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Evaluation of nutritional status and factors contributing to malnutrition in children aged 6 to 59 months in the Luiza Health Zone, Democratic Republic of the Congo

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ABSTRACT

Introduction

This study assesses the nutritional status of children aged 6 to 59 months in the Luiza Health Zone of the Democratic Republic of Congo.

Purpose

The main objective was to evaluate the nutritional situation of children aged 6 to 59 months. Specific objectives included determining the rate of acute malnutrition, identifying different forms of malnutrition, and analysing which age groups and sexes are most affected.

Methods

A descriptive cross-sectional study was conducted from February 15 to 18, 2025, using systematic random sampling. Data were collected from 915 children aged 6 to 59 months, measuring between 65 cm and 110 cm, in randomly selected households in the Luiza Health Zone. Data collection tools included a data collection form, pen, scale, height board, and MUAC tape. Data entry was performed using Excel 2019, and analysis was conducted with Epi Info.

Results

The study found a concerning nutritional status among children in the Luiza Health Zone. Gender distribution included 516 females (56%) and 399 males (44%). Age groups comprised 391 children (42.73%) aged 6–23 months and 524 children (57.27%) aged 24–59 months. Regarding nutritional status, 660 children (72.13%) were in good nutritional condition, 163 (17.81%) suffered from moderate acute malnutrition, and 92 (10.05%) had severe acute malnutrition. Edematous severe acute malnutrition accounted for 1.42%. The overall prevalence of malnutrition was 26.45%.

Conclusion

The prevalence of malnutrition in all its forms remains alarmingly high among children aged 6 to 59 months in the Luiza Health Zone.

INTRODUCTION

Malnutrition remains a significant global public health issue, affecting approximately 16 million children under the age of five. Children with acute malnutrition are nine times more likely to die than their well-nourished peers. These fatalities result directly from malnutrition and indirectly from associated illnesses such as diarrhoea, malaria, helminthiasis, and acute respiratory infections—all of which are major contributors to undernutrition (UNICEF, 2016; FAO, 2013).

In many developing countries, dietary practices often do not align with the recommendations of the World Health Organization (WHO), leading to widespread nutritional deficiencies (FAO, 2009; WHO, 2000). The WHO estimates that around 1.6 million children under five suffer from severe forms of malnutrition, underscoring the urgent need for effective interventions. Improving dietary practices is essential to addressing malnutrition effectively (FAO, 2018).

Today, the world faces a dual burden of malnutrition, encompassing both undernutrition and overnutrition. Although typically associated with low-income countries, malnutrition significantly contributes to child mortality worldwide, necessitating effective prevention and treatment strategies to ensure child survival and optimal development.

In the Kasai region—particularly Kasai Central—chronic food insecurity is a persistent problem, with an average food insecurity rate of 87% (EFSA & INS, 2020). Vulnerable populations, including children under five, pregnant women, and breastfeeding mothers, are especially at risk. The conflict known as *Kamuina Nsapu* has exacerbated the crisis, causing widespread displacement and the destruction of livelihoods.

In addition, poor harvests and border closures have contributed to skyrocketing food prices and limited access to essential food products. Treatment for acute malnutrition has become inadequate due to shortages of medical supplies and nutrition-related resources (PRONANUT, 2022).

The typical diet of the population consists mainly of starchy foods, with limited intake of essential nutrients. The average caloric intake is approximately 1,836 kilocalories per person per day—well below the recommended minimum of 2,500 kcal (PNSA, 2010). Furthermore, infant and young child feeding practices often do not meet international standards, contributing to persistently high rates of malnutrition.

Research Question and Objectives

Given this context, the primary research question of this study is: ***What is the nutritional status of children aged 6 to 59 months in the Luiza Health Zone of Kasai Central?*** Specifically, the study aims to evaluate:

- The rate of acute malnutrition;
- The different forms of malnutrition present;
- The age groups and sexes most affected.

The objective of this research is to generate insights into the extent of malnutrition in the Luiza Health Zone, which is influenced by inadequate feeding practices, poor agricultural productivity, and socio-political instability. The findings will contribute to the development of strategies aimed at mitigating acute malnutrition and supporting future research in this context.

METHODS

Study Area

The study was conducted in the Luiza Health Zone.

Materials

The following materials were used for data collection and implementation:

- Data collection forms
- Pen
- Scale
- Stadiometer (height board)
- MUAC tape for measuring upper arm circumference (UAC)

Type and Period of Study

A descriptive cross-sectional study was conducted focusing on children aged 6 to 59 months during June 2022.

