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OUTPATIENT THERAPEUTIC FEEDING PROGRAM OUTCOMES AND DETERMINANT IN THE TREATMENT OF SEVERE MALNUTRITION IN SOS HOSPITAL IN HELIWA DISTRICT, SOMALIA

Hamdi Abdullahi Roble[1*], Dr. Sophia Ngala (PhD)[2] & Dr. Dasel Wambua Mulwa Kaindi (PhD)[3]

[1]Scholar, School of Applied Human Nutrition of the University of Nairobi
[2] Lecturer, School of Applied Human Nutrition of the University of Nairobi
[3] Lecturer, School of Applied Human Nutrition of the University of Nairobi

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Abstract

Proper nutrition is vital for young children's growth and health, especially those under two. Globally, 52 million children are affected by acute malnutrition, with common issues including anemia and vitamin A deficiency. In Somalia, drought and economic hardships have worsened malnutrition, affecting 1.2 million children under five over 231,000 of whom face life-threatening Severe Acute Malnutrition (SAM). This study assessed the prevalence, treatment outcomes, and key factors influencing SAM management. A descriptive cross-sectional study was conducted at SOS Hospital in Mogadishu, using systematic random sampling to select 343 children aged 6 to 59 months enrolled in the Outpatient Therapeutic Program (OTP) between December 2023 and April 2024. Structured questionnaires gathered information on demographics, maternal nutritional knowledge, cultural practices, dietary habits, food security, coping strategies, clinical history, medication adherence, and children's nutritional status. Maternal nutritional knowledge was moderate, 62% had medium knowledge, 34% low, and only 4% high. Key gaps included 13% unaware of when to stop breastfeeding, 55% unsure of when to start complementary feeding, and only 33% knowing sunlight is a source of vitamin D. Dietary diversity was low; only 31.3% of children met the required score and 35% consumed protein-rich foods. Food scarcity affected 74% of households, and 51% did not treat drinking water. Malnutrition rates were high: 48.2% experienced acute malnutrition (more common in boys: 54.3% vs. 45.7%), 61.8% were stunted, 83.8% underweight, and 2.5% overweight. Common illnesses included cough (15%), fever (14%), and diarrhea (11%), with 52% hospitalized. Significant factors associated with wasting included child illness (p=0.007), age under 6 months (p=0.000), and maternal age (p=0.003). Only 18.4% of children met the All5 score, with a mean (SD) of 4.2 (1.36). Consumption of legumes, pulses, nuts, and seeds was poor (31%). However, the mean (SD) NCD risk score was low at 0.88 (0.96), with 98.9% of children at minimal non-communicable disease risk. The study concludes that malnutrition is both acute and chronic, with low maternal knowledge, poor dietary diversity, and low All5 consumption. Despite high malnutrition, the risk of NCDs was minimal. The study recommends enhancing community

service integration, staff training, and continuous monitoring of OTPs to improve treatment adherence and recovery outcomes at SOS Hospital in Mogadishu.

Keywords: *Outpatient, Therapeutic Feeding Program Outcomes, Treatment of Severe Malnutrition*

INTRODUCTION

The national median Global Acute Malnutrition (GAM) rate in Somalia is 17.4%, exceeding the emergency threshold of 15%. Globally, 52 million children under five suffer from acute malnutrition, with 17 million facing severe forms, mainly in South Asia and Sub-Saharan Africa (Abate et al., 2020). SAM impedes child development and increases long-term health risks.

In developing countries, about 2% of children face severe malnutrition (Collins, 2007). African studies show a 51% faster recovery in SAM cases treated with Ready-to-Use Therapeutic Foods (RUTF) compared to standard care (Lenters et al., 2013). Proper nutrition is essential for children under two, and women's nutrition directly affects child health. Malnutrition often leads to illnesses such as diarrhea and respiratory infections (Directorate of National Statistics, 2020).

In Somalia, drought and economic hardship have worsened malnutrition, elevating child mortality and impairing growth and cognition. WHO defines SAM by WHZ below -3, MUAC under 11.5cm, or bilateral edema, with a mortality risk nine times higher than MAM (WHO, 2013). Despite interventions, Somalia faces high malnutrition rates: 28% stunted, 12% wasted, and 23% underweight. Additionally, 34% of children have vitamin A deficiency, 43% anemia, and 28.6% iron deficiency anemia (Directorate of National Statistics, 2020).

