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Predictors of recovery in children aged 6–59 months with uncomplicated severe acute malnutrition: a multicentre study

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Abstract

Objective: To identify predictors of recovery in children with uncomplicated severe acute malnutrition (SAM).
Design: This is a secondary data analysis from an individual randomised controlled trial, where children with uncomplicated SAM were randomised to three feeding regimens, namely ready-to-use therapeutic food (RUTF) sourced from Compact India, locally prepared RUTF or augmented home-prepared foods, under two age strata (6–17 months and 18–59 months) for 16 weeks or until recovery. Three sets of predictors that could influence recovery, namely child, family and nutritional predictors, were analysed.
Setting: Rural and urban slum areas of three states of India, namely Rajasthan, Delhi and Tamil Nadu.
Participants: In total, 906 children (age: 6–59 months) were analysed to estimate the adjusted hazard ratio (AHR) using the Cox proportional hazard ratio model to identify various predictors.
Results: Being a female child (AHR: 1·269 (1·016, 1·584)), better employment status of the child's father (AHR: 1·53 (1·197, 1·95)) and residence in a rental house (AHR: 1·485 (1·137, 1·94)) increased the chances of recovery. No hospitalisation (AHR: 1·778 (1·055, 2·997)), no fever, (AHR: 2·748 (2·161, 3·494)) and ≤ 2 episodes of diarrhoea (AHR: 1·579 (1·035, 2·412)) during the treatment phase; availability of community-based peer support to mothers for feeding (AHR: 1·61 (1·237, 2·097)) and a better weight-for-height *Z*-score (WHZ) at enrolment (AHR: 1·811 (1·297, 2·529)) predicted higher chances of recovery from SAM.
Conclusion: The probability of recovery increases in children with better WHZ and with the initiation of treatment for acute illnesses to avoid hospitalisation, availability of peer support and better employment status of the father.

Keywords
Severe acute malnutrition
Ready-to-use therapeutic food
Predictors
Recovery

India has 57 million (more than a third) of the world's 146 million undernourished children[1]. In the 1990s, an effort was made to list malnutrition as an independent factor leading to child death. Later, malnutrition was found to be associated with 50 % of child deaths in developing nations[2,3]. As a nation carrying over a third of the world's malnourished children, implementing control measures against malnutrition is thus essential.

Identifying and treating severe acute malnutrition (SAM) begins with accurate diagnosis, and SAM is diagnosed on the basis of the following criteria: a weight-for-height *Z*-score (WHZ) of < -3SD, a mid-upper arm circumference (MUAC) of < 115 mm and presence of bilateral oedema in children aged 6–59 months[4]. Children with SAM often present with a medical condition or intercurrent illness, defined as complicated SAM, and require hospitalisation

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and treatment. However, in children with uncomplicated SAM, treatment may be through home-based management using ready-to-use therapeutic food (RUTF), which is associated with a better outcome than standard inpatient therapy[5,6]. Control and prevention of this condition also involves investigating the factors influencing a child's progression to malnutrition and determining their recovery, with recovery being defined as the attainment of a WHZ of ≥ −2SD and having no oedema for 2 weeks[7].

Studies have found that a child's birth weight, family income and maternal breast-feeding can be positively and maternal unemployment can be negatively associated with nutritional recovery[8]. Furthermore, parents' higher education; exclusive breast-feeding for 6 months; proper weaning; immunisation; higher socio-economic status; environmental conditions such as proper housing, tap water supply and houses with latrines; lower birth order and small family size contribute to an improvement in the nutritional status of children[9]. However, such associations are yet to be studied in the Indian context, where differences might exist due to differing presentations of SAM across regions, such as a lower prevalence of oedema (< 1 %) in Indian[10] children with SAM than in their African counterparts[11]. Developing local data is essential to inform national policies on the need and means to control this situation and improve the nutritional status of children. Thus, the current study examines the potential role of socio-demographic, maternal, child-related and environmental factors as predictors of recovery among Indian children with uncomplicated SAM.

