



Cure Rate of Severe Acute Malnutrition Treatment among Children Aged 6-59 Months Admitted to Daikundi Hospitals

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Background: Acute malnutrition is a critical health issue affecting children, particularly in low- and middle-income countries. Severe Acute Malnutrition (SAM) is the primary reason for pediatric admissions and a major cause of mortality in many countries, including Afghanistan. This study aims to evaluate the treatment outcomes and recovery rates of SAM among children under five years of age.

Methods: A facility-based cross-sectional study was conducted by reviewing health records of SAM cases treated in 2022.

Results: Among the SAM cases, 46.4% were male and 53.6% were female. The average weight at discharge was 8.4 kg, with an average length of stay of 70.37 days. Most children were admitted with wasting, while a small percentage presented with edema. Common signs and symptoms included appetite failure, vomiting, diarrhea, fever and cough. Of the total cases, 75.9% were cured, 12.5% defaulted, 1.4% died, 3.7% were referred and 6.5% did not respond to treatment.

Conclusion: The recovery, defaulter and death rates meet the minimum standards set by the Sphere Project. However, the average weight gain is below national standards and the length of stay exceeds recommendations, indicating the need for further improvements in the management of SAM cases among children under five years of age

Keywords: Treatment Outcome, Severe Acute Malnutrition, Under Five, Children

Introduction

Severe acute malnutrition (SAM) remains a critical threat to child survival globally, with affected children facing significantly higher mortality rates compared to their well-nourished peers [1]. An estimated 19 million children under the age of five suffer from SAM, underscoring it as a pressing public health concern, particularly in resource-limited settings [1]. International standards, such as those advocated by the Sphere Project, recommend a minimum recovery (cure) rate of 75% for children with SAM undergoing treatment [2]. However, achieving this target is often hindered by various challenges, including delayed presentation to healthcare facilities and overwhelmed healthcare systems [2]. Studies from Ethiopia have shown varied recovery rates, with an overall pooled estimated recovery rate of 72.02% [3]. These inconsistencies in recovery from SAM, with cure rates ranging from 22.1% to 95.36%, indicate the need for continuous evaluation and improvement of SAM management programs [3]. Factors such as residing in rural areas and vaccination status



can affect recovery time [3]. In Afghanistan, there are currently 12.9 million children, with over 1,200 births reported each day [4][5]. The percentage of children under 5 years of age with registered births is only 51%, indicating significant challenges in obtaining accurate statistics for this age group.

Despite these difficulties, the number of children under 5 admitted to hospitals with severe acute malnutrition has risen significantly, from 16,000 admissions in 2020 to 28,000 in 2022 [6]. In 2022, an estimated 45 million children under 5 (6.8%) were affected by wasting, with 13.6 million (2.1%) suffering from severe wasting. In 2022-23, 3.7% of children under five are reported to be wasted, with 1.2% suffering from severe wasting. Specifically, in Daikundi province, 3.6% of children under five suffer from wasting and 1% suffer from severe wasting [7, 8]. This study addresses a pressing public health issue: the treatment outcomes and recovery rates of severe acute malnutrition (SAM) among children under five years of age in Daikundi hospitals. Given the alarming rise in admissions of malnourished children, it is crucial to evaluate the effectiveness of current treatment protocols and identify factors that may impede recovery. The rationale for this research lies in the urgent need to understand these treatment outcomes, as they directly impact child survival rates in resource-limited settings. By focusing on the evaluation of recovery rates among children aged 6–59 months with SAM, this study aims to provide insights that will inform improvements in management strategies and enhance the overall effectiveness of SAM treatment programs. Ultimately, the goal is to contribute to better health outcomes for vulnerable populations and reduce the burden of malnutrition in similar contexts.

Materials and Methods

Study Design

This was a facility-based cross-sectional study conducted by reviewing the health records of children diagnosed with Severe Acute Malnutrition (SAM) and treated at four Therapeutic Feeding Units (TFUs) in Daikundi Province, Afghanistan in 2022.

Study Population and Sampling

The study population included all children aged 6-59 months who were admitted with SAM to the TFUs in Daikundi Province during the study period. Initially, 968 children aged 6-59 months with SAM cases admitted to the four TFU sites in 2022 were considered. Of these, 101 children were less than six months old and 4 cases had incomplete data and were excluded. The remaining 863 children were entered into the database for analysis. Subsequently, 161 children who were referred within the hospitals and 212 children who were referred between health facilities across the province were excluded. Finally, 490 children were included in the final analysis.