Feeding programs in Somalia target acute malnutrition in vulnerable populations through therapeutic and supplementary feeding, fortified foods, and routine screenings. Community-based approaches, including peer support and local health workers, improve access and sustainability. Programs are funded by WFP, UNICEF, and FAO, and implemented by international and local NGOs.

Statement of the Problem

Despite collaborative efforts involving various international and local agencies, non-governmental organizations, and health authorities from the Ministry of Health, the nutritional situation in Somalia is worsening. There is a paucity of research and publications concerning therapeutic feeding programs in Somalia, highlighting the need for further studies to investigate outcomes and factors affecting recovery rates in Outpatient Therapeutic Program (OTP) interventions (Somalia National Strategy, 2020-2025).

SOS Hospital Mother and Child Care, established in Mogadishu during the onset of the civil war in 1991, is a prominent regional public hospital. It offers various health and nutrition services, focusing primarily on women and children. These services include primary and secondary healthcare, delivery assistance, inpatient care, a fully operational theater available 24/7, laboratory and blood bank services, pharmacy facilities, stabilization units for managing severe acute malnutrition with complications, as well as programs such as Outpatient Therapeutic Program (OTP), Targeted Supplementary Feeding Program (TSFP), and Mother and Child Health (MCH) services (Said Mohamed Nor et al., 2016). In 2016, a study conducted at SOS Hospital investigated the determinants of malnutrition among children under five. The findings revealed that 66.4% of malnourished children were between the ages of 6 and 12 months, followed by 18.0% who were aged 13 to 24 months (refer to Table 4.3 and Figure 4.12). The study also identified a significant association between a child's nutritional status and age, with a P-value of 0.001, as well as the parent's educational level. (Said Mohamed Nor et al., 2016).

Research questions

1) How does the caregivers' nutritional knowledge affect the nutritional status of children 6-59 months attending OTP?
2) What are the cultural practices impacting children influencing common comorbidities observed in children with SAM admitted to SOS Hospital in Mogadishu, Somalia?
3) Does the administration of routine medications appropriately carried out affect the dietary practices, water availability, and coping mechanisms among households with children (aged 6-59 months) with severe acute malnutrition for children admitted to SOS Hospital in Mogadishu, Somalia?
4) How does demographic and socioeconomic characteristics of the households influence the nutritional status of the children during treatment among children admitted at SOS Hospital in Mogadishu, Somalia?

Materials and Methods

This study employed a descriptive cross-sectional design to investigate the characteristics, treatment outcomes, and influencing factors of children aged 6–59 months undergoing treatment for Severe Acute Malnutrition (SAM) through the Outpatient Therapeutic Program (OTP) at SOS Hospital in Heliwa District, Mogadishu, Somalia. The study, conducted between December 2023 and April 2024, involved a systematic sampling of 343 children. SOS Hospital was selected due to its specialization in maternal and child health and its established nutrition program, making it suitable for evaluating OTP outcomes.

Data collection was carried out through structured and pretested questionnaires, registration record reviews, and anthropometric assessments. The research addressed five core objectives: demographic and socioeconomic profiling, assessing caregivers' nutritional knowledge and cultural practices, analyzing household dietary patterns and coping mechanisms using Somalia's diet quality score toolkit, evaluating medical adherence and comorbidities, and monitoring changes in children's nutritional status. Clinical and routine medication history, food composition knowledge, and household water access were central to understanding treatment outcomes.

To ensure data quality and analytical rigor, a 5% pilot test was conducted to refine instruments. Data collection was closely supervised for accuracy and consistency. The analysis, performed using SPSS version 29, included treatment outcomes such as recovery, default, and weight gain duration, calculated per national guidelines. The Global Dietary Recommendation (GDR) score was also applied to reflect caregivers' adherence to diet quality practices, with a higher score indicating better alignment with nutritional standards aimed at preventing non-communicable diseases.

Results, Analysis, Discussions and Conclusions

Most of the children recruited in the study were female (70%) and nearly all lived in the urban areas (98%). About two thirds (61%) of the mothers had education level up to primary school and 31% had secondary school level of education. Most of mothers in the study (83%) were casual laborers and 80% were living in rental houses

Effect of the caregivers' nutritional knowledge on the nutritional status of children 6-59 months attending OTP

A review of the response to each of the questions for assessing nutritional knowledge (Table 2), it is evident that 13% of women are unaware when a child should stop continued breastfeeding, frequency of breastfeeding a child (32%), age to start complementary feeding (55%), 11% causes of malnutrition, examples of triple burden of malnutrition (20%). Only 30% knew the correct

frequency of deworming for children or when first dose of vaccine should be offered (32%). A few mothers could identify with the correct energy source food (37%) and 33% knew sunlight is a source of vitamin D. Only 4.7%% of mothers agreed that they can entrust their expressed breast milk to another woman. However, the cultural issues around this were not well captured in this study, which a limitation of the current assessment.

