

## Original Research Article

# Study to determine gender variation in severe acute malnutrition at nutrition rehabilitation centre

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### ABSTRACT

**Background:** The objective of this study is to know the gender variation in number of admissions, severity of malnutrition at the time of admission, gaining of weight and adherence to follow up in children admitted to nutrition rehabilitation center and during follow up.

**Methods:** This is a retrospective study involving the review of existing programme records. Children who were admitted to nutrition rehabilitation centre, district hospital, Chamarajanagar, Karnataka, India, between January 2017 to December 2017 with severe acute malnutrition were involved in the study. The programme included 2 weeks of in-patient care, and four follow-up visits to the NRC subsequently as follows; 1<sup>st</sup> visit at 7 days, 2<sup>nd</sup> at 14 days, 3<sup>rd</sup> at 1 month and 4<sup>th</sup> at 2 months after discharge.

**Results:** Among 57 children who admitted to NRC females were 30 (52.6%) and males 27 (47.4%). 25 among 57 children (43.9%) could sustain weight gain of >5grams/kg/day as per one of the discharge criteria. 13 (52%) were females and 12 (48%) were males. 32(56%) among 57 admitted children to NRC, could achieve <-1SD during entire programmed. 15(46.8%) were females and 17 (53.1%) were males.

**Conclusions:** There was no gender variation in either number of admission or severity of malnutrition at the time of admission or weight gain during NRC programme.

**Keywords:** Anthropometric measurements, Nutrition rehabilitation centre (NRC), Rashtriya bal swasthya karyakram (RBSK), Severe acute malnutrition (SAM)

### INTRODUCTION

The world made remarkable progress in child survival in the past few decades, and millions of children have better survival chances than in 1990-1991 in 26 children died before reaching age 5 in 2017, compared to 1 in 11 in 1990. Moreover, progress in reducing child mortality has been accelerated in the 2000-2017 period compared with the 1990s, with the annual rate of reduction in the global under-five mortality rate increasing from 1.9 per cent in 1990-2000 to 4.0 per cent in 2000-2017.<sup>1</sup> In 2013, an estimated 2.9 million children under five were admitted globally for treatment of severe acute malnutrition (SAM). This figure represents significant progress when

compared with just over 1 million reported during 2009 (UNICEF Nutrition Section 2013) yet is clearly insufficient when compared to the global burden of 17 million children affected by SAM (UNICEF, WHO, World Bank 2014). Children with SAM are nine times more likely to die than well-nourished children.<sup>2</sup>

As per National Family Health Survey (NFHS)-4 (2015-16), the children who are fed with adequate diet between 6 months to 23 months are 8.2%. Children under 5 years who are wasted (weight-for-height) are 26.1%. Children under 5 years who are severely wasted (weight-for-height) are 10.5%. The prevalence of undernutrition is almost the same among girls and boys.<sup>3</sup> SAM children

with medical complications should be admitted and managed in a health facility.<sup>4</sup>

Nutritional rehabilitation center is the facility-based unit made available in many Indian states with the advent of the national rural health mission for the treatment of SAM children.<sup>5,6</sup>

## METHODS

This is a retrospective study involving the review of existing programmed records of nutrition rehabilitation center. Children admitted to NRC, district hospital, Chamarajanagar, Karnataka, India, between January 2017 to December 2017 with severe acute malnutrition were involved in the study. The NRCs has been operational for more than 5 years in Karnataka, India.

The study was aimed to know the gender variation in terms of number of admissions and number of children who got successfully treated among SAM children admitted to NRC in patient care and during follow-up visits.

The operational guidelines of NRC setup were according to National rural health mission/RCH-phase II.<sup>4</sup> The NRCs consist of 10 bedded wards with a kitchen, toilet facility and demonstration room. Children aged 6months to 5 years are referred to the NRC by RBSK, Anganwadi workers/ASHA workers, pediatricians, or approached by parents themselves in some cases.

NRCs function along the lines of the WHO and revised Indian association of Pediatrics (IAP) protocols.<sup>7</sup>

### Admission criteria<sup>4</sup>

Severe acute malnutrition (SAM) among children aged 6-59 months with:

- Weight-for-height/length Z-score (WHZ) <-3 (Z-score in standard deviations (SDs) reflects the deviation from the median of World health organization (WHO) child growth standards)
- Mid-upper arm circumference (MUAC) < 115mm
- Presence of nutritional oedema.