Operational Definitions

Treatment outcome: Was defined as recovered or not recovered from SAM management at TFU in this study.

Recovered: Was defined as a gain of 15% of weight at admission and/or MUAC > 125mm / WHZ $\geq$ -2 for wasting children and resolution of edema for 2 consecutive visits for kwashiorkor children.

Not recovered: was defined as children discharged from TFU with outcome other than recovery in this study (death, default, medical transfer and noncured).

Non-cured: was defined as a patient that failed to reach the discharge criteria after 8 weeks of treatment in the program.



Defaulter: was defined as a child who was absent for two consecutive follow-up visits from the TFU and confirmed by home visit.

Weight gain: is the average weight gain (in grams) for every kg of body weight of the child per day. Weight gain calculation was conducted for recovered children in the marasmus categories, with a formula of = (Discharge weight in gram – Admission weight in gram)/ (Admission weight in kg)/ (Number of days in program).

Average length of stay: was calculated by adding the total number of days that each child stays in the TFU until cured and dividing this by the number of children cured for a specific month. [9]

Sphere Standards: are a set of principles and minimum humanitarian standards in four technical areas of humanitarian response (WASH, Nutrition, Shelter and Health) [10].

Data Collection

Data were collected through a review of medical records using a standardized data collection sheet. Information about the children's characteristics, including admission date, nutrition status at admission, discharge date, weight at discharge, length of stay and average weight gained, was extracted from the registration book and inpatient treatment cards. Six nutrition nurses and two administrative staff participated in the data collection.

Data Quality Assurance

The data collection sheet was pre-tested on 5% of the sample size at one of the TFU sites 2 weeks before the actual data collection. The pre-test results showed a Cronbach's alpha of 0.82, indicating good reliability of the data collection tool. The collected data were checked for completeness and consistency daily. Double data entry was performed and cross-checking ensured consistency.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS, Version 22). Descriptive statistics were employed to summarize the characteristics of the study participants.

Ethical Considerations

The research proposal for this study was approved by the Research Committee of the Master's Program of Kabul University of Medical Sciences (1402/05/21-13). The study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

RESULT

Demographic Characteristics

Out of the total 490 SAM children, 227 (46.4%) were male and 263 (53.6%) were female. The age of the children ranged from 6 to 55 months, with a mean age of 16.4 months. The largest age group was 12-23 months, comprising 221 (45.1%) children, followed by 174 (35.5%) children in the age group 6-11 months and 95 (19.4%) children in the age group 24-59 months (Table 1).

Variable		Frequency	Percent%
Sex			
Male		227	46.3
Female		263	53.7
Age	Minimum	Maximum	Mean
	6	55	16.4
Age Group		Frequency	Percent%
6-11 month		174	35.5
12-23 month		221	45.1
24-59 month		95	19.4

Table1. Demographic Characteristics of children admitted in TFU in Daikundi hospitals

Admission Characteristics of Children

The weight of the children at the time of admission ranged from 2.5 kg to 15.6 kg, with a median weight of 6.8 kg (interquartile range: 5.6 - 8.2 kg). The height of the children on admission ranged from 49 cm to 115 cm, with a median height of 70 cm (interquartile range: 65 - 77 cm). The children were admitted with MUAC values ranging from 65 mm to 138 mm, with a mean MUAC of 111.7 mm (SD $\pm$ 6.8 mm) (Table 2).

Weight (Kg)	Minimum	Maximum	Mean	St. Deviation
	2.5	15.6	7.2	1.6
Height (cm)				
	49	115	71.9	8.6
MUAC (mm)				
	65	138	111.7	6.8

Table 2. Admission Characteristics of the Children

The clinical characteristics and symptoms of the children with severe acute malnutrition (SAM) are presented in Table 3. The majority of the children (60.8%) passed the appetite test, while 39.2% failed. The most common signs were fever (45.9%), diarrhea (32.4%) and cough (34.7%).