Study Population

The study population consisted of households in the Luiza Health Zone during the survey period in June 2022. In randomly selected households, all children aged 6 to 59

months, with heights between 65 cm and 110 cm, were included in the study.

Sampling Method and Sample Size

Systematic random sampling was employed, resulting in a sample size of 915 children. The sample size was calculated using the following formula:

$$\frac{Z^2 x\ p\ x\ (1-p)}{d^2}$$

Where:

- *n = required sample size*
- *Z = Z-value (1.96 for 95% confidence level)*
- *p = estimated proportion of the population (prevalence of malnutrition)*
- *d = margin of error (0.05)*

Data Collection Technique

Data were collected face-to-face using a structured questionnaire, supplemented by interviews focusing on various determinants of malnutrition, including health, food security, education, hygiene, water, and sanitation.

Data Management, Processing, and Analysis

Data management involved:

- Excel 2019 for data entry
- Epi Info for data analysis and interpretation

Variables Studied

The following variables were recorded:

- **Age:** Exact age of the child in months, based on birth certificate or health card; if unknown, estimated using an event calendar.
- **Sex:** Recorded as "M" for male and "F" for female.
- **Weight:** Measured using an electronic scale, expressed in kilograms, rounded to the nearest 100 grams.
- **Height:**
  - For children under 87 cm, height was measured lying down.
  - For children 87 cm or taller, standing height was measured using a stadiometer, recorded in centimetres or millimetres. Children shorter than 65 cm or taller than 110 cm were excluded.
- **Edema:** Assessed by applying pressure on the top of the foot; bilateral edema was considered indicative of nutritional issues if a thumbprint remained.
- **Upper Arm Circumference (UAC):** Measured on the left arm at the midpoint between shoulder and elbow, recorded in millimetres (PRONANUT, 2016; Camara Lansana, 2005).

Ethical Considerations

All data collection was conducted with respect for human dignity and anonymity. Ethical clearance for this study was obtained from the Health Zone Office of the Luiza Rural Health Zone (Zone de Santé Rurale de Luiza), under the Provincial Health Division of Kasaï Central, Democratic Republic of Congo, on 06 January 2025. The authorisation was signed by the acting Chief Medical Officer, Patrice Lumumba Kabatula. No formal approval number was provided.

Statistical Analysis

The prevalence of severe acute malnutrition (SAM), moderate acute malnutrition (MAM), and overall acute malnutrition was calculated using the formula:

$$P = \left(\frac{\sum \text{Children with Acute Malnutrition} \times 100}{\text{total Children Screened}}\right)$$

Where:

- P = Prevalence
- SAM = Severe Acute Malnutrition

RESULTS

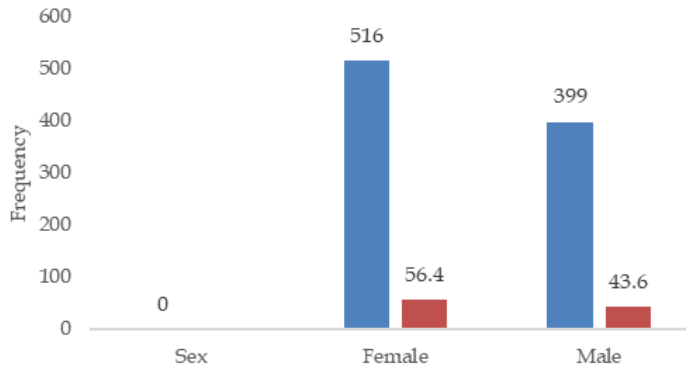
Results Presentation

This section presents the findings obtained during our field survey, organised into tables reflecting various aspects related to nutrition and health.

Demographic Distribution

The survey revealed that 516 respondents (56%) were female, resulting in a female-to-male sex ratio of 1.3.

Figure 1:
Distribution of Respondents by Sex



Source: Field surveys conducted in July 2025

Figure 1 illustrates the distribution of respondents by sex in the survey conducted in the Luiza Health Zone. A total of 916 respondents participated, with 516 identified as female, accounting for approximately 56% of the total population. In contrast, 400 respondents were male, representing about 44%.

The female-to-male sex ratio is 1.3, indicating a higher representation of females in the survey. This imbalance may reflect demographic trends in the region or the specific targeting of female respondents in the study. Overall, the data highlight significant female representation, which could influence findings related to nutrition and health, as women often play crucial roles in child care and nutrition decisions within households.

Table I:
Distribution of Children by Age (Months)

Age (Months)	Frequency	Percentage
6–23	391	42.73%
24–59	524	57.26%
Total	**915**	**100.00%**

Source: Field surveys conducted in July 2025

The findings in Table I show that 391 children (42.73%) were aged between 6 and 23 months, whereas 524 children (57.26%) were aged between 24 and 59 months.

