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Weight Gain in Severe Acute Malnutrition Children after Discharge from CMC Children's Hospital Larkana Followed-Up for Two Months

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ABSTRACT

Globally, 19 million children under five suffer from severe acute malnutrition, causing 400,000 deaths annually. Early detection is crucial for treatment and reducing consequences in community and healthcare settings. **Objectives:** To assess weight gain in severe acute malnutrition (SAM) children two months after discharge from Children's Hospital. **Methods:** A prospective cohort study was conducted on children with SAM, receiving treatment at the oral therapy program (OTP) clinic at Chandka Medical College, Children Hospital, Larkana. Through consecutive sampling, 99 children aged 6-60 months with SAM and good appetites during discharge were enrolled. Mothers were explained about OTP. Follow-ups were conducted every 15 days up to two months after discharge to assess weight gain. SPSS version 22.0 was used to analyze the data. **Results:** Analysis revealed that 58.6% were male, with a mean age of 16.4 ± 8.2 months, while 52.5% were below 12 months old, mostly in rural areas (58.6%), and (32.3%) had illiterate maternal education status. Mean body weight at discharge was 4100 ± 620 grams. By the end of 2 months, weight gain was noted among 91(91.9%) children. Weight gain was "good" in 51.5% of children, moderate in 34.3%, and poor in 14.2%. The weight gain was significantly associated with younger age groups (p=0.0085), literate mothers (p=0.0071), and increased monthly income families (p= 0.0416). **Conclusions:** The study found a significant association between weight gain and SAM management. Clinical-based treatment is often only the first step; however, sociodemographic factors like age, maternal education, and family income are crucial for sustaining nutritional and medical recovery and reducing morbidity and mortality.

INTRODUCTION

Severe acute malnutrition (SAM) is a major worldwide and national public health concern, especially among children under the age of five [1]. In low- and middle-income countries, an estimated 34.2 million children under the age of five (5) were affected by SAM in 2022, accounting for almost 45% of all child deaths [2, 3]. Severe acute malnutrition (SAM) is defined as "very low weight for height (below -3Z scores of the median WHO growth standards) by apparent severe wasting or the presence of nutritional edema" [4]. According to the report of WHO 2013, SAM is considered to be a major cause of mortality among children. SAM is estimated to affect around 20 million pre-school children who are mainly from African and Southeast Asian countries. In 2022, 45 million children under the age of five, or 6.8% of this age group, were afflicted by wasting. Out of these, 13.7 million (2.1%) experienced severe wasting [5]. Compared to healthy children, the risk of mortality is estimated to increase 9-fold among children who have SAM [6]. SAM affects around 3.1% of children under 5. years old with a weight-for-length or height z-score (WHZ) <-3 criteria, resulting in an estimated 450,000 cases [6]. There is no national evidence on the incidence of SAM by mid-

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upper arm circumference and the existence of bipedal edema in children below 5 years of age; thus, the actual figures for children having SAM might be much greater than estimated currently [7]. Children with SAM can be effectively treated by WHO recommendations that are practical and maintainable even in small district hospitals with imperfect resources. WHO guidelines are an organized method of care and include 10 steps in two stages, to manage the acute problems and long-term to promote recovery and growth [8]. In 2022, there were 149 million stunted children under the age of five, while 37 million were overweight or obese. Undernutrition is responsible for about half of all fatalities in low- and middle-income countries, and it affects nearly half of these children [9]. A study from Rajasthan, India, evaluating outcomes on follow-up of children after SAM treatment, noted that 51.7% of children had a poor rate of weight gain, 31% had moderate, and 6.89% had a good rate of weight gain on follow-up [10]. Pakistan has the world's third-highest proportion of stunted children, after only Nigeria and India. In Pakistan, the prevalence of stunting was estimated to be 45%, wasting at 10.5%, and underweight at 31.6% [11, 12]. This study will address the gap in the gain among SAM children on follow-up visits after discharge, as well as challenges such as inadequate nutrition, poor access to resources, or lack of monitoring that could hinder their progress. A two-month follow-up will assist in identifying social, environmental, or economic aspects that impact the child's health after being discharged from the hospital and that contribute to a sustained recovery. Although they are counseled about the treatment, nutrition, and preventive measures, the high mortality rate alarms establishing a better follow-up program to identify the actual situation. This study will test the follow-up. treatment and care and will give us insight into the exact picture of follow-up among children with SAM.