Methodology

The current study involves a secondary analysis of data from a previously conducted multicentre randomised control trial in India[12]. The trial was conducted at three sites across India, namely urban slums and resettlement colonies in Delhi, rural (predominantly tribal) Rajasthan and rural and urban Tamil Nadu. The sites were located in areas where the SAM prevalence was reported to be above the national average of 6·4 %[13]. In this randomised control trial, children aged 6–59 months with uncomplicated SAM were enrolled to assess the efficacy of three feeding regimens: commercially produced ready-to-use therapeutic food sourced from Compact India (RUTF-C); locally prepared RUTF (RUTF-L) made according to uniform specifications in production units at the three study sites and augmented home-prepared foods (A-HPF) for which raw ingredients were provided at 1·5 times the amounts required for the child in question. Study children were provided the intervention for 16 weeks or until recovery (treatment phase), whichever was earlier. The primary study objective was to evaluate the impact of the three feeding regimens. The composition of the feeding regimens and the details of their efficacy on the nutritional status on children with SAM have been described previously[12].

Two comparisons were made in the study: between RUTF-C and A-HPF and between RUTF-L and A-HPF; A-HPF was the comparison group. A 17–23 % difference in recovery between RUTF and a standard diet was reported by non-randomised studies conducted in Africa[14–16]. Therefore, a 15 % difference in recovery between the A-HPF (65 % recovery) and RUTF groups (80 % recovery) was hypothesised. With 90 % power and $\alpha = 0{\cdot}025$, a sample size of 231 children in each group was thus calculated. To account for the loss to follow-up, the sample size was increased by 10 %, resulting in a final sample size estimate of 765. Considering lower recovery rates, to preserve the power to test the *a priori* hypothesis of 15 % difference between the intervention and comparison groups, the Data Safety Monitoring Bureau proposed an increase in the sample size to at least 900 children[12].

Children aged 6–59 months were identified through a door-to-door survey of the defined study population. The selection criterion was a WHZ of < −3 SD. Only children with a MUAC of ≤ 130 mm[17] were brought to the study clinic for the assessment of their WHZ using WHO Anthro software. A physician evaluated the children and classified them as those with complicated or uncomplicated SAM based on the WHZ of < −3SD, irrespective of the MUAC value. Children who were severely malnourished and had medical complications according to the WHO guidelines[18], such as a Hb level of < 6 g/dl, allergy to milk, unable to consume the test feed (failed appetite test) and clinical features of infection, were referred for hospital admission and treatment. Those who did not present with any of the listed symptoms of complicated SAM and passed an appetite test were enrolled after obtaining informed consent from the parents. The children were then classified into two strata on the basis of age: stratum 1 (6–17 months) and stratum 2 (18–59 months) and randomised to one of the three aforementioned intervention groups.

A total of 106 935 children between 6 and 59 months were identified at the three sites. Of these, 6815 (6·4 %) children who had a MUAC of < 130 mm were referred to the study clinic, and of the 5103 (74·9 %) children who came to the study clinic, 1190 (23 %) had SAM (WHZ < −3). Children having a medical complication were referred to a hospital (*n* 292) and were revisited approximately after a month to ascertain the resolution of complications. In total, 98 of the children referred to the hospital were enrolled after they recovered from the illness and were available at home.

Nine hundred and six children with uncomplicated SAM were enrolled in the study after excluding those who presented with complications, whose family was planning to move out of the study area during the study period, that is, within 4 months, failed to consent or had a sibling enrolled (if there were two children in a family with SAM, only the one with a more severe form of SAM was enrolled). Data pertaining to the demographic profile,

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family details, breast-feeding practices and complementary feeding practices were collected using structured questionnaires for interviewing primary caregivers. A trained anthropometry team recorded anthropometric measurements at enrolment.

During the treatment phase, a trained anthropometry team, blinded to the treatment allocation of the child, took weekly anthropometric measurements as well as collected morbidity details regarding diarrhoea, fever, acute lower respiratory infections (ALRI) and hospitalisation, if any. WHO Anthro software was used to determine the child's nutritional status as SD for WHZ, weight-for-age *Z*-score (WAZ) and height-for-age *Z*-score (HAZ) according to the WHO standards. After completion of the treatment phase, the study team facilitated linkages between the families and government-run Anganwadi centres, where supplementary food is provided under the Integrated Child Development Services scheme. This was performed over the next 16 weeks (sustenance phase), and the child was then censored from the study.

Outcome measurement

Children were classified as recovered if they had a WHZ of ≥ -2SD and no oedema for two consecutive weeks and not recovered if they had a WHZ of < -2SD and/or oedema[7]. Treatment with the feeding regimen ceased after recovery or at week 16 after recruitment. Children who did not recover were evaluated by the physician for any underlying illness, and the study team facilitated linkages between the families of these children and the local Anganwadi centres.

Description of variables

The variables collected were child-related predictors, parental and family-related predictors and nutritional and anthropometric predictors.