Table 2:
Distribution of Children by Upper Arm Circumference (UAC) and Edema

UAC (mm)	Frequency	Percentage
≥ 125 mm (Normal)	660	72.1%
> 115 mm and < 125 mm (MAM)	163	17.8%
< 115 mm (SAM)	79	8.7%
Edematous nutritional signs	13	1.4%
Total	**915**	**100.00%**

Source: Field surveys conducted in July 2025

According to Table 2, 660 children (72.1%) had a good nutritional status (normal), while 163 children (17.8%) suffered from moderate acute malnutrition (MAM).

Table 3:
Distribution of Children with Severe Acute Malnutrition (SAM) According to Nutritional Edema Classification

Edema	Frequency	Percentage
+	7	53.85%
++	4	30.77%
+++	2	15.38%
Total	**13**	**100.00%**

Source: Field surveys conducted in July 2025

Table 3 indicates that among the 13 children with SAM exhibiting nutritional edema, 7 (53.85%) had edema classified as (+), while 4 (30.77%) had (++) edema.

Table 4:
Overall Distribution of Nutritional Status Across the Entire Zone

Category	Frequency	Percentage
Normal (BEN)	660	72.1%
Moderate Acute Malnutrition (MAM)	163	17.8%
Severe Acute Malnutrition (SAM)	79	8.7%
Nutritional Edema	13	1.4%
Total Screened	**915**	**100.00%**

Source: Field surveys conducted in July 2025

The findings in Table 4 show that 660 children (72.1%) were in good nutritional condition, while 163 (17.8%) had moderate acute malnutrition and 79 (8.7%) suffered from severe acute malnutrition. Nutritional edema accounted for 1.4%. The overall prevalence of malnutrition was 26.45%.

Table 5:
Distribution of Children with Severe Acute Malnutrition (SAM) by Sex

Sex	Frequency	Percentage
Male	43	46.7%
Female	49	53.3%
Total	**92**	**100%**

Source: Field surveys conducted in July 2025

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Table 5 indicates that among children with severe acute malnutrition, 49 (53.3%) were female.

Table 6:
Prevalence of Malnutrition Based on Admission Criteria

Characteristic	N=915	6–23 months	24–59 months
Overall Acute Malnutrition	255 (27.8%)	113 (28.9%)	142 (27.1%)
Severe Acute Malnutrition	92 (10.1%)	49 (12.5%)	43 (8.2%)

Source: *Field surveys conducted in July 2025*

The findings in **Table 6** reveal an overall acute malnutrition prevalence of 27.8%, with the 6–23 months age group most affected at 28.9%. The prevalence of severe acute malnutrition was 10.1%, with the 6–23 months age group also showing the highest rate at 12.5%, exceeding the acceptable threshold of 3%.

DISCUSSION

The findings from our study indicate a concerning nutritional situation in the Luiza Health Zone regarding acute malnutrition among children aged 6 to 59 months. A total of 516 children (56%) were female, while 399 (44%) were male. Among these, 391 children (42.73%) were aged 6 to 23 months, and 524 children (57.27%) were aged 24 to 59 months. Of the children assessed, 660 (72.13%) were classified as having good nutritional status, 163 (17.81%) experienced moderate acute malnutrition (MAM), and 92 (10.05%) suffered from severe acute malnutrition (SAM). Nutritional oedema accounted for 1.42%, resulting in an overall malnutrition prevalence of 26.45%.

These results differ significantly from those reported by PRONANUT (2022) in their SNSAP bulletin for the second quarter of 2022, where only 9% of children had MAM and 0% presented with oedema. This discrepancy may be attributed to factors such as low purchasing power, limited access to adequate food and clean drinking water, and social issues like early marriage and closely spaced births (Dackam, 1988; Ntumba, 2021). The findings align with Akoto and Hill (1998), who noted that socio-economic factors play a critical role in child mortality and malnutrition in sub-Saharan Africa.

Moreover, previous studies have identified key determinants of malnutrition among children. For instance, Bakenda (2004) highlighted that dietary practices, cultural beliefs, and maternal education significantly influence child nutrition in Gabon. Similarly, Barbieri (1991) emphasised that child mortality is closely linked to malnutrition, illustrating the urgent need for interventions targeting these determinants. The relationship between socio-economic status and nutrition is further corroborated by Bhandari et al. (2002), who found that children from affluent backgrounds in India exhibited better growth performance compared to their less affluent counterparts, underscoring the impact of economic factors on child health outcomes.