Severe acute malnutrition (SAM) remains one of the most critical public health emergencies affecting children under five in low- and middle-income countries, with Pakistan bearing a disproportionately high burden reflected in stunting prevalence of 45%, wasting at 10.5%, and underweight at 31.6%, all of which contribute to approximately 45% of all under-five deaths nationally and globally. While WHO-endorsed inpatient treatment protocols and oral therapeutic programs have demonstrated effectiveness in achieving weight recovery during hospital admission, the post-discharge trajectory of SAM children in resource-limited settings like Larkana, Sindh, remains poorly documented, leaving a critical gap in understanding how sociodemographic factors such as maternal education, household income, and child age influence sustained nutritional recovery at home. Most existing Pakistani studies focus on treatment outcomes during hospitalization rather than monitoring weight gain over structured post-discharge follow-up periods, limiting the evidence base for designing effective community-level aftercare programs. This study therefore aimed to assess weight gain in SAM children aged 6 to 60 months over a two-month post-discharge follow-up period and identify the sociodemographic determinants that significantly influence recovery outcomes.

METHODS

A prospective cohort study was conducted at the oral therapeutic program clinic at CMC Children Hospital, Larkana, from August 2021 to February 2022, approved by the CPSP Research Evaluation Unit and authorized by the Hospital's Ethical Review Committee with Reference No. CPSP/REU/PED-2017-221-4562. All participants were informed about the research methodology and acquired written consent. A study of a total of 99 children aged 6-60 months with severe acute malnutrition with good appetite discharged from the hospital was enrolled at the OTP clinic at CMC Children Hospital, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, Pakistan. Mothers were explained about OTP. All children whose mothers or caretakers were trained about how to feed and how to give complementary locally prepared food at home according to WHO protocol. Children were called in for follow-up every 15 days for up to two months following discharge to see if they had gained weight. The sample size is computed by Rao sample size software to be 99 according to the formula (n = z2 * p *(1 - p)). / e2), assuming the rate of weight gain among SAM children on follow-up (6.89%) [10], with a confidence level of 95% and a margin of error of 0.05 and a consecutive sampling technique applied. This study included both genders, aged 6 to 60 months. discharged children (as per operational definition) with a good appetite. All children who had gained weight for at least 3 days. No sign of active infection. In the study, children with chronic illnesses, congenital heart disease, cerebral palsy, and those who missed or didn't complete a 2-month follow-up period were excluded. All study data such as age, residence, gender, food, and weight (Seca 725 Germany) were entered into a study-specified questionnaire. The study reduced potential bias by excluding caregivers who were unwilling to follow up during selection, using phone reminders to caregivers to reduce the bias, and weight measurement bias was reduced by using a standardized digital scale by trained healthcare staff. However, selection bias may persist due to the exclusion of children unable to attend follow-ups, potentially limiting the generalizability of the findings. SPSS version 26.0 was applied to analyze the data. Mean ± SD was presented for quantitative variables like age, gestational age, and body weight. Frequency and percentage were computed for qualitative variables like

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age, gender, body weight, maternal education, and monthly income. Effect modifiers like age, gender, body weight, maternal education, and monthly income were controlled by stratification. Post-stratification chi-square test was applied, and p-value ≤ 0.05 was considered statistically significant.

RESULTS

In all, 99 children had a mean age of 16.4 ± 8.2 months, 52 (52.5%) were under 12 months, 40 (40.4%) were between 13 and 36 months, and 7 (7.1%) were between 37 and 60 months (Figure 1).

