

## ORIGINAL ARTICLE

## Role of integrated therapy and nutritional counselling in treating malnourished children in M-East ward Mumbai, India: A Longitudinal Study

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### Abstract

**Background:** Under-nutrition is a big risk factor for increasing the morbidity and mortality burden in the society. Acute malnutrition contributes to almost 61% of diarrheal and 53% of pneumonia deaths. In urban slums like M-East ward, Mumbai, acute malnutrition prevalence ranges from 16% to 59.8%. **Objectives:** To assess the outcome of weight gain by providing nutritional supplements to the undernourished children along with nutritional counseling. **Materials and Methods:** RUTF (Ready-to-Use Therapeutic Food) and Hyderabad mix with nutritional counselling to parents of children were used to reduce the undernourishment among the under-five children in slums of this ward. Six hundred and fifty malnourished children and their caregivers were provided nutritional supplement and nutritional counselling over 6 months. **Results:** There was steady weight gain of enrolled children. Highest weight gain occurred over 13th week of the program. **Conclusion:** A minimum of thirteen weeks nutritional supplement program including fortnightly counselling is necessary and sufficient for converting undernourished children to normal.

### Keywords

Ready to Use Therapeutic Food (RUTF); Malnourishment; Counselling; Slums; Mumbai

### Introduction

Undernutrition has negative impact on growth of children, affecting the productivity and economic growth of the country and a big risk factor for increased morbidity and mortality(1). First 1000 days from conception are the most crucial phase of child's life where maximum development of brain and other vital organs occur(2,3). In South Asia, prevalence of under-weight, stunting and wasting was found to be 32%, 38% and 16%(4,5,6) whereas in India, it was 30.7%, 29.3%, and 24.3%(7) and in Mumbai it was 22.7%, 25.5% and 28.8% respectively(8).

In urban slum of Mumbai, undernutrition is associated with overcrowding, poor sanitation, improper feeding practices and others(9). Acute malnutrition prevalence ranges from 16% to 59.8% in this area. Researchers have

suggested that the Infant Mortality Rate (IMR) in certain pockets of the ward is over 66/ 1000 live births(10).

UN in 2007 has accepted the use of RUTF for reducing malnutrition in under-five children(11). These supplements are cost effective and can be utilized in low socio-economic urban scenario efficiently(12,13). Another crucial aspect is Nutritional and Hygiene Counselling of the family to prevent common infections, and thereby improve the overall nutritional status. The current study attempts a combination of nutritional supplements and counselling for reducing the malnutrition among the under-five children.

### Aims & Objectives

1. To identify under five-year age group children suffering from undernutrition in the Urban slum area of Mumbai.
2. To enroll the children for Nutrition based therapy.

- To assess the outcome of weight gain by providing nutritional supplements to the undernourished children along with nutritional counselling.

## Material & Methods

A community based cross-sectional study was conducted among the children in slums and resettlement colonies in M-East ward in Mumbai, India. Inclusion criteria: Undernourished children of age 0-5 years (SAM & MAM), with parents who gave informed consent to participate in study, paid registration fee, agreed to adhere to counseling including feeding RUTF and Hyderabad mix to their children as per the recommendation and presently residing in M-east ward. The sampling strategy to select participants was purposive. Visits to Anganwadi centers, health centers as well as house to house screening were undertaken to recruit the samples in the study. In this screening survey, 1201 children were identified as malnourished. Out of these, only 650 children were enrolled in study, as they fit the inclusion criteria.

Participants were provided with 0.5-2 packets of RUTF per day or 2.4 kg Hyderabad Mix in two weeks and followed up at regular weekly intervals. In the community, counseling sessions were undertaken regarding importance of exclusive breastfeeding for 6 months and semi-solid food up to 2 years of age along with breastfeeding. Importance of immunization of all children was explained to them as per Universal Immunization Program of Government of India. They were taught about maintaining sanitation and hand hygiene including clipping of fingernails and hand washing after use of toilets. They were advised to adopt nutritious diet including green vegetables, fruits, and lentils. In monsoons, they were asked to drink boiled water, cover stored water, and maintain good cooking habits.

During follow up visits, the height, and the weight of the enrolled participant (child) was measured to monitor the changes over the course of the study. Severe acute malnutrition (SAM) was defined as a condition when Z score for Weight for Height is less than  $-3$  and/ or mid-upper-arm circumference (MUAC) is less than 115 mm and/or presence of bilateral edema. In children aged 6–59 months, moderate acute malnutrition (MAM) is defined as moderate wasting (i.e. Weight-for-Height between  $-3$  and  $-2$  Z-scores of the WHO Child Growth Standards median) and/or MUAC is greater or equal to 115 mm and less than 125 mm(14).

