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Financial Cost to Households of Hospital Care for Children Aged 0 to 59 Months, Case Study of the Kalonda West Health Zone, Kasai Province, Democratic Republic of the Congo

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Abstract

Introduction: Severe acute malnutrition (SAM) remains a major public health problem among children under 5 years of age in the Democratic Republic of the Congo. Hospital care can represent a significant financial burden for households, potentially leading to catastrophic healthcare expenditures. This study aimed to compare the direct and indirect financial costs of care for children with SAM and for those with normal nutritional status hospitalized for other conditions. **Methods:** A cross-sectional analytical study was conducted in the Kalonda West health zone, within the pediatric ward of the Kalonda West General Referral Hospital and the Ditekemena Hospital. The sample comprised 390 children aged 0 to 59 months: 130 cases of malnourished children with severe acute malnutrition (SAM) and 260 children with normal nutritional status hospitalized for other pediatric conditions. Data were collected via a structured questionnaire administered to parents or guardians. **Results:** The overall com-

bined direct and indirect cost was statistically significantly higher in malnourished children (USD 13.84 [8.46 - 19.23]) compared to children with normal nutritional status (USD 10.48 [6.54 - 12.77], P = 0.001). Direct costs related to medication, nursing care, and dietary rations were significantly higher in malnourished children (P = 0.013). For indirect costs, hospital stay was more expensive for cases (P < 0.001), compared to children with normal nutritional status. **Conclusion:** Hospital care for severe acute malnutrition (SAM) entails higher financial costs than for other pediatric conditions. These findings highlight the need for measures to reduce the economic burden on households, particularly through financial protection mechanisms and improved access to care.

Subject Areas

Public Health

Keywords

Severe Acute Malnutrition, Financial Cost, Hospital Care, Children under 5, Ditekemena Hospital, Democratic Republic of the Congo

1. Introduction

Malnutrition is one of the main causes of infant morbidity and mortality in low-income countries [1]. According to the World Health Organization (WHO), nearly 45 million children under the age of five suffered from acute malnutrition in 2023, including more than 13 million with severe acute malnutrition (SAM), a critical form requiring urgent therapeutic intervention [2]. In the Democratic Republic of the Congo (DRC), the situation remains concerning, with high rates of chronic and acute malnutrition in several provinces, particularly in Kasai.

For the Kalonda West health District in the Kasai province, there is a high prevalence of severe acute malnutrition (SAM) among children under five years of age, due to factors such as food insecurity, poverty, limited access to healthcare, and insufficient community nutrition services [1] [3]. While efforts are being made by technical partners (UNICEF, WFP, Ouermi Alain Saga) and the Congolese government to improve detection and treatment, few studies have documented the actual cost to households [4] [5].

Understanding the economic implications of severe acute malnutrition (SAM) is essential for guiding subsidy policies and planning public health budgets. Furthermore, comparing the costs of care for children with SAM with those hospitalized for other conditions allows for an assessment of the additional financial burden imposed by malnutrition [5].

This study aims to estimate and compare the direct, indirect, and total costs of hospital care between children hospitalized for severe acute malnutrition (SAM)

and children with normal nutritional status hospitalized for other conditions, in two referral hospitals in the Kalonda West health zone.

2. Methods

2.1. Study Design

A cross-sectional analytical study was conducted.

2.2. Study Framework

Our study was conducted in the Kalonda Ouest health zone at the Kalonda Ouest General Referral Hospital and the Ditekemena Hospital, two facilities that regularly treat children suffering from severe acute malnutrition (SAM) and other paediatric conditions.

2.3. Study Population

Our study population consists of children aged 0 to 59 months who were hospitalized in the paediatric wards during our study period (January to December 2024).

In addition to the characteristics of the child and parents, the variables analyzed in this study were:

• Direct costs: Consultation fees, hospitalization, medications, examinations, and nursing care.

• Indirect costs: Medical indirect cost are economic losses from reduced work productivity and informal care, stemming from illness or mortality (Expenses with no link with medical care).

• Total cost: sum of direct and indirect costs.

The median, interquartile range (IQR), and frequency constituted our study parameters.

Inclusion Criteria

• Malnourished children: Children aged 0 to 59 months hospitalized with a confirmed diagnosis of severe acute malnutrition (SAM).

• Children with normal nutritional status or comparison group: Children aged 0 to 59 months hospitalized for other conditions, without severe acute malnutrition.

• Presence of a parent or legal guardian available to provide the necessary information.

Sampling and Sample Size

Our sample was exhaustive, comprising 390 children aged 0 to 59 months found in the paediatric ward during our study period, from January to December 2024. Of these, 130 had confirmed severe acute malnutrition (SAM) according to WHO criteria, and 269 cases, nine were not considered because the hospitalization forms were incorrectly filled out and only 260 files were considered. The presence of a consenting parent or legal guardian was required to participate in the study.