The Multiple Indicator Cluster Surveys (MICS, 2018) provide additional context, revealing that many regions experience high rates of malnutrition, which often correlate with poor access to healthcare, education, and nutritious food. The data from MICS underscore the importance of comprehensive approaches to tackling the multifaceted nature of malnutrition, emphasising the need for policies that address food security as well as maternal and child health services.

A comparison of our data with previous surveys conducted by COOPI and PRONANUT (2017) reveals a stark increase in acute malnutrition rates. Earlier surveys indicated 9.0% overall acute malnutrition, with 1.8% classified as SAM. In contrast, our survey showed that 42.73% of children aged 6 to 23 months were affected by malnutrition, highlighting a significant rise despite being conducted during the dry season. This increase underscores the urgent need for targeted interventions, as emphasised by Matipa (2017), who identified similar trends in malnutrition among vulnerable populations.

The rise in malnutrition rates may also reflect broader global trends. According to the FAO (2017), the number of undernourished people worldwide increased to 815 million, exacerbated by factors such as conflict and climate variability. These global challenges resonate with the local conditions observed in the Luiza Health Zone, where ongoing conflicts and economic downturns significantly impact food security (World Health Organization [WHO], 2015).

Furthermore, the coexistence of undernutrition and overweight in various regions underscores the complexity of malnutrition (Black et al., 2008). This dual burden is evident in our findings, where both acute malnutrition and associated health risks are prevalent. Addressing these

issues requires a multifaceted approach—integrating nutritional education and food security measures—as advocated by the WHO (2017) and supported by evidence from Dackam (1988), who emphasised the link between maternal education and child health outcomes.

In conclusion, the prevalence of malnutrition in the Luiza Health Zone is alarmingly high, necessitating urgent interventions. Our findings underscore the need for targeted public health strategies to address the multifaceted causes of malnutrition and improve the nutritional status of children in this region.

Limitations

It is important to acknowledge certain limitations of our study. The cross-sectional design means that we cannot establish causality between the identified risk factors and malnutrition outcomes. Additionally, potential self-report bias may have influenced the accuracy of some data collected through interviews, particularly regarding dietary practices and health history.

Furthermore, our study was limited to the Luiza Health Zone, and the results may not be generalisable to other regions. Variations in local food security, health services, and socio-economic conditions could affect malnutrition rates differently in other areas. Additionally, the reliance on a single time point for data collection may not capture fluctuations in nutritional status due to seasonal variations or changes in local economic conditions.

The prevalence of malnutrition in the Luiza Health Zone is alarmingly high, necessitating urgent interventions. Our findings underscore the need for targeted public health strategies to address the multifaceted causes of malnutrition and improve the nutritional status of children in this region.

CONCLUSION

The prevalence of malnutrition among children aged 6 to 59 months in the Luiza Health Zone is alarmingly high, with 26.45% of children suffering from acute malnutrition. These findings highlight the urgent need for targeted public health interventions to address this critical issue.

Recommendations

1. **Implement Nutritional Education Programs:** Public health initiatives should focus on educating families about proper feeding practices, including the importance of balanced diets and the timely introduction of complementary foods. Workshops and community outreach can help improve dietary habits, especially for infants and young children.
2. **Enhance Food Security Measures:** Strategies should be developed to improve access to nutritious food, particularly in vulnerable households. This could include supporting local agriculture, providing food assistance programmes, and ensuring access to clean water and sanitation facilities.

Given the significant rates of malnutrition, immediate action is essential to mitigate its impact on child health. By prioritising these recommendations, efforts can be directed towards reducing malnutrition rates and improving overall child health outcomes in the Luiza Health Zone.

Author Declaration: We, the authors of the manuscript titled *"Evaluation of Nutritional Status and Factors Contributing to Malnutrition in Children Aged 6 to 59 Months in the Luiza Health Zone, Democratic Republic of Congo,"* declare that we have no conflicts of interest related to the publication of this article. We affirm that this work is original and has not been submitted elsewhere for publication. All authors have contributed significantly to the study and have approved the final version of the manuscript.

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- The persons responsible for training, coordinating, and supervising the teams in the field, notably:
  - The Coordinator of Caritas Luiza
  - The Diocesan Project Officer
  - The Diocesan Project Accountant

Ethical Approval: Ethical clearance for this study was obtained from the Health Zone Office of the Luiza Rural Health Zone (Zone de Santé Rurale de Luiza), under the Provincial Health Division of Kasaï Central, Democratic Republic of Congo, on 06 January 2025. The authorisation was signed by the acting Chief Medical Officer, Patrice Lumumba Kabatula. No formal approval number was provided.

Conflicts of Interest: None declared.

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