The data was analyzed with the help of statistical software IBM version 20.0 SPSS. Simple descriptive statistics were used to determine the effect of feeding the RUTF and Hyderabad mix to the malnourished children. Also, various inferential statistics were used like repeated measures ANOVA, and Paired t test.

## Results

The current study was conducted by providing nutritional supplements and counselling to 650 children from 0-5

years of age, residing in the slums and resettlement colonies of M-East ward. RUTF and Hyderabad mix were given to the malnourished children during the different visits in four months. During the visits, 6487 RUTF packets and 278.4 kg Hyderabad mix were distributed to the SAM males, whereas 6779 RUTF packet and 196.2 kg Hyderabad mix were given to the SAM females. Similarly, 976 RUTF packets and 1068.4 kg Hyderabad mix were distributed to MAM males, and 1163 kg Hyderabad mix and 722 RUTF packets were to MAM females.

[Table 1](#) shows the prevalence of malnutrition cases among males and females. Out of the total 650 malnourished children, 312 (48%) were males and 338 (52%) were females. Among the 650 children, 352 (54.2%) were Severe Acute Malnourished (SAM) and 298 (45.8%) were found to be Moderate Acute Malnourished (MAM). Out of 352 SAM cases, 53% were females. At the end of the stipulated 4 months of the study, 310 (88.1%) out of 352 SAM children were found to be in normal condition, while among 298 MAM cases, 294 (98.7%) were found in normal condition. Out of the total 650 children, weekly follow up of 21 children could not be performed as they (and their parents) did not report to the health center for the anthropometric measurements and counseling sessions. To these children, the nutritional supplements were delivered to their houses and a final measurement was taken at the end of 4 months. Hence, all subsequent tables report data only for 629 (650-21) children.

[Table 2](#) indicates the change in prevalence of underweight from 1<sup>st</sup> week to 15<sup>th</sup> week according to the different age groups. It was high (89.4%) in the age group of 37-60 months. After intervention program, it gradually declined throughout the weeks and arrived at 5.3% in 15 weeks. Similarly, prevalence of underweight continued to decline in other age groups  $\leq 12$ , 13-24 and 25-36 months and reached from 68.8%, 76.4% and 84.4% to 3.9%, 3.6% and 1.8% respectively. Initially, it was found more (84.6%) in females than the males (80.8%) and went down throughout the weeks and reached at around 3% and 4% in females and males respectively (Table 2).

Out of 629 malnourished children, around 55% were found to be severely underweight, which reduced steadily after the initiation of program until second week. After this, this number declined drastically till the 15<sup>th</sup> week and measured around 1.3%. Moreover, it was also found that severe underweight was high in the age groups of 37-60 months followed by those in 13-24 months.

Distribution of stunting and severe stunting by age groups and sex is shown in [Figure 1](#) and [Figure 2](#) respectively, which indicates that stunting and severe stunting is high in the age groups 37-60 months and contributes to around 59% and 34% respectively ([Figure 1](#)). In addition, prevalence of stunting was found high among females (nearly 58%) ([Figure 2](#)). The overall prevalence of stunting and severe stunting among the children screened was 53.3% and 28% respectively.

Average weight of malnourished children observed in the first week was 9.2 kg. After the start of intervention of the program it steadily increased in the second week onwards. The highest weight gain by malnourished children were found at the end of the program (fifteen week) (mean = 10.34; SD = 2.15) and lowest were at first week (at beginning of the program) (mean = 9.18; SD = 3.35). [Table 3](#) represents the significant change in weight that under-5 children gain over time (F14, 1165.9) = 173.68,  $p = 0.000$ ,  $\eta_p^2 = 0.21$ ). Repeated measure ANOVA test was applied, and significant change was observed in the weight gain of children.

[Table 4](#) shows the breakdown of the average weight gain at different levels. This indicates that fewest weights were gained in the first to second week, and slightly increased throughout the weeks. **The highest change was observed at 13<sup>th</sup> week of program** (mean = 10.32; SE = 0.084; C.I. = 10.15-10.48). After this, negligible change was found between 14 to 15<sup>th</sup> week. To understand when and at which stage significant change in weight occurred multiple comparisons between every possible combination of pairs for different weeks were carried out (Supporting information). Here, difference in between 1<sup>st</sup> and 5<sup>th</sup>, 1<sup>st</sup> and 6<sup>th</sup>, 1<sup>st</sup> and 7<sup>th</sup>, 1<sup>st</sup> and 8<sup>th</sup>, 1<sup>st</sup> and 9<sup>th</sup>, 1<sup>st</sup> and 10<sup>th</sup>, 1<sup>st</sup> and 11<sup>th</sup>, 1<sup>st</sup> and 12<sup>th</sup>, 1<sup>st</sup> and 13<sup>th</sup>, 1<sup>st</sup> and 14<sup>th</sup>, and 1<sup>st</sup> and 15<sup>th</sup> were found to be significant ( $p < 0.05$ ).