2.4. Data Processing and Analysis

Information was collected using a structured questionnaire administered to parents or guardians.

Data were entered and analyzed using Microsoft Excel 2024 and SPSS version 25. Qualitative variables were described using frequencies and percentages. For quantitative variables, normality was tested using the Kolmogorov-Smirnov test to perform comparisons, as was the case for the direct cost of care, for which the distribution was either free or skewed.

2.5. Ethical Considerations

The study was approved by the Ethics Committee of the University of Lubumbashi (number UNILU/CEM/054/2025). Authorization was obtained from the local health authorities, and informed consent was obtained from the parents or guardians of the included children. The confidentiality and anonymity of the participants were strictly maintained.

3. Results

3.1. Sociodemographic Profile of the Children and Their Respondents (Table 1)

A total of 390 children aged 0 to 59 months and their respondents participated in the study. The gender distribution was perfectly balanced, with as many girls as boys. Regarding education level, nearly four out of ten mothers (37.9%) had completed secondary school; among fathers, the overall level of education was higher, with 46.4% having completed secondary school and 17.4% tertiary education. Concerning occupation, most fathers were self-employed (82.8%), while 60.3% of mothers were homemakers. A small proportion of both parents held salaried employment (paid employment) (4.6%).

Table 1. Profile of the children and respondents who participated in the study, n = 390.

Variables	Frequency	Percentage
Sex of children		
Female	212	54.4
Male	178	45.6
Mother's level of education		
None	69	17.7
Primary	127	32.6
Secondary	148	37.9
Higher or university	46	11.8

Continued

Father's level of education		
None	37	9.5
Primary	104	26.7
Secondary	181	46.4
Higher or university	68	17.4
Father's profession		
None	49	12.6
Liberal	323	82.8
Paid profession	18	4.6
Mother's profession		
Housekeeper	235	60.3
Self-employed	137	35.1
Paid occupation	18	4.6
Age of the head of household	**Median [IQR]**	**[Min-Max]**
	33 [10 - 37]	[22 - 73]
Child's age (in months)	**Median [IQR]**	**[Min-Max]**
	24 [21 - 28]	[1 - 59]
Household size	**Median [IQR]**	**[Min-Max]**
	7 [2 - 9]	[3 - 14]

Regarding the age of the heads of household, at least half were 33 years old or younger (median = 33 years), and the middle half of the population ranged within a 10-year age range. For the children, 50% were 24 months old or younger (median = 24 months). For all households, at least half had seven members (median = 7), with some having up to 14 members (Table 1).

3.2. Comparison of Direct Care Costs between Malnourished and Children with Normal Nutritional Status

Direct costs related to care were generally higher in Malnourished children than in children with normal nutritional status, although the differences were not significant for most expenditure categories. However, the differences were marked for the costs related to medication, nursing care, and dietary rations, the median costs of which were approximately USD 2 to 3 higher in cases, with statistically significant differences ($P < 0.05$) (Table 2).

Table 2. Distribution of direct financial costs according to status (malnourished child or children with normal nutritional status), n = 390.