Table 1: Nutritional knowledge of mothers of study children using mother's knowledge assessment tool as indicator

Nutritional knowledge	Wronged the Questions		Answered correctly	
	Number	Percent	Number	percent
The frequency of deworming of children	240	70	103	30
Time to initiate breastfeeding after birth	132	38	211	62
Age of child to stop breastfeeding	299	87	44	13
How often should a child be breastfed	233	68	110	32
Age a child start complementary feeding	155	45	188	55
An example of a balanced diet	110	32	233	68
Foods that prevent anaemia	101	29	242	71
Causes of malnutrition	306	89	37	11
Socio-economic factors that cause malnutrition	94	27	249	73
Examples of triple burden of malnutrition	275	80	68	20
When first dose of vaccine is offered to a child	232	68	111	32
An energy food source	216	63	127	37
vit D is obtained from sunlight	230	67	113	33
Food source of a protein	128	37	215	63
Why fruits and vegetables are consumed	68	20	275	80
Basic functions of calcium in the body	208	61	135	39
An example of an healthy snack	126	37	217	63
Reason for washing hands	87	25	256	75

Dietary Diversity score for study Children

Only 31.3% of the children met dietary diversity score by meeting at least 5 out of 8 food groups of the infant and young children's dietary guidelines. Consumption of the specific food groups is shown in Table 3. Protein source foods were the least consumed, beans, legumes, nuts and seeds (30%), flesh foods (meat, fish, poultry and organ meats (35%), and eggs (25%) (Table 3). Cereal staples were consumed nearly by every child (95.9%) while 56.6% of the children were breastfeeding.

Global diet score (GDR) was 10.26(1.38). Other indicators Consumption of at least one fruit or vegetables was 92.3% with zero consumption of the later was 7.5%. Consumption of animal source protein was 73.2% without considering breastfeeding after considering breastfeeding, 87.5% of the children consumed animal source protein, indicating that 14% were not on ASF but were on breast milk Two thirds of the children (65.5%) were fed on sweet beverage especially teas, with milk. Consumption of salty snacks and soft drinks were low, 14% and 4.1%, respectively.

Nutritional status of study children attending SOS Hospitals

Nutritional status of children was assessed by taking anthropometric assessments – measurement of height, weight, MUAC, and assessment of presence of oedema. The mean z-scores and SDs are weight for height (-1.84±1.48), weight for age (-2.90±1.16) and height for age (-2.41±1.68) (Table 3). The total sample size was 343, however, due to flagging of data by ENA SMART, the sample sizes varied as shown in Table 2.

Table 2: Nutritional status of study children (stunting, Wasting and underweight) weight for height, weight for age, and height for age

Nutrition status Indicator	n	Mean z-scores ± SD
Weight-for-Height	326	-1.84±1.48
Weight-for-Age	339	-2.90±1.16
Height-for-Age	325	-2.41±1.68

* contains for WHZ and WAZ the children with edema.

Prevalence of study children in SOS hospital with chronic malnutrition

Close to two thirds (61.8%) of the children were stunted, more boys than girls were stunted (65.2% compared to 60.5%). The prevalence of moderate stunting and severe stunting was 25.2% and 36.6%, respectively. The highest prevalence of stunting was at the ages 6-17 months of age.

Prevalence of underweight of study children

The prevalence of underweight was 83.8%, higher in boys than girls (89.1% vs 81.5%, repectively). severe and moderate underweight were 36% and 47.8%, respectively (Table 13). The children of ages below 40 months were the most affected.

Prevalence of overweight

prevalcne of overweight was 2.5% wiht the boys having a higher prevalnce of overweight than girls (4.3% and 1.7%) (Table 15). A small proportion had severe overwight (0.6%). The ages between 6-17 months were the ones with overweight observed in the study

Child illness and health seeking behavior of mothers

More than half of the children were not suffering from childhood illnesses. Cough, fever, and diarrhea were the common illness with 15%, 14% and 11% respectively being affected. None of the children was suffering from non-communicable diseases (Table 3).