## Discussion

This study aimed to assess the outcome of providing RUTF and Hyderabad mix to the undernourished children along with nutritional counseling to the mothers or caretakers of those children. This study shows a welcome finding in improving the weight of the children by providing this combination therapy in resource constrained settings.

Similar studies using RUTF and home-based preparations with some success have been reported in the literature. A randomized multicenter trial conducted in Rajasthan, Tamil Nadu and Delhi shows a high efficacy of RUTF in reducing the uncomplicated severe acute malnutrition among under five years of age group(15). A similar type of study conducted in Bihar, which shows the significant improvement in the weight gain and low mortality among the under five children in rural areas where resource availability remains a constraint(16). Another study conducted in urban Delhi between the middle to low socio-economic status groups compared the acceptability of RUTF with that of home-based cereal preparations. The energy intake was found to be significantly higher in RUTF although the acceptability of home-based cereal preparations was higher(17). RUTF has also been found to be effective in treating the undernourished children in Africa through community based management of malnutrition(18,19). In the current study, it was observed that RUTF was sometimes not accepted by children and better results were seen when using Hyderabad mix, as

the mothers/caretakers were familiar with the mixture and could use it in their regular recipes.

A study conducted in rural eastern India shows that the nutrition counseling cum interventions caused improvement in underweight among children <5 years of age group and also gave a positive outcome on changing the hand hygiene and dietary behavior among the mothers which helped to increase the infant survival chances(20). A systemic review conducted in 2013 shows that complementary education has a positive impact on improving stunting among children of less than 5 years of age(21). In one of the Malawian study, it has been found that the supplementary feeding has a significant improvement among the children who are at risk of malnutrition(22). In 2016 there was an analysis conducted on stunting among the children to determine the probable reasons. It was found that poor sanitation and hygiene practices were the main causes for stunting among the children(23). These studies have thus, signified that proper nutritional counseling is necessary for significant improvement of undernutrition in children of less than of 5 years of age. Even in the current study, in addition to the nutritional supplement, nutritional counseling cum education (complementary and supplementary feeding, handwashing techniques, proper sanitation and drinking water) to mothers or care takers showed a positive result in improving the undernutrition among children less than five years of age. There was no mortality over the course of the study which is the unique feature of this study. This study suggests that integrated therapy of nutritional supplement along with nutritional counseling should be included in the health care system to break the cycle of undernutrition among the children.

## Conclusion

This study has proven that nutritional supplement along with nutritional counselling of the mothers of the malnourished children is an effective way of community management of SAM and MAM in underprivileged communities. The nature of the intervention can be made sustainable by the mix of RUTF and Hyderabad mix powder. It was established that 13 weeks of program of nutritional supplement including fortnightly counselling is necessary and sufficient for converting SAM and MAM children to normal. The significant changes in weight started to be seen after as less as 5 weeks of the program.

## Recommendation

Nutritional assessment, supplementation, including RUTF along with Nutrition and Hygiene counselling is an easy, practical, and sustainable way in treating and controlling undernutrition in low socioeconomic urban settlement. This should be incorporated in policy making and implemented in a focused manner to control undernutrition among under 5-year age population and prevent disease burden in the community.

More such studies in different geographical and socio-economic communities should be encouraged.

### Limitation of the study

There could be other confounding factors which might have played a role in undernutrition in certain cases.

### Relevance of the study

Undernutrition among under 5-year age children in lower socio-economic communities especially in urban poor settlements has been long identified as a public health concern of prime importance. Apart from increasing the burden of communicable diseases and resultant morbidity and mortality, there is a long-term impact in overall neurological development of brain. This has direct relevance with social and economic development of the community.

Focused intervention by providing Nutritional supplements and counselling along with repeated follow ups in a time bound manner can successfully raise the weight of the child and prevent undernutrition in this age group. This would not only prevent short term impact of infections but also long-term impact on neurological development. This study is therefore relevant in the present setting.

### Authors Contribution

All the three authors have contributed in all the stages of this study like conception and design, acquisition of data and its analysis and interpretation, drafting the article and its revision along with the final approval of the version to be published.