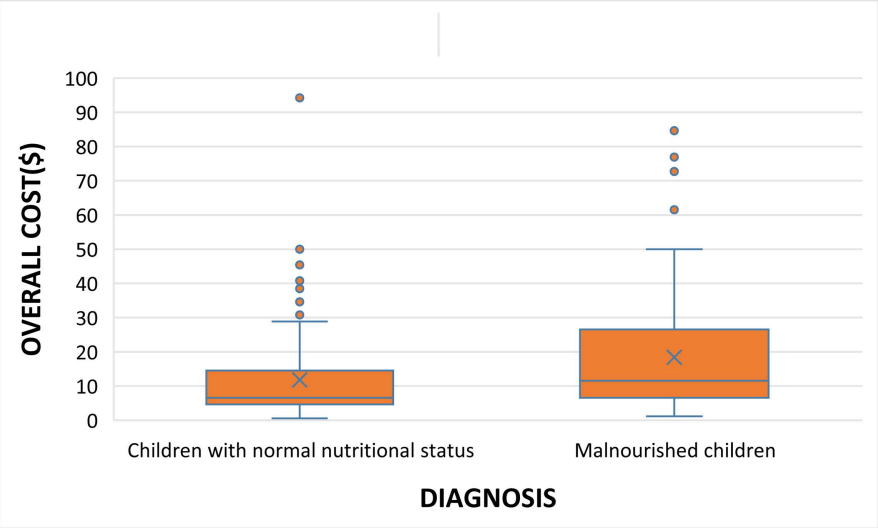
Variable	Frequency	[Min-Max]	Median [IQR]	P (Mann-Whitney test)
Laboratory test				
Malnourished child	130	[0.96 - 3.85]	1.92 [0.96 - 2.69]	>0.05
Children with normal nutritional status	260	[1.15 - 4.61]	2.69 [1.92 - 2.69]	
Hospitalization				
Malnourished child	130	[2.31 - 19.23]	2.69 [2.31 - 10.96]	>0.05
Children with normal nutritional status	260	[1.53 - 3.85]	2.31 [2.30 - 2.89]	
Drugs(medication)				
Malnourished child	130	[1.15 - 76.95]	7.69 [1.15 - 12.11]	0.03
Children with normal nutritional status	260	[1.15 - 19.23]	5.77 [3.75 - 9.62]	
Nursing care				
Malnourished child	130	[1.92 - 57.69]	11.54 [1.92 - 15.38]	0.04
Children with normal nutritional status	260	[0.96 - 13.46]	3.85 [1.54 - 7.69]	
Dietary ration				
Malnourished child	130	[1.92 - 46.74]	6.53 [1.92 - 8.46]	0.01
Children with normal nutritional status	260	[0.76 - 57.69]	2.30 [1.73 - 5.19]	
Other examinations				
Malnourished child	130	[1.92 - 6.35]	2.31 [1.92 - 3.65]	>0.05
Children with normal nutritional status	260	[1.92 - 3.85]	2.31 [1.92 - 2.64]	
Total direct cost				
Malnourished child	130	[1.92 - 19.23]	8.46 [1.92 - 19.23]	>0.05
Children with normal nutritional status	260	[1.92 - 80.77]	6.54 [3.85 - 11.35]	

Indirect costs included expenses related to transporting the caregiver and their hospital stay. Indeed, no statistically significant difference was observed between cases and Children with normal nutritional status for transportation and food costs ($P > 0.05$). However, the cost of the hospital stay was significantly higher for cases, half of whom spent at least USD 5.19 compared to USD 1.35 for Children with normal nutritional status ($P < 0.001$) (Table 3). The overall cost, including direct expenses, was significantly higher for cases than for Children with normal nutritional status ($P = 0.013$). At least half of the cases spent USD 13.84 or less. Among Children with normal nutritional status, at least half spent USD 10.48, with the middle half spending between USD 6.54 and USD 12.77. Furthermore, some cases generated exceptional expenses, reaching up to USD 80.77, while

among Children with normal nutritional status, the maximum reached USD 53.50 (Figure 1).

Table 3. Distribution of indirect financial costs according to status (malnourished child or children with normal nutritional status), n = 390.

Variable	Frequency	[Min Max]	Median [IQR]	P (Mann-Whitney test)
Child guard Transport				
Malnourished child	130	[0.76 - 4.04]	1.15 [0.77 - 2.31]	>0.05
Children with normal nutritional status	260	[0.57 - 3.85]	1.35 [1.15 - 2.26]	
Sick food ration				
Malnourished child	130	[0.96 - 11.54]	3.84 [0.96 - 7.69]	>0.05
Children with normal nutritional status	260	[0.96 - 11.54]	2.40 [2.29 - 3.08]	
Hospital Stay				
Malnourished child	130	[3.85 - 7.69]	5.19 [3.85 - 6.44]	<0.001
Children with normal nutritional status	260	[0.57 - 3.85]	1.35 [1.15 - 2.26]	
Total indirect cost				
Malnourished child	130	[1.00 - 53.50]	5.38 [1.00 - 8.46]	>0.05
Children with normal nutritional status	260	[0.58 - 19.23]	3.94 [3.80 - 7.69]	



Normality test (Kolmogorov-Smirnov): 0.000; P-value (Mann-Whitney U): 0.013.

Figure 1. Box plots comparing the total cost (direct and indirect) in cases and in children with normal nutritional status among the 390 participants.

4. Discussion

In this study, the direct costs associated with medications, nursing care, and die-

tary rations were clearly higher for children with severe acute malnutrition (SAM) than for children hospitalized for other pediatric conditions (**Table 2**). This observation reflects clinical reality. SAM requires specific treatments to correct nutritional deficiencies and prevent or treat associated infections, including medications, vitamin supplements, and rehydration solutions. In addition, close monitoring of weight, hydration status, and vital signs is essential, placing a greater burden on healthcare staff and increasing the use of medical supplies [6] [7]. The therapeutic diet, enriched with protein and micronutrients, also contributes to increased costs [8]. These factors explain why direct expenses are higher in cases than in children with normal nutritional status, whose care requires less intensive interventions [9] [10].