Gender, birth weight, birth order, age of the child at enrolment and number of episodes of diarrhoea, ALRI and hospitalisations during the treatment phase were considered under child-related predictors of recovery.

Under parental and family-related predictors of recovery, mother's age, education and occupation; mother's BMI (based on WHO classification), father's education and occupation, residence ownership (owned or rental), family structure (nuclear (pair of adults living with their children) or joint family (more than one pair of adults living with their children)), family size, number of living children, additional family support (additional caregiver such as aunt or grandparents apart from the mother) and peer support (workers who visited the children's home several times a day to help caregivers feed their children with the allocated intervention food) were included.

Nutritional and anthropometric predictors of recovery included breast-feeding up to 6 months, a feeding regimen used for home-based treatment, weight gain in gram per kilogram of body weight and anthropometric parameters (WHZ, WAZ, HAZ and MUAC).

Definitions

Diarrhoea: Three or more watery stools in a 24-h period. An episode is considered new if the individual's bowel movements are normal in the 48 h prior to symptom presentation[19].

Acute lower respiratory infection: The presence of cough or breathing difficulties and either fast breathing or lower chest indrawing. Two episodes are separated by a symptom-free interval of 15 d[19].

Fever: The presence of an axillary temperature of more than 37·5 °C[19].

Hospitalisation: If the child was admitted to a hospital for reasons other than the consequences of malnutrition during the treatment phase.

Improved water and toilet source: According to the WHO/UNICEF Joint Monitoring Programme for water supply and sanitation, a sanitation facility is classified as suitable/improved if it consists of a flush toilet, a piped sewer system, a septic tank, a flush/pour flush to pit latrine, a ventilated improved pit latrine, a pit latrine with a slab or a composting toilet. Similarly, a household's water source is considered as improved, if the source is a public tap, tube well or borehole, water piped into the dwelling or yard, a protected dug well, a protected spring or rainwater[20].

Breast-feeding: This was classified as exclusive breast-feeding (breast-feeding present, no solids and no liquids), predominant breast-feeding (breast-feeding present, clear liquids (water, fruit juice), no solids and no animal milk or formula feed) and partial breast-feeding (breast-feeding with solids, animal milk and/or formula feed) on the basis of breast-feeding habits during the child's first 6 months[21].

Statistical methods

Quantitative statistical analysis was performed using IBM SPSS version 20.00 software. Continuous variables were expressed in terms of mean (SD) or median (interquartile range (IQR)). Categorical variables were expressed as frequencies and percentages. Bivariate analysis was performed using the χ^2 test for dichotomous variables to know the association between dependent and predictor variables. The mean difference in WHZ between male and female children was assessed using Student's unpaired *t* test. Based on the conceptual model, all variables were included to identify independent predictors of recovery. A multivariate COX proportional model was used to measure the hazard ratio and adjusted hazard ratio (AHR). Variables with a hazard ratio of more than 1, with a *P* value of $< 0·05$, signified predictor variables.

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Results

The present study recruited a total of 906 children across all the three sites, of which 855 (94·4 %) children completed the treatment phase (Table 1). The children were from both rural and urban areas. At the end of the treatment phase or during the treatment phase, 420 (46·4 %) children recovered from SAM, having attained a WHZ of ≥ –2SD. Among the recovered children, time (median) to recover was 5 (IQR 3–9) weeks. At enrolment, the mean age of recovered children was 24·27 (SD 13·8) months, whereas that of not-recovered children was 26·37 (SD 13·9) months. None of the children had bilateral pitting oedema. Based on their age, children were stratified into two groups, namely 6–17 months and 18–59 months, and randomisation was performed separately for both groups. However, further analysis for identifying the predictors of recovery from SAM was not performed on the basis of stratification.

In the current study, recovery was observed 1·27 times more among the female children, and this association was statistically significant ($P = 0·036$) even after adjusting for all other variables in the model (Table 2). At enrolment,

Table 1 Demographic and anthropometric characteristics of study children and parents at the time of recruitment