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### References

1. Akombi BJ, Agho KE, Merom D, Renzaho AM, Hall JJ. Child malnutrition in sub-Saharan Africa: PLoS One. 2017;12(5):1–11.
2. Wanzira, H., Muyinda, R., Lochoro, P. et al. Quality of care for children with acute malnutrition at health center level in Uganda: a cross sectional study in West Nile region during the refugee crisis. BMC Health Serv Res 2018;18, 561. <https://doi.org/10.1186/s12913-018-3366-5>
3. Severe acute malnutrition | Nutrition | UNICEF [Internet]. [cited 2020 Mar 20]. Available from: [https://www.unicef.org/nutrition/index\\_sam.html](https://www.unicef.org/nutrition/index_sam.html) Accessed on 20/09/21.

4. Unicef. Global Overview Child Malnutrition Regional Trends. Unicef. 2016
5. Akombi BJ, Agho KE, Hall JJ, Wali N, Renzaho AMN, Merom D. Stunting, wasting and underweight in Sub-Saharan Africa: A systematic review, International Journal of Environmental Research and Public Health. 2017;14.
6. Biradar MK. Nutritional status of under five children in an urban slum. Int J Pharma Bio Sci. 2013;4(2):247–52.
7. Sheet SF. National Family Health Survey-4 (2015-16) Maharashtra factsheet. NFHS. 2015
8. Sheet DF, Nadu T. National Family Health Survey - 4 District Fact Sheet Thiruvallur Tamil Nadu. NFHS. 2015
9. Srivastava A, Mahmood SE, Srivastava PM, Shrotriya VP, Kumar B. Nutritional status of school-age children - A scenario of urban slums in India. Arch Public Heal. 2012;70(1):2–9.
10. About M-Ward Transformation Project [Internet]. Critical Edge Alliance. [cited 2020 Mar 21]. Available from: <https://www.criticaledgealliance.com/about-uo52s> Accessed on 20/09/21.
11. Field MSF, Gall L. A qualitative investigation of adherence to nutritional therapy in malnourished adult AIDS patients in Kenya. MSF F Res. 2019;
12. Statement J, Programme WF, Children UN. COMMUNITY-BASED MANAGEMENT OF SEVERE ACUTE MALNUTRITION. WHO. 2007
13. Ac U, Ns I. High Burden of Protein – Energy Malnutrition in Nigeria : Beyond the Health Care Setting. Ann Med Health Sci Res. 2015;2(1):66–9.
14. Organisation WH, Fund UNC. WHO child growth standards and the identification of severe acute malnutrition in infants and children. 2009.
15. Bhandari N, Mohan SB, Bose A, Iyengar SD, Taneja S, Mazumder S, et al. Efficacy of three feeding regimens for home-based management of children with uncomplicated severe acute malnutrition : a randomised trial in India. BMJ. 2016;1:e000144.
16. Burza S, Mahajan R, Marino E, Sunyoto T, Shandilya C, Tabrez M, et al. Community-based management of severe acute malnutrition in India : new evidence from Bihar. Am J Clin Nutr. 2015;101:847–59.
17. Dube B, Rongsen T, Mazumder S, Taneja S, Rafiqi F, Bhandari N, et al. Comparison of ready-to-use therapeutic food with cereal legume-based Khichri among malnourished children. Indian Pediatr. 2009;46(5):383–8.
18. André Briend SC. Therapeutic Nutrition for Children with Severe Acute Malnutrition: Summary of African Experience. Indian Pediatr. 2010;47(10):655–9.
19. Nackers F, Broillet F, Djibo A, Gaboulaud V, Guerin PJ, Rusch B, et al. Effectiveness of ready-to-use therapeutic food compared to a corn / soy-blend-based pre-mix for the treatment of childhood moderate acute malnutrition in Niger. J Trop Pediatr. 2010;56(6):407–13.
20. Nair N, Tripathy P, Sachdev HS, Pradhan H, Bhattacharyya S, Gope R, et al. Articles Effect of participatory women’s groups and counselling through home visits on children’s linear growth in rural eastern India ( CARING trial ): a cluster-randomised controlled trial. Lancet Glob Heal. 2017;5(10):e1004–16.
21. Shah D, Hs S, Gera T, Lm D, Jp P. Fortification of staple foods with zinc for improving zinc status and other health outcomes in the general population (Review). Cochrane Database Syst Rev. 2016;(6).
22. Patel MP, Sandige HL, Ndekha MJ, Briend A. Supplemental Feeding with Ready-to-Use Therapeutic Food in Malawian Children at Risk of Malnutrition. J Heal Popul NUTR. 2005;23(4):351–7.
23. Kam S Van Der, Salse-ubach N, Roll S, Swarthout T. Effect of Short-Term Supplementation with Ready-to-Use Therapeutic Food or Micronutrients for Children after Illness for Prevention of Malnutrition : A Randomised Controlled Trial in Nigeria. PLoS Med. 2016;1–26.