Table 3: Proportion of children who had illnesses in the last 14 days preceding date of interview

	Number	**Percent**
Illness child		
None	200	58%
Cough	50	15%
Fever	47	14%
Diarrhoea	38	11%
Generalized body swelling	3	1%
Oral thrush	3	1%
Seizures	1	0%
Failure to gain weight	1	0%
chronic illness of children		
None	**320**	93%

Others	**21**	6%
Congenital heart disease	**1**	0%
PTB	**1**	0%

Half the children (52%) were admitted at the hospital for treatment, with 76% of children being under routine medication The medications were mainly issued on admission (63% of the children), 91% received supplements, with this 94% of the children were reported to have improved (Table 5). Even the medications used were not declared, 37% of the children suffered from side effects.

Table 4: Percent of study children admitted in SOS Hospital, use of medications and supplements.

Immunization Status/rourine medication	**Number**	**Percent**
Child admitted hospital		
Yes	180	52
Immunization card updated		
Yes	305	89
Children on routine medications		
Yes	260	76
When on routine medications		
On admission	216	63
During visits	47	14
As per the guideline	41	12
On discharge	39	11
Children on supplements use		
Yes	312	91
Self-reported adherence on medications		
Yes	282	82
Children experience challenges with adherence to medications		
Yes	135	39
Children suffered medications side-effects		
Yes	126	37
Children improved after medications/treatment		
Yes	**323**	94

Determinants of malnutrition among study children attending SOS hospital

Presence of child illness (p=0007), child age below 6 months (p= 0.00), mother's age (p=0.003) was significantly association with child wasting status. Minimum Dietary diversity score (MDDS) (p= 0.96), gender of the child (p= 0.139), education level of the mothers (p=0.41) and mother's nutritional knowledge (p=0.123) were not significantly associated with Wasting.

Table 5: Determinants of acute malnutrition among study children and their mother in SOS Hospital

Categories of study children	Wasting				
	Normal n=169	Moderate n=85	Severe n=80	Chi-value	P-Value
illness child				9.8	0.007

child not ill	53	73	56		
child ill	47	27	44		
Child MDDS				0.07	0.96
never met MDDS	80	81	80		
Met MDDS	20	19	20		
Child age				52.3	0.000
below 12 months	89	65	54		
13-24 months	10	23	20		
<60 moths	1	12	26		
Gender of child				3.94	0.139
Female	75	68	63		
Male	25	32	38		
Mother's age				20.2	0.003
below 18 years	14	4	8		
19-24	39	27	25		
25-34	36	56	44		
>34 years	12	13	23		
Education level of the mother					
Primary	72	48	58	3.9	0.41
secondary	22	38	37		
University	6	14	5		
Mother's nutritional knowledge				7.3	0.123
Low Knowledge	30	29	44		
Medium knowledge	64	67	54		
High knowledge	7	4	3		

Discussion

The study found a higher proportion of female children were malnourished A study in Nairobi, Kenya, found that female children made up a significant proportion of the study population, particularly in urban slums (Kimani-Murage et al., 2011). Similarly, a study conducted in Addis Ababa, Ethiopia, reported that female children were overrepresented in nutrition surveys focusing on urban populations (Haileselassie et al., 2016). The nutritional assessment of children attending SOS Hospital in Mogadishu reveals a concerning prevalence of both acute and chronic malnutrition. The mean z-scores for weight-for-height, weight-for-age, and height-for-age show that most children suffer from under nutrition, highlighting significant levels of both wasting (acute malnutrition) and stunting (chronic malnutrition).

Most of the mothers of study children were casual laborers particularly in LMICs. Research in Dhaka, Bangladesh, revealed that a large proportion of mothers were engaged in informal employment, which often leads to economic instability and food insecurity, adversely affecting

child health (Hossain et al., 2019). In Nairobi, Kenya, and Johannesburg, South Africa, studies have highlighted the significant impact of maternal employment in casual labor on household food security and child health, with children in these households being more vulnerable to malnutrition and poor health outcomes (Mutua et al., 2017; Vorster et al., 2014).

A high proportion of study children belonged to households with rented houses. In Lagos, Nigeria, research has shown that rental housing is common among economically vulnerable families, often correlating with poorer health outcomes for children (Olusanya & Renner, 2012). This trend is also observed in Nairobi, Kenya, where studies have highlighted the challenges faced by families in rental housing, including food insecurity and limited access to healthcare (Kimani-Murage et al., 2011). The dietary patterns and associated non-communicable disease (NCD) risks among children in this study raise significant concerns about their long-term health outcomes

The study revealed that although children had an adequate dietary diversity score, their consumption of protein-rich foods was low, with fewer than one-third eating legumes, nuts, and seeds, and only slightly more consuming animal-source foods. Most children primarily ate cereal staples, a trend common in low- and middle-income countries that leads to "hidden hunger", adequate calories but poor micronutrient intake. Intake of vitamin A-rich fruits and vegetables was also limited, and fewer than one-fifth met the All5 dietary diversity score, indicating the need for improved dietary interventions.