	Recovered (*n* 420)		Not recovered (*n* 486)	
Characteristic	*n*	%	*n*	%
Age at enrolment in months				
Mean	24·27		26·37	
SD	13·8		13·9	
Median	20		22	
IQR	14–32		16–38	
Sex				
Male	226	53·8	299	61·5
Female	194	46·2	187	38·5
Religion				
Hindu	339	80·7	397	81·7
Muslim	71	16·9	66	13·6
Christian	9	2·1	18	3·7
Others	1	0·2	5	1·02
Treatment group				
A-HPF	122	29	179	36·8
RUTF-C	133	31·7	165	34·0
RUTF-L	165	39·3	142	29·2
Breast feeding				
Exclusively breastfed	136	32·4	184	37·9
Predominantly breastfed	93	22·1	110	22·7
Partially breastfed	190	45·2	184	37·9
No breast-feeding	1	0·2	7	1·4
Anthropometry				
Height-for-age *Z*-score at enrolment				
Mean	–3·00		–3·00	
SD	1·42		1·21	
Weight-for-height *Z*-score at enrolment				
Mean	–3·28		–3·45	
SD	0·39		0·45	
MUAC				
Mean	11·79		11·87	
SD	0·87		0·70	
Mother's age		%		%
< 18 years	2	0·5	0	
18–25 years	179	43·1	222	45·8
26–30 years	147	35·4	161	33·2
>30 years	87	21	102	21
Mother's education				
Up to primary	203	53·8	243	55
Secondary school	75	19·9	79	17·9
High school	62	16·4	77	17·4
Higher secondary school	24	6·4	29	6·6
College and above	13	3·4	14	3·2
Father's education				
Up to primary	174	41·5	195	40·5
Secondary school	96	22·9	126	26·1
High school	95	22·7	115	23·9
Higher secondary school	37	8·8	29	6
College and above	17	4·1	17	3·5

IQR, inter-quartile range; AHPF, augmented home prepared food; RUTF-C, centrally produced ready-to-use therapeutic food; RUTF-L, locally prepared ready-to-use therapeutic food.

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Table 2 Predictors of recovery among children with severe acute malnutrition (SAM) in the age group of 6–59 months*,†

Variable	Recovered		Not recovered		Crude HR		Adjusted HR		*P*-value
	n	%	*n*	%	OR	95 % CI	OR	95 % CI	
Gender	*n* 420		*n* 486						
Female	194	46·1	187	38·4	1·238	1·021, 1·499	1·269	1·016, 1·584	0·036‡
Age in months§	*n* 420		*n* 486						
17 and less	181	43·1	186	38·3 %	1·221	0·936, 1·594	1·196	0·946, 1·512	0·134
Mother's age	*n* 415		*n* 485						
25 and less	181	43·6	222	45·8 %	0·985	0·812, 1·196	1·034	0·822, 1·299	0·777
Mother's Education (grade)	*n* 377		*n* 442						
9th and above	99	26·2	120	27·1	0·907	0·721, 1·141	0·773	0·586, 1·02	0·069
Mother's occupation	*n* 411		*n* 481						
Do not work outside the house	262	63·7	303	62·9	1·051	0·859, 1·285	0·866	0·663, 1·13	0·29
Mother's BMI	*n* 393		*n* 460						
> 18·5	209	53·1	224	48·6	1·130	0·927, 1·378	0·965	0·764, 1·22	0·768
Father's education (grade)	*n* 419		*n* 482						
11th and above	54	12·8	46	9·5	1·123	0·844, 1·495	0·99	0·7, 1·4	0·954
Father's occupation	*n* 418		*n* 484						
Employed	224	53·5	237	48·9	1·138	0·939, 1·379	1·53	1·197, 1·955	0·001‡
Family size	*n* 420		*n* 485						
≤ 4	148	35·2	163	33·6	1·084	0·887, 1·324	0·889	0·698, 1·133	0·343
Residence	*n* 420		*n* 482						
Rental house	157	37·3	145	30	1·350	1·107, 1·645	1·485	1·137, 1·94	0·004‡
Exclusive breast feeding	*n* 420		*n* 486						
Yes	136	32·3	184	37·8	0·863	0·703, 1·058	0·989	0·759, 1·288	0·933
Predominantly breast-feeding	*n* 420		*n* 486						
Yes	93	22·1	110	22·6	0·980	0·779, 1·234	0·955	0·71, 1·284	0·761
Additional family support to look after the child	*n* 420		*n* 485						
No	188	44·8	170	35·1	1·502	1·149, 1·963	1·233	0·956, 1·59	0·106
Peer support	*n* 420		*n* 486						
Yes	268	63·8	244	50·2	1·465	1·200, 1·787	1·61	1·237, 2·097	< 0·001‡
Improved sanitation	*n* 415		*n* 482						
Yes	225	54·2	228	47·3	1·236	1·019, 1·500	1·181	0·896, 1·558	0·238
Improved water	*n* 420		*n* 482						
Yes	384	91·4	445	92·3	0·88	0·625, 1·238	0·796	0·533, 1·189	0·265
Hospitalisation§	*n* 420		*n* 486						
No	401	95·4	421	86·6	2·892	1·825, 4·583	1·778	1·055, 2·997	0·031‡
Diarrhoeal Episodes§	*n* 372		*n* 382						
≤ two	345	92·7	334	87·3	1·871	1·264, 2·769	1·579	1·035, 2·412	0·034‡
ALRI episodes§	*n* 372		*n* 381						
≤ one	368	98·9	366	96	3·107	1·160, 8·324	2·501	0·919, 6·81	0·073
Fever§	*n* 372		*n* 382						
No	195	52·4	97	25·4	3·237	2·380, 4·402	2·748	2·161, 3·494	< 0·001‡
Weight-for-height *Z*-score‖	*n* 419	Min–max	*n* 486	Min–max		Min–max		Min-max	
Median	–3·17	–5·75– 2·32	–3·35	–5·68–2·62	2·331	1·745–3·114	1·811	1·297–2·529	< 0·001‡