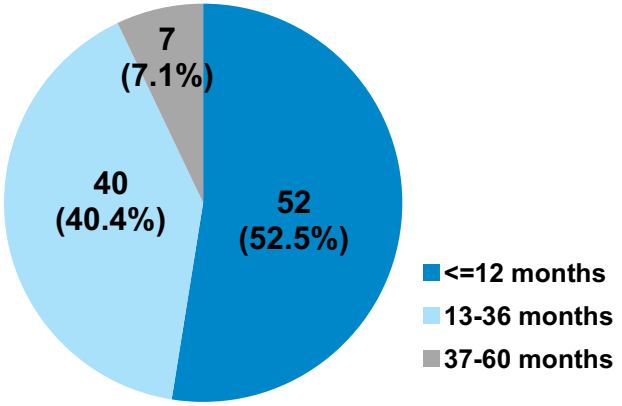


Figure 1: Distribution of Age in Months (n=99)

Gender-wise distribution of patients, 58 (58.6%) were male and 41 (41.4%) females (Figure 2).

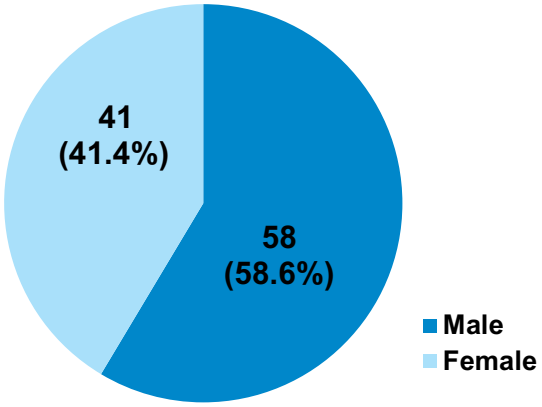


Figure 2: Distribution of Gender

Concerning area of residence was rural in 58 (58.6%) children while the remaining 41 (41.4%) belonged to urban areas (Figure 3).

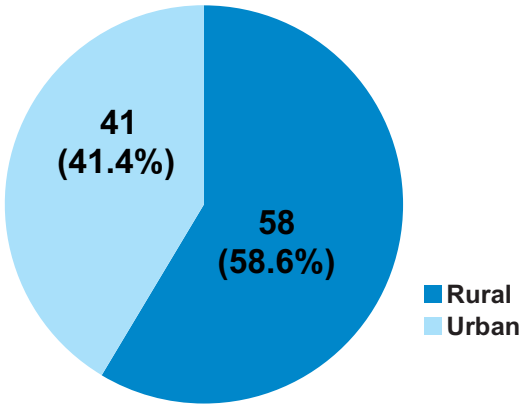


Figure 3: Distribution of Area of Residence (n=99)

The frequency of maternal education status was 32 (32.3%) for illiterate mothers and 67 (67.7%) for literate mothers. Monthly family income was between 25,000 and 40,000 PKR among 53 (53.5%) children, less than 25,000 PKR in 36 (36.4%), whereas the remaining 10 (10.1%) children had monthly family income above 40,000 PKR. Distribution of body weight at the time of discharge showed that most of the children, 59 (59.6%), had body weight between 3000 and 5000 grams. The mean body weight at the time of discharge was calculated to be 4100 ± 620 grams. By the end of 2 months, weight gain was noted among 91 (91.9%) children, while the remaining 8 (8.1%) did not have weight gain (Table 01).

Table 1: Frequency Distribution of Various Variables

Variable	Characteristics	Frequency (%)
Maternal Education	Illiterate	32 (32.3%)
	Literate	67 (67.7%)
Monthly Family Income	< Rs. 25,000	36 (36.4%)
	Rs. 25,000 – 40,000	53 (53.5%)
	> 40,000	10 (10.1%)
Body Weight at the Time of Discharge	<3 kg	27 (27.3%)
	3-5 kg	59 (59.6%)
	>5 kg	13 (13.3%)
Weight Gain After 2 Months	Yes	91 (91.9%)
	No	08 (08.1%)

Frequency Distribution of Weight Gain after 2 months shows that weight gain was good in 51 (51.5%) children, moderate in 34 (34.3%) and poor in 14 (14.2%) (Figure 4).