Indirect costs, primarily related to hospital stays, were also higher for malnourished children (**Table 3**). This reflects the time parents or guardians must dedicate to caring for their children, often at the expense of their income-generating activities. In rural or semi-urban areas, where income largely depends on informal work, this lost time represents a significant economic burden for households [7] [10]. The extended stay is often linked to the clinical severity of the cases and the presence of comorbidities, such as respiratory infections or malaria, which require prolonged monitoring and care, with a consequent increase in the indirect financial burden [2].

The overall cost, combining direct and indirect expenses, was significantly higher for children with severe acute malnutrition (SAM) (**Figure 1**). In Niger, the cost of severe acute malnutrition was as high, but much higher, than that found in our study [11].

In northern Senegal, a study revealed that the average total cost of managing severe acute malnutrition was USD 431.9 (standard deviation = 203.9), with staff costs representing the largest expense (33% of the total). Household expenses accounted for 45.3% of the total cost, or USD 195.6 (standard deviation = 103.6) [12].

This finding underscores the cumulative economic burden of SAM, combining the intensity of care and the loss of income for families. These results are consistent with national and regional observations [3] [13], and emphasize the need for appropriate support strategies, such as subsidizing treatments, improving access to care, and strengthening national nutrition programs. These measures are undoubtedly essential to reducing the financial burden on households and improving the chances of recovery for malnourished children.

These results are like those found by Daures and colleagues, who demonstrated that indirect costs associated with managing severe malnutrition constitute a significant portion of the economic burden borne by households, especially in rural areas where income is based on daily labor. They also highlight that prolonged hospital stays, frequently complicated by comorbidities, lead to a significant decrease in family productivity, thus confirming the findings in the Congolese context [13].

Furthermore, the findings presented here align with those of Tadesse, who highlighted that the overall cost of severe acute malnutrition, combining direct medical expenses and indirect income losses, is significantly higher than for other common pediatric conditions. This convergence of results demonstrates that SAM constitutes a major economic problem for vulnerable households and reinforces the need for public policies aimed at reducing treatment costs and supporting affected families [14].

It is crucial to consider the psychological impact of severe acute malnutrition on families, beyond the direct and indirect costs. Prolonged hospitalization of a child generates stress that degrades the emotional well-being of parents, thus affecting their work performance and exacerbating the family's economic hardship [13] [15].

Severe acute malnutrition (SAM) also places additional strain on health systems.

In low-resource countries, it is common for referral hospitals to redeploy staff and equipment to meet the specific needs of malnourished children. This restricts the availability of care for other illnesses and leads to increased institutional spending [16].

At the community level, severe malnutrition in children has lasting effects on human capital. Children who survive severe acute malnutrition (SAM) often show delays in their growth and cognitive development, which may decrease their future economic and educational potential. Thus, the total cost also includes long-term productivity losses for the business [17].

Comparative research indicates that preventive nutritional interventions are significantly more cost-effective than curative treatments. According to Ould Abdeslam-Hamaz [18], funding for community-based micronutrient supplementation and awareness programs significantly reduces the incidence of severe acute malnutrition (SAM), leading to a decrease in associated direct and indirect costs.

The importance of intersectoral collaborations in reducing the economic burden of SAM is emphasized. The involvement of NGOs, international funders, and local stakeholders in providing financial support for treatments and establishing social safety nets improves household resilience and promotes greater equity in access to care [19].

Study Limitations

Several limitations should be highlighted. First, the study does not distinguish between costs covered by external aid and those actually paid by households. Finally, the specific rural context of Kalonda West limits the generalizability of the results to other regions of the DRC or Africa.

5. Conclusions

This study, conducted in the Kalonda West health zone, demonstrated that hospital care for children suffering from severe acute malnutrition (SAM) incurs a significantly higher financial cost than for children hospitalized for other illnesses.

Direct costs, primarily medication and hospitalization, constitute the bulk of the expenses, while indirect costs reflect the lost income for children with normal nutritional status and high transportation costs for those with other pediatric conditions. The results also reveal that total financial costs are significantly higher for children with normal nutritional status than for those with other conditions. These findings highlight the disproportionate impact of other childhood illnesses on vulnerable households, which often must mobilize substantial resources, with or without external support.

These findings call for multisectoral and structural actions, including:

- Strengthening targeted subsidy and free healthcare policies for children with other illnesses.
- Community support and early outpatient care to reduce lengthy and costly hospitalizations.
- Integrating prevention into primary healthcare and food security interventions.

Finally, further studies incorporating cost-effectiveness, cost-benefit, and long-term economic burden analyses will be essential to support policymakers in building more equitable and resilient health systems.

Conflicts of Interest

The authors declare no conflicts of interest.

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