The Association between child illness and wasting highlighted the critical impact of acute illnesses but only the respiratory infections were significantly associated with Acute wasting ($p=0.033$) but, diarrhea was not in the current study ($P=0.226$). Illnesses can exacerbate malnutrition by increasing nutritional needs, reducing appetite, and causing nutrient losses (Checkley et al., 2008). This observation aligns with global literature, which establishes a strong link between frequent illness episodes and acute malnutrition (Black et al., 2013).

Child age is also associated with wasting, with younger children (under one year) being more susceptible to severe wasting ($p=0.000$). This highlights the increased vulnerability of infants to malnutrition, especially during the transition from exclusive breastfeeding to complementary feeding. Infants need a nutrient-dense diet to support their rapid growth and development, but they often face the risk of insufficient dietary intake during this crucial stage. (Dewey & Adu-Afarwuah, 2008). This observation is consistent with findings from other low-income settings, where younger children, especially those under two years, are disproportionately affected by wasting due to inadequate complementary feeding practices and frequent infections (Victora et al., 2010).

Maternal education was found to be linked to the nutritional status of children. In Addis Ababa, Ethiopia, higher maternal education was strongly associated with better child health and nutrition outcomes, especially regarding nutritional status and the use of healthcare services. (Berhane et al., 2009). A similar relationship was observed in Kampala, Uganda, where higher levels of maternal education correlated with better child health outcomes, particularly in terms of nutritional status and healthcare utilization (Nabukeera-Barungi et al., 2015).

Conclusion

This study aimed to examine health and nutrition outcomes and their determinants in OTPs. The data collected encompassed socio-demographic details, cultural practices, caregiver knowledge, children's nutritional status, and dietary habits. The results highlighted significant challenges related to maternal nutritional knowledge, cultural practices, dietary diversity, and the nutritional status of children attending SOS Hospital in Mogadishu.

Maternal nutritional knowledge was found to be insufficient, with notable gaps in understanding vital nutrients like vitamin D and protein, which are essential for the growth and development of children. These knowledge deficits directly impact the effectiveness of nutritional interventions, as seen in other low- and middle-income countries (LMICs). Addressing these knowledge gaps through culturally sensitive educational programs is essential for improving maternal and child health outcomes.

Dietary diversity among children was suboptimal, marked by limited consumption of protein-rich foods, fruits, and vegetables. The over-reliance on starchy staples combined with a low intake of animal-source foods has contributed to micronutrient deficiencies, stunting, and other forms of malnutrition. Although the consumption of sweetened beverages was high, the low intake of processed snacks and sugary drinks reflects economic constraints rather than deliberate health choices. This underscores the need to promote affordable, nutrient-dense diets that enhance dietary diversity and reduce the risk of non-communicable diseases (NCDs).

The study also uncovered alarmingly high levels of malnutrition, including acute malnutrition, stunting, and underweight, especially among boys and younger children. Chronic malnutrition (stunting) was most common in children aged 6 months to 2 years, aligning with the period when complementary feeding is introduced. These findings underscore the urgent need for comprehensive and multifaceted interventions to tackle these issues and enhance child health outcomes.

Recommendations

Improving child nutrition requires a comprehensive strategy focused on education, food quality, healthcare, and targeted support. Increasing mothers' knowledge about child nutrition, especially about breastfeeding and the right time to start complementary feeding is crucial. Community programs and awareness campaigns about vitamin D and sunlight exposure can fill important knowledge gaps. Efforts to improve dietary diversity should promote protein-rich foods like eggs through local farming, food distribution, or subsidies, while providing food assistance to families facing scarcity.

Food security can be strengthened by supporting local agriculture, community gardens, and emergency food relief, alongside educating households on safe water practices to reduce illness-related malnutrition. Healthcare services must be expanded to treat common childhood illnesses, with integrated programs that combine nutrition screenings and vaccinations for more effective care.

Special attention should be given to vulnerable groups, such as younger and older mothers, through counseling and healthcare access. Programs should also prioritize infants under six months with breastfeeding support and appropriate complementary feeding. Broader policies addressing food insecurity through economic development, social protection, and empowering community health workers for nutritional counseling and home visits are essential to reaching the most at-risk populations.

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