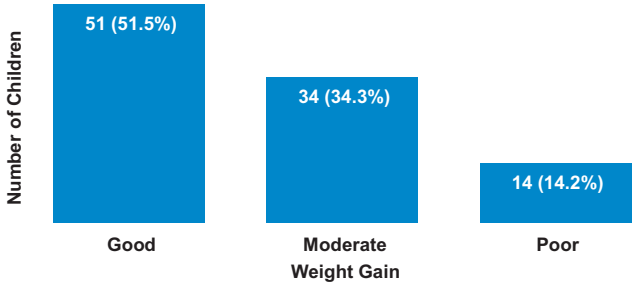


Figure 2: Frequency Distribution of Weight Gain after 2 months (n=99)

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The statistically insignificant differences in gender (p=0.8147), area of residence (p=0.3256), and body weight at discharge (p=0.0970), along with weight gain among children with severe acute malnutrition who were monitored for two months after being discharged from the hospital. It shows a statistically significant observed between age (p=0.0085) with weight gain in severe acute malnutrition children after discharge from the hospital followed for 02 months. Of patients who gained weight, 54.9% were ≤ 12 days old, 40.7% were 13–36 days old, and 4.4% were 37–60 days old. The study found an insignificant relationship between residence and weight gain after two months (p=0.32560). The majority of participants (42.9%) gained weight from urban areas, while only 25% did not gain weight. The majority (57.1%) gained weight from rural areas, while 75% did not gain weight. A significant correlation between maternal education and weight gain in severely acute malnourished children after hospital discharge, with literate mothers experiencing a higher weight gain (71.4%) compared to illiterate (28.6%) children. In the distribution of monthly family income and weight gain after two months families earning less than Rs. 25,000 exhibited a weight rise of 34.1%, while those earning between Rs. 25,000 and Rs. 40,000 showed a weight gain of 56.0%, indicating a significant correlation (p=0.0416). The study revealed that 27.5% of weight gain participants had a body weight below 3 kg at discharge, with the majority (61.5%) gaining between 3-5 kg. 37.5% did not gain weight, and 11% gained above 5 kg. The p-value did not show a significant association between body weight and weight gain. (p=0.0970)(Table 2).

Table 2: Distribution of different variables concerning Weight Gain at 2 Months (n=99)

Variable	Characteristics	Weight Gain		p-Value
		Yes (n=91)	No (n=8)	
Gender	Male	53 (58.2%)	5 (62.5%)	0.814
	Female	38 (41.8%)	3 (37.5%)	
Age	<12 Months	50 (54.9%)	2 (25.0%)	0.008
	13-36 Months	37 (40.7%)	3 (37.5%)	
	37-60 Months	4 (4.4%)	3 (37.5%)	
Area of Residence	Rural	52 (57.1%)	6 (75.0%)	0.325
	Urban	39 (42.9%)	2 (25.0%)	
Maternal Education	Illiterate	26 (28.6%)	6 (75.0%)	0.007
	Literate	65 (71.4%)	2 (25.0%)	
Monthly Family Income	< Rs. 25,000	30 (34.1%)	6 (75.0%)	0.041
	Rs. 25,000–40,000	52 (56.0%)	1 (12.5%)	
	> 40,000	9 (8.9%)	1 (12.5%)	
Body Weight at Time of Discharge	<3 kg	25 (27.5%)	2 (25.0%)	0.097
	3-5 kg	56 (61.5%)	3 (37.5%)	
	>5 kg	10 (11.0%)	3 (37.5%)	

In demographic variable analysis, it was revealed that only the younger age group of children was significantly higher among SAM children, while in socioeconomic variables, weight gain had a significant relation with higher maternal education levels and higher family income. In the study, weight gain did not show an association with gender, area of residence, and body weight at the time of discharge.

