt, G., Bilbao, T., Rodríguez, D., & García, M. A. (2021). Estimación de la calidad antioxidante de la dieta de estudiantes universitarios mexicanos. *QhaliKay*, *5*(2), 30-41. https://doi.org/10.33936/qkrcs.v5i2.3494

Forbes-Hernández, T. Y., Betancourt, G., Rodríguez, D., & García, M. A. (2020). Capacidad antioxidante total de la dieta vs. balance redox. *QhaliKay*, *4*(1), 35-48. https://doi.org/10.33936/qkrcs.v4i1.2711

García, M., Beldarraín, T., Fornaris, L., & Díaz, R. (2011). Partial substitution of nitrite by chitosan and the effect on quality properties of pork sausages. *Food Science and Technology (Brazil)*, *31*(2), 481-487. http://dx.doi.org/10.1590/S0101-20612011000200031

Instituto Nacional de Estadística y Censos (INEC). (2022). *Encuesta Nacional de Salud y*

Nutrición. Recovered in 2025 at http://bit.ly/40DboqV

Instituto Nacional de Estadística y Censos (INEC). (2023). *Encuesta Nacional de Empleo, Desempleo y Subempleo 2021*. Recovered in 2025 at http://bit.ly/4fdQc0C

Montoya, V., & Cumbicus, T. (2024). Conocimientos de los padres sobre alimentación y hábitos nutricionales de los niños de 1 a 3 años de los centros infantiles municipales de la ciudad de Loja. *Revista Ecuatoriana de Nutrición Clínica y Metabolismo*, *3*(1), 58-59. https://senpeazuay.org.ec/ojs/index.php/renc/issue/view/3

Montoya, V., & Salinas, M. (2023). Alimentación complementaria y desarrollo físico-psicomotor en niños del programa Creciendo con Nuestros Hijos de Espíndola. *Revista Ocronos*, *8*(2), 392-412. http://bit.ly/4o71BmT

Organización de las Naciones Unidas para la Alimentación y la Agricultura (FAO). (2024). *El estado de la seguridad alimentaria y la nutrición en el mundo*. Recovered in 2025 at http://bit.ly/4kZSvpc

Organización Mundial de la Salud (OMS). (2024). *Malnutrición*. Recovered in 2025 at https://www.who.int/es/news-room/fact-sheets/detail/malnutrition

Rachen, L., Quemba, M., & Vargas, L. (2023). Prevalencia y factores relacionados con desnutrición en la primera infancia. Colombia año 2018 a 2020. Revista chilena de nutrición, 50(4), 424-432.

Rodríguez, R., Leal, J., Vera, J., & Ávila, C. (2024). Factores de riesgo de anemia y estado nutricional en menores de 5 años atendidos en el Centro de Salud Rocafuerte, Manabí, Ecuador. *QhaliKay*, 8(1), 1-10. https://doi.org/10.33936/qkrcs.v8i1.6236