### Tables

TABLE 1 DISTRIBUTION PERCENTAGE OF SAM AND MAM CASES ACCORDING TO GENDER.

Background Characteristics	Male	Female	Total
	N (%)	N (%)	N
SAM	46.9 (165)	53.1 (187)	352
MAM	49.3 (147)	50.7 (151)	298
SAM to Normal	46.8 (145)	53.2 (165)	310
MAM to Normal	48.3 (142)	51.7 (152)	294
<b>Total</b>			<b>1254</b>

**TABLE 2 DISTRIBUTION PERCENTAGE OF UNDERWEIGHT CHILDREN UNDER-5 YEARS OVER THE WEEKS BY AGE GROUPS AND SEX.**

Variable	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	7 <sup>th</sup>	9 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup>	15 <sup>th</sup>	N
	Week	Week	Week	Week	Week	Week	Week	Week	
<b>Age groups (in months)</b>									
≤ 12	68.8	61	53.3	33.8	24.7	11.7	7.8	3.9	77
13-24	76.4	70.7	67.9	48.6	27.9	13.6	7.9	3.6	140
25-36	84.4	76.1	66.5	44.3	25.8	15	7.2	1.8	167
37-60	89.4	86.1	74.7	54.7	33.5	21.2	12.7	5.3	245
<b>Sex</b>									
Male	80.8	74	67.2	46.8	28.8	17.3	9.9	4.3	323
Female	84.6	80.1	69.6	49.4	29.4	16	9.2	3.3	306
Overall	82.7	77	68.4	48	29.1	16.7	9.5	3.8	629

**TABLE 3 WEIGHT CHANGES AMONG STUDY PARTICIPANTS**

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared ( $\eta_p^2$ )
<b>Week</b>	Sphericity Assumed	1696.182	14	121.156	173.680	0.000	.211
	Greenhouse-Geiser	1696.182	1.796	944.207	173.680	0.000	.211
	Huynh-Feldt	1696.182	1.801	941.757	173.680	0.000	.211
	Lower-bound	1696.182	1.000	1696.182	173.680	0.000	.211
<b>Error (Week)</b>	Sphericity Assumed	6338.218	9086	.698			
	Greenhouse-Geiser	6338.218	1165.870	5.436			
	Huynh-Feldt	6338.218	1168.902	5.422			
	Lower-bound	6338.218	649.000	9.766			

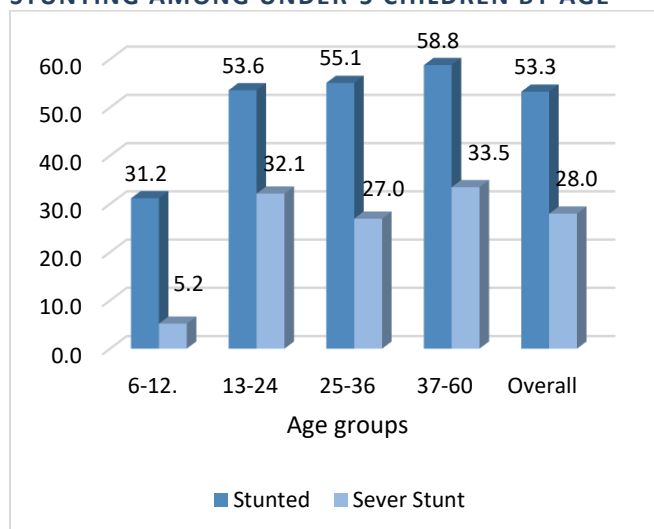
Repeated measure ANOVA

**TABLE 4 DESCRIPTIVE STATISTICS: DESCRIBES THE PATTERNS OF WEIGHT GAIN OVER DIFFERENT WEEKS**

Weeks	Mean	Std. Error	95% Confidence Interval	
			Lower	Upper
1	9.175	.131	8.918	9.433
3	9.309	.084	9.145	9.474
5	9.703	.084	9.538	9.868
7	9.971	.083	9.807	10.135
9	10.157	.083	9.993	10.321
11	10.252	.084	10.087	10.417
13	10.318	.084	10.153	10.484
15	10.338	.084	10.173	10.504

**Figures**

**FIGURE 1 PREVALENCE OF STUNTING AND SEVER STUNTING AMONG UNDER-5 CHILDREN BY AGE**



**FIGURE 2 PREVALENCE OF STUNTING AND SEVER STUNTING AMONG UNDER-5 CHILDREN BY SEX**