*All variables are dichotomised variables except weight-for-height *Z*-score at the time on enrolment; crude hazard ratio (95 % CI) calculated using bivariate Cox-proportional hazard model.
†All variables in Table 2 were included in the regression analysis. Adjusted Hazard Ratio and corresponding *P* value were calculated using multivariate Cox-proportional hazard model; ALRI, acute lower respiratory infection; IQR, inter-quartile range.
‡Significant *P* value.
§During treatment phase.
‖At the time of enrolment.

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the mean WHZ among the male and female children was –3·42 and –3·33, respectively. The mean difference between the WHZ for the male and female children was –0·087 ($P = 0·002$). Other birth-related factors, such as birth order, and age at enrolment exhibited no association with recovery among the children ($P = 0·819$ and $P = 0·248$, respectively).

No fever (AHR: 2·748 (2·161, 3·494)), ≤ 2 episodes of diarrhoea (AHR: 1·579 (1·035, 2·412)), and no hospitalisation (AHR: 1·778 (1·055, 2·997)) during the treatment phase had a significant association with recovery. Fewer episodes (≤ 1) of ALRI had no significant association with recovery.

Parental factors such as parents' education, mother's occupation, BMI and age were not identified as significant predictors of recovery from SAM. However, father's occupation (AHR: 1·53 (1·197, 1·955)) was significantly associated with recovery even after adjusting for other variables in the model (Table 2). Interestingly, the residential status of the children's parents was significantly associated with recovery among the children. Children staying in a rental house exhibited a positive association (AHR: 1·485 (1·137, 1·94)) with recovery. Nuclear family status (up to 4 people) also showed no association with recovery.

Among the study children, no statistically significant association was observed between additional family support and recovery ($P = 0·106$). Community-based feeding/caregiver support (peer support) was found to be a significant predictor of recovery (AHR: 1·61 (1·237, 2·097)) in the current study. Usage of improved water for consumption or improved sanitation showed no association with recovery. Similarly, no significant association was observed between exclusive/predominant breast-feeding and recovery among the children.

Of the various anthropometric measurements included in the study, WHZ at enrolment was significantly associated with recovery from SAM. Higher WHZ at enrolment increased the chances of recovery, which was statistically significant (AHR: 1·811 (1·297, 2·529)).

Discussion

Although there are various ongoing programmes for improving the nutritional status of children, SAM remains a global burden in many low- and middle-income countries such as India[22]. However, little information is available on the predictors of recovery from uncomplicated SAM. In the current study, we examined numerous factors that may have a role in predicting the recovery of children from uncomplicated SAM. The present study was conducted in urban and rural populations of India and identified a few major factors that could predict the recovery of children with uncomplicated SAM. The predictors included being a female child, higher WHZ at the time of initiation of intervention, fewer/no episodes of diarrhoea or fever, no hospitalisation during the treatment phase, availability of peer support for the mothers during the intervention, living in a rental house, and employed father.

However, many factors already reported to act as predictors (such as age and educational status of parents) were found to have no association with prediction of recovery from SAM in the present study. A study conducted in Southern Ethiopia reported that age and breast-feeding were not significant predictors of recovery from SAM[22]. Similar to studies conducted in Kenya[23] and India[24], the present study showed that age at enrolment was not a significant predictor of recovery. Exclusive or predominant breast-feeding too was not found to be a significant predictor. In the present study, 35 % of the children were exclusively breastfed for 6 months. However, a cohort study conducted in urban Vellore, India, reported that only 22 % of children were exclusively breastfed for 4 months and only 1 % of children were exclusively breastfed for 6 months[25]. This is in line with the findings of other studies conducted in several developing countries that have failed to find any significant association between exclusive breast-feeding and stunting, wasting, and children being underweight[26–28].