DISCUSSION

Timely identification and appropriate treatment regarding various complications accompanying SAM, followed up with optimal feeding protocols, can result in a reduction of morbidity and mortality associated with it. In this study, we found that 58.6% of children with SAM were male. Nagar RP et al., evaluating 75 children under the age of 5 years with malnutrition, found that 74.6% were male [10]. Our observations differ from what was found by Dale NM et al., where the authors noted 58.0% of the cases with SAM under the age of 5 years to be female. [12]. A study from India by Sanghvi J et al., found 52.0% of the children under the age of 5 years with SAM to be female [13]. So, variation exists regarding the predominance of gender in children presenting with SAM in our region. In this study, the mean age was found to be 16.4 ± 8.2 months, while 52.5% of children were below 12 months of age. Our findings were consistent. with regional data where 52% of the children under the age of 5 years with SAM were aged below 1 year [10]. This study observed that weight gain after 2 months following hospital discharge was noted among 91.9% of children. It was also found that weight gain was good in 51 (51.5%) children, moderate in 34 (34.3%), and poor in 14 (14.2%). Mamidi et al., reported that 8% of children with SAM did not have gain by the end of the study period, 44% had poor catch-up growth described as weight gain below 5 grams per kilogram per day, 35% had moderate catch-up growth as described by 5 to 10 grams per kilogram per day, whereas 12% were found to have rapid catch-up growth as labeled weight gain of more than 10 grams per kilogram per day. 14.7% of the children gained weight poorly, 30.9% gained weight moderately, and the remaining 30.9% gained weight well [14]. The study found a significant association between weight gain after hospital discharge, particularly among younger age groups, literate mothers, and high-income families. Sanghvi J et al., from India showed similar results in terms of the relation of age with weight gain among children with SAM, where they reported that children having higher ages were not found to gain weight in comparison to children in younger age groups [13]. About 45% of all deaths among children under the age of five are related to undernutrition, which is concerning and should not be ignored. The majority of these deaths occur in low- and middle-income nations, particularly in Asia and Africa [15, 16]. Maternal educational status is regarded as a strong factor contributing to the prevalence of SAM. Maternal education is a crucial factor in enhancing the developmental status of children with severe acute malnutrition (SAM), who are at a higher risk for

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developmental delays in multiple areas [17]. Likewise, researchers from Bangladesh reported similar observations where it was noted that maternal education status as illiterate was linked with a 4-fold rise in the risk of SAM among the pediatric population [18]. Similar to our study, many researchers have found a significant relationship between poverty, poor socio-economic status, and the risk of SAM [19, 20]. The study conducted by Maharashtra emphasizes the various factors contributing to SAM, highlighting the necessity of interventions that focus on maternal education, healthcare accessibility, and vulnerable age groups [21]. The current study found an insignificant relationship between residence and weight gain after two months. In a Pakistani study, an estimated 5.9% of Pakistani children under five had both wasted and stunted growth, with a significant association with rural areas (6.8%), mother education (7.7%), and low-income families (10.7%) [22]. Pakistan's rural regions have higher child malnutrition rates, largely due to factors such as early marriage, large families, irregular pregnancy rates, low income, and inadequate or nonexclusive nursing, which contributes to malnutrition under age five. Lack of awareness about the importance of nutrition, poor educational status, poverty, and lack of attention to children by parents in our area could be a few reasons contributing to the presence of SAM among children. In this study, despite all possible education and advice about the required measures and treatment, children unable to gain satisfactory weight suggest that the literacy rate, especially among women, and economic aspects of the population of our area are important. As soon as children were discharged and sent home, many factors contributing to SAM must have been enabled in some cases. All this also hints towards measures and strategies to be planned. regarding comprehensive nutritional and health education to parents/caregivers/guardians of children with SAM when they attend healthcare facilities for help regarding the resolution of SAM so that they can further practice and implement measures and practices necessary at home to improve SAM among their children.