Clinical Characteristics		Frequency (N=490)	Percent%
Wasting		487	99.4
Edema		3	0.6
Failed Appetite test	Yes	192	39.2
	No	298	60.8
Vomiting	Yes	120	24.5
	No	370	75.5



Diarrhea	Yes	159	32.4
	No	331	67.6
Fever	Yes	225	45.9
	No	265	54.1
Cough	Yes	170	34.7
	No	320	65.3
Night blindness	Yes	2	0.4
	No	488	99.6
Hair loose	Yes	61	12.4
	No	429	87.6
Short breathiness	Yes	99	20.2
	No	391	79.8
Intestinal Parasite	Yes	14	2.9
	No	476	97.1

Table 3. Clinical Characteristics Signs and Symptoms of Children with SAM

Characteristics of the children when discharged

The characteristics of children at discharge (Table 4) shows an average weight of 8.4 kg (SD $\pm$ 1.9 kg) and an average length of stay of 70.37 days (SD $\pm$ 28.5 days), with outpatient cases averaging 8.4 kg (SD $\pm$ 1.8 kg) and 77.1 days (SD $\pm$ 20.7 days), while inpatient cases averaged 6.7 kg (SD $\pm$ 1.28 kg) and 10.5 days (SD $\pm$ 6 days).

Weight (Kg)	Minimum	Maximum	Mean	St. Deviation
OPD	3.8	16.4	8.4	1.8
IPD	2.8	11	6.7	1.28
Total	2.8	16.4	8.4	1.9
Length of stay (day)				
OPD	1	124	77.1	20.7
IPD	1	53	10.5	6
Total	1	124	70.37	28.5
Average Weight Gain (g/Kg/day)				
OPD	-5.5	9.5	2.4	1.7
IPD	-3.4	56.1	9	7.2
Total	-3.4	43.5	3.2	3.8

Table 4. Characteristics of the children when discharged

Treatment Outcome of SAM

Among the 490 admitted SAM cases, 372 (75.9%) children were declared cured, as recorded in the malnutrition registration log books. Additionally, 61 (12.5%) SAM cases defaulted from the therapeutic feeding center, while 7 (1.4%) cases resulted in death during treatment. Eighteen (3.7%) cases were referred to other facilities and 32 (6.5%) SAM children did not respond to the treatment for SAM (Table 5).

Clinical Characteristics	Frequency, Percent	Sphere Standard reference for the main indicators	
		Acceptable	Alarming
Recovery rate	372 (75.9%)	>75%	<50%
Defaulter rate	61 (12.5%)	<15%	>25%
Death rate	7 (1.4%)	<10%	>15%
Refer out	18 (3.7%)	--	--
Non cure rate	32 (6.5%)	--	--
Weight gain	3.2	≥5 gr/Kg/day	<5gr/Kg/day
Average length of stay	70.37	56 days	>90 days
Total	N=490		

Table 5: Treatment Outcome of admitted SAM children

Discussion

This study primarily aimed to report on the treatment outcomes of severe acute malnutrition (SAM) among children treated in hospitals. Significant findings emerged regarding nutritional recovery time for children with SAM managed in nutritional rehabilitation units. The overall median length of stay was 70.37 days (± 28.5 days), which exceeds the accepted national minimum standard of 56 days for outpatient treatment [9]. This longer recovery time contrasts with studies conducted in Northwest Ethiopia [10][11], potentially due to differences in socio-economic status, the quality of healthcare provided and the utilization of therapeutic foods and medications. Further studies are necessary to substantiate these findings. The study revealed that weight gain among SAM children admitted to hospitals was 3.2 g/kg/day, which is lower than the national acceptable range of ≥ 5 g/kg/day [9]. This finding aligns with a study conducted in the Wenago District of Southern Ethiopia, which reported a weight gain of 3.9 g/kg/day [11]. However, it is lower than findings from studies in India and Jimma University Medical Center in Southwest Ethiopia [12][13]. The inadequate weight gain, which falls below national standards, may be attributed to insufficient provision of routine medications and improper utilization of ready-to-use therapeutic food (RUTF), potentially prolonging the median recovery time. In terms of the type of SAM, edematous malnutrition was observed in only 3 (0.6%) children, a lower rate than reported in studies from Ethiopia and other African countries, including India and Pakistan [11][12][13][14]. Regarding treatment outcomes, the Sphere Project sets minimum acceptable standards at a recovery rate of >75%, a default rate of <15% and a death rate of <10% [15]. In this study, the recovery rate was 75.9%, aligning with the minimum standard and similar to reports from Sub-Saharan Africa [16], though higher than findings from studies in India and Pakistan [12][14]. The study indicated a default rate of 12.5%, which is within the Sphere Project's minimum standard (<15%) [15]. This finding is comparable to studies from Jimma University Medical Center and Gubalafto Wereda, North Wollo Zone, Ethiopia [13][17], but lower than findings from a study in India [12]. The low default rate may suggest that mothers and caregivers