In a study conducted in Bangladesh, the chance of recovery was higher among male children[29], which contradicts our study findings. However, our results are consistent with those of a study conducted in a North-West Ethiopia, where recovery was higher among female children[22]. A reason for these differences could be a significantly lower WHZ for male children than for female children at study enrolment.

Epidemiological studies have shown that diarrhoea affects the physical growth of a child[30]. For instance, through a meta-analysis, Khalil *et al.* reported that diarrhoea due to *Cryptosporidium* infection affects childhood health by decreasing the growth rate[31]. Our study results are consistent with these results as those who had fewer episodes (≤ 2) of diarrhoea during the treatment phase had a higher chance of recovery. The aforementioned finding is also in accordance with that of a case–control study conducted in Ghana, which reported that in 6 months, malnourished children had > 2 episodes of diarrhoea than children who were not malnourished[32].

The present study showed that hospital admission for other morbidities can adversely affect the nutritional status of children[33]. Very few studies have assessed whether hospital admission affects nutritional recovery from SAM. This could be because most studies enrolled children who were already admitted to the hospital. The study conducted by Desyibelew *et al.* reported a direct relationship between prolonged hospital stays and nutritional recovery[22]. A similar relationship was observed in the present study, with no hospitalisation due to other morbidities during the treatment phase being identified as a significant predictor of recovery from SAM.

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According to a study conducted in rural Karnataka, India, preschool children who had recurrent cough and cold were independently associated with malnutrition[34]. This is not consistent with our study results, which showed neither the presence nor the absence of ALRI during the treatment phase being associated with recovery. The absence of fever during the treatment phase showed a significantly positive association with recovery in our study, which contradicts the results of a study conducted in Ethiopia where fever was not associated with recovery from SAM[35].

Community-based educational support (peer support) to mothers can increase the motivation to follow any health practice. Studies have shown that educational support to the caregiver of the children can improve the nutritional status of the children[12,36,37]. Here, peer support during the treatment phase showed a positive association, even after adjusting for other variables in the model.

A study conducted in rural Ethiopia among malnourished children showed that drinking water from an improved water source and using improved sanitation are predictors of recovery from malnutrition[38]. In our study, both improved water and improved sanitation were not found to act as predictors of recovery from SAM.

Among the various socio-economic factors, parents' education is considered one of the most crucial factors that can predict malnutrition. Various studies have demonstrated that parents' literacy improves the nutritional status of children[39,40]. On the contrary, our study showed that neither the mother's (above 8th grade) nor the father's (above 10th grade) education was associated with recovery of their children. Another factor of interest is the employment status of the children's parents. Mothers' gainful (monetary) employment (i.e. when mothers could spend more time with the children) was not a good predictor of recovery. However, fathers' gainful employment (i.e. when fathers were financially stable enough to provide food) was found to be a good predictor of recovery in the current study. A study conducted in rural Ethiopia showed lower chances of recovery among children with mothers having a heavy work index[40], which is more self-explanatory when compared with our study findings. Surprisingly, living in a rental house is a predictor of recovery. A possible explanation could be that families felt the need to work sufficiently so as to produce/earn enough to pay rent. Therefore, their cash flow may not be limited, and hence may not impact the food provided.

Limitations

A major limitation of our study was the unavailability of a few data parameters. Studies have shown that birth weight is directly associated with recovery from SAM. Unfortunately, we could not investigate this association due to incomplete data (approximately 50 %) on birth weight. Vaccination coverage was also not studied for the same reason. Because the analysis emerged from a randomised control trial conducted under a controlled setting, the findings may not be generalisable. Moreover, the current study did not investigate the predictors of recurrence of malnutrition in later stages of childhood because long-term follow-up of the study children was not conducted.

Conclusion

For children with SAM, having fewer episodes of diarrhoea, no hospitalisation for other morbidities during the treatment phase, better WHZ at the time of initiation of treatment, along with a better employment status of the father and availability of peer support could provide higher chances of recovery. Notably, the improved chances of recovery for children having higher WHZ emphasises the need for the early identification of children with SAM and provision of appropriate nutritional interventions before any further deterioration in their scores. Furthermore, the identified predictive factors could help researchers and even policymakers to develop a follow-up protocol for the community management of children with SAM.

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