This study was constrained by its single-center design at CMC Children's Hospital Larkana, a relatively small sample of 99 children recruited through consecutive sampling, and a follow-up period limited to only two months, which may be insufficient to capture the full arc of nutritional recovery or detect relapse and long-term growth trajectories in SAM survivors. The exclusion of children with chronic illnesses and those who missed follow-up visits may have introduced selection bias and overestimated the weight gain rates by excluding the most nutritionally compromised cases. Additionally, the absence of dietary intake data, feeding practice documentation, and morbidity records during the follow-up period limited the ability to identify modifiable behavioral determinants of recovery beyond socioeconomic variables. Future research should employ multicenter, longer-duration prospective cohort designs spanning at least six months post-discharge across diverse geographic and socioeconomic settings in Sindh and other high-burden provinces of Pakistan. Integrating community health worker-led home visits, caregiver nutrition counseling assessments, and detailed dietary and morbidity monitoring would provide richer data to guide the development of comprehensive, context-sensitive post-discharge support programs that address both clinical and socioeconomic barriers to sustained SAM recovery.

CONCLUSIONS

The research findings revealed that socio-demographic characteristics such as age, maternal education, and monthly family income showed a significant association with weight gain in severe acute malnutrition children after hospital discharge. The study emphasizes that socioeconomic factors reduce morbidity and mortality post-hospital discharge for a child's sustained recovery, ensuring therapy adherence, reducing complications, supporting nutritional needs, and aiding caregivers.

Authors' Contribution

Conceptualization: M
Methodology: VKG
Formal analysis: NFS, DB, SA
Writing and Drafting: SJ, NFS, DB, SA
Review and Editing: SJ, NFS, DB, SA

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Mandla N, Mackay C, Mda S. Prevalence of severe acute malnutrition and its effect on under-five mortality at a regional hospital in South Africa. South African Journal of Clinical Nutrition. 2022; 35(4): 149-54. doi: 10.1080/16070658.2021.2001928.

[2] Ali YD. Child and Maternal Related Factors Associated with Malnutrition among Under Fives in Bosaso, Puntland Somalia (Doctoral dissertation, King Edward Medical University). 2024 Apr.

[3] Otiti MI and Allen SJ. Severe acute malnutrition in low-and middle-income countries. Paediatrics and Child Health. 2021 Aug; 31(8): 301-7. doi: 10.1016/j.paed.2021.05.001.

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DOI: https://doi.org/10.54393/pjhs.v6i1.2559

[4] Shams Z, Zachariah R, Enarson DA, Satyanarayana S, Van den Bergh R, Ali E *et al.* Severe malnutrition in children presenting to health facilities in an urban slum in Bangladesh. Public Health Action. 2012 Dec; 2(4): 107-11. doi: 10.5588/pha.12.0039.

[5] Chama GC, Siame L, Kapoma C, Hamooya BM, Masenga SK. Severe Acute Malnutrition Among Children Under the Age of 5 Years. PLOS One. 2024 Aug; 19(8): e0309122. doi: 10.1371/journal.pone.0309122.

[6] Fahim SM, Islam MR, Rasul MG, Raihan MJ, Ali NM, Bulbul MM *et al.* A qualitative assessment of facility readiness and barriers to the facility-based management of childhood severe acute malnutrition in the public healthcare settings in Bangladesh. Public Health Nutrition. 2022 Nov; 25(11): 2971-82. doi: 10.1017/S1368980022002014.

[7] O'Sullivan NP, Lelijveld N, Rutishauser-Perera A, Kerac M, James P. Follow-up between 6 and 24 months after discharge from treatment for severe acute malnutrition in children aged 6-59 months: a systematic review. PLOS One. 2018 Aug; 13(8): e0202053. doi: 10.1371/journal.pone.0202053.