in the study area are aware of the consequences of defaulting from therapeutic feeding units (TFUs). It could also reflect the economic pressures faced by households, which may compel them to attend hospitals to obtain RUTF, either for their malnourished children or to share with other under-five siblings. The death rate among SAM children in this study was 1.4%, aligning with the Sphere minimum standard ($<10\%$) [15]. This finding is consistent with studies conducted in India and Ethiopia [12][17], but not comparable to the 12.35% reported in Southwest Ethiopia [13]. The referral rate in this study was 3.7%, indicating that children with severe complications or other co-morbidities that could not be managed in the hospital were referred to inpatient departments or specialized hospitals. Finally, the study found a non-cure rate of 6.5% among children with SAM, which is consistent with findings from the Wenago District in Southern Ethiopia (7.2%) [11]. However, those children should have been referred for inpatient treatment in a stabilizing center after 90 days in the program if they did not meet discharge criteria. Inadequate or partial provision of routine medications and caregivers' intentions to remain in the program to secure RUTF supplies may contribute to delays in recovery from SAM. In conclusion, the treatment outcomes for severe acute malnutrition (SAM) in 2022 align with the minimum standards set by the Sphere Project, demonstrating a high recovery rate and low rates of defaulters and deaths. However, the average weight gain and length of stay fall short of recommended targets, indicating a need for improvements in SAM management across the nation. Addressing the high rates of complications and enhancing the overall quality of care are essential for optimizing treatment outcomes and recovery rates. These findings provide valuable insights for health authorities and stakeholders in Afghanistan to strengthen the SAM management program and improve the health and nutritional status of children in similar regions.

Limitations

This study has several limitations. There is a lack of prior research on severe acute malnutrition (SAM) in Afghanistan and some children's documents were unavailable in hospitals. Conducted in only four hospitals, the findings may not represent all health facilities in the province. Additionally, missing data in registration books and treatment cards could affect the accuracy of the results.

Recommendations

To enhance treatment outcomes for children with Severe Acute Malnutrition (SAM) and promote sustainable health improvements, the following concise recommendations are proposed:

1. **Implement Integrated Programs:** Stakeholders should adopt holistic programs that combine Infant and Young Child Feeding (IYCF), Community-based Nutrition Programs (CBNP) and Water, Sanitation and Hygiene (WASH) initiatives to address the multifaceted causes of malnutrition.
2. **Staff Training and Capacity Building:** Invest in training healthcare personnel, including midwives and nutrition counselors, focusing on documentation best practices and treatment protocols to improve data accuracy and support informed decision-making.
3. **Strengthen Health Education:** Enhance health education initiatives for families and community members to raise awareness about nutrition, identify signs of malnutrition and understand SAM treatment protocols, empowering communities to proactively address malnutrition.
4. **Focus on Complex Cases:** Prioritize cases with prolonged treatment times, ensuring strict adherence to established protocols and providing tailored support to improve recovery rates and minimize complications.



5. Utilize Follow-Up Charts: Standardize the use of SAM management follow-up charts to enable systematic tracking of patient progress, identify trends and facilitate timely interventions.
6. Strengthen Community Engagement: Actively involve local communities in designing and implementing nutrition programs, ensuring relevance and sustainability through community leader engagement.
7. Enhance Access to Therapeutic Foods: Ensure a reliable supply of ready-to-use therapeutic foods (RUTF) and nutritional supplements by collaborating with suppliers to improve distribution channels.
8. Monitor and Evaluate Program Impact: Establish robust monitoring and evaluation frameworks to assess the effectiveness of nutrition interventions, providing insights for data-driven policy adjustments.
9. Policy Advocacy for Nutrition Programs: Advocate for increased funding and policy support at local and national levels, ensuring nutrition remains a priority in health agendas and resource allocation.

Conflicts of Interest

The author(s) declare(s) that there are no conflicts of interest regarding the publication of this paper.

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