[8] Ashworth A. Guidelines for the inpatient treatment of severely malnourished children. World Health Organization. 2003.

[9] World Health Organization. Fact Sheets-Malnutrition. World Health Organization. 2021 Jun.

[10] Nagar RP, Nagar T, Gupta BD. Treatment outcome in patients with severe acute malnutrition managed with Protocolised Care at Malnutrition Treatment Corner in Rajasthan, India: a prospective observational study (quasi-experimental). International Journal of Research in Medical Sciences. 2016 Jan; 4(1): 238-45. doi: 10.18203/2320-6012.ijrms20160037.

[11] Ahmed N, Umar F, Saleem F, Iqbal Q, Haider S, Bashaar M. Treatment Outcomes of Severe Acute Malnutrition and Its Determinants Among Paediatric Patients in Quetta City, Pakistan. Journal of Multidisciplinary Healthcare. 2023 Dec: 2809-21. doi: 10.2147/JMDH.S428873.

[12] Dale NM, Salim L, Lenters L, Sadruddin S, Myatt M, Zlotkin SH. Recovery and relapse from severe acute malnutrition after treatment: a prospective, observational cohort trial in Pakistan. Public Health Nutrition. 2018 Aug; 21(12): 2193-9. doi: 10.1017/S1368980018000745.

[13] Sanghvi J, Mehta S, Kumar R. Predicators for weight gain in children treated for severe acute malnutrition: a prospective study at nutritional rehabilitation center. International Scholarly Research Notices. 2014; 2014(1): 808756. doi: 10.1155/2014/808756.

[14] Mamidi RS, Kulkarni B, Radhakrishna KV, Shatrugna V. Hospital based nutrition rehabilitation of severely undernourished children using energy dense local foods. Indian Pediatrics. 2010 Aug; 47: 687-93. doi: 10.1007/s13312-010-0101-7.

[15] Hossain MI, Dodd NS, Ahmed T, Miah GM, Jamil KM, Nahar B *et al.* Experience in managing severe malnutrition in a government tertiary treatment facility in Bangladesh. Journal of Health, Population, and Nutrition. 2009 Feb; 27(1): 72. doi: 10.3329/jhpn.v27i1.3319.

[16] Boah M, Azupogo F, Amporfro DA, Abada LA. The epidemiology of undernutrition and its determinants in children under five years in Ghana. PLOS One. 2019 Jul; 14(7): e0219665. doi: 10.1371/journal.pone.0219665.

[17] Jain V, Agrawal A, Tomar S, Parihar AS. Impact of maternal education on the development of severe acute malnourished children. Asian Journal of Medical Sciences. 2024 May; 15(5): 121-5. doi: 10.3126/ajms.v15i5.62145.

[18] Sakisaka K, Wakai S, Kuroiwa C, Flores LC, Kai I, Arago MM *et al.* Nutritional status and associated factors in children aged 0–23 months in Granada, Nicaragua. Public Health. 2006 May; 120(5): 400-11. doi: 10.1016/j.puhe.2005.10.018.

[19] Odunayo SI and Oyewole AO. Risk factors for malnutrition among rural Nigerian children. Asia Pacific Journal of Clinical Nutrition. 2006 Dec; 15(4).

[20] Jeyaseelan L and Lakshman M. Risk factors for malnutrition in south Indian children. Journal of Biosocial Science. 1997 Jan; 29(1): 93-100. doi: 10.1017/S002193209700093X.

[21] Lakhmawar N, Shinde A, Patil P, Waydande S, Mhaske SN. Socio-Demographic Risk Factors Associated with Severe Acute Malnutrition in Children. VIMS Health Science Journal. 2024; 11(4): 01-8. doi: 10.46858/vimshsj.110401.

[22] Shuja S, Ategbo EA, Ihtesham Y, Ahmed KM. Wasting prevention and treatment-central to stunting reduction in Pakistan. 2023.

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