### Indicators<sup>4</sup>

Relapse: A patient who has been discharged as cured from the programmed within the last 2 months but is again eligible for admission to NRC.

Defaulter: Number of beneficiaries that defaulted during the reporting period divided by the total exits. Defaulter will be a child with SAM admitted to the ward but absent (from the ward) for three consecutive days without been discharged.

Non-respondent: this exit category includes those beneficiaries who fail to respond to the treatment. Referral by: RBSK/Asha worker/pediatric OPD/self.

Weight gain achieved target weight (15% weight gain). Referral to higher center. Case fatality rate. Performance of NRC may be assessed based on the criteria described below (Table 1).

**Table 1: Quantitative indicators.**

	Acceptable	Alarming
Recovery rate	>75%	50%
Death rate	<10%	>15%
Defaulter rate	<15%	>25%
Weight gain	>8g/kg/day	<8g/kg/day
Length of stay	<4 weeks	>6 weeks

### Guidance for calculation of indicators<sup>4</sup>

#### Weight gain (g/kg/d)

Weight gain= {discharge weight in grams–minimum weight in grams}/ {minimum weight in kg x number of days between date of minimum weight and discharge day}. All SAM children should be followed up by health providers in the program till s/he reaches weight-for-height of-1SD.

Therapeutic diet is made of locally available food for a minimum of 14 days and accompanied by the mother /the primary care giver. Initial feeding begins with F-75 with 75kcal and 0.9g protein per 100ml when child is stabilized (usually after 2-7 days) Catch up diet (F-100) with 100kcal and 2.9g proteins per 100ml is given. Vitamin A is given to all severely malnourished children on Day 1.

Timing and oral dosage of vitamin A includes:<6 months, 50000 IU; 6-12 months or if weight <8kg, 100000 IU; >12 months, 200000 IU.<sup>3</sup> Weight, height and MUAC, are monitored using standard techniques guidelines. Mother/primary care giver is counseled and educated on the composition and preparation of therapeutic diets.

Children are discharged according to the criteria given below (Table 2). Follow-up visits after discharge to NRC include; 1st visit at 7 days, 2<sup>nd</sup> at 14 days, 3<sup>rd</sup> at 1 month and 4<sup>th</sup> at 2 months after discharge.

All SAM children followed up till he/she reaches weight-for-height of -1 SD.

Data variables, sources and definitions the data are collected from NRC admission registers maintained at Medical record section, district hospital, Chamarajanagar. The follow up records are collected from follow up registers maintained at NRC.

**Table 2: Prepare for discharge and follow up after recovery.<sup>4</sup>**

Criteria for discharge from inpatient care	
Child	Edema has resolved.
	Achieved weight gain of $\geq 15\%$ and has satisfactory weight gain for 3 consecutive days ( $>5$ gm/kg/day).
	Child eating an adequate amount of nutritious food that the mother can prepare at home.
	All infections and other medical complications have been treated.
	Child is provided with micronutrients.
	Immunization is updated.
Mother/caregiver	Knows how to prepare appropriate foods and to feed the child.
	Knows how to make appropriate toys and play with the child.
	Knows how to give home treatment for diarrhea, fever and acute respiratory infections, and how to recognize the signs that/he must seek medical assistance.
	Follow-up plan is completed.

**Statistical analysis**

Data is analyzed done by SPSS version 16. Descriptive statistics and chi-square test for independence used for statistics.

**RESULTS**

Among total 61 admissions between January 2017 and December 2017, 57 children completed 14 days treatment (93.44%). 4 children were discharged against medical advice and could not complete 14 days treatment and were taken as defaulters (6.55%). There was no referral to higher center and no deaths during the above said period.

The mean weight at the time of admission was 7.46kg, and standard deviation of 1.53; minimum weight of 4.5kg and maximum weight of 11.5kg. At the time of discharge there was increase in the mean weight of 7.92kg and standard deviation of 1.57; minimum weight of 5.05kg and maximum 12.65kg. Mean age of admission was 23.3 months with minimum of 10 months and maximum of 54 months. Females were 30 and males 27 among 57 cases. There was no statistically significant association with sex ratio either in number of admissions or in severity of malnutrition ( $p=0.451$ ) (Table 3 and 4).

**Table 3: Sex 1\* Sd\_A cross-tabulation.**

		Sd_A					Total
			-4	-3	-2	-1	
Sex1	Female	Count	3	16	10	1	30
		% within Sex1	10.0%	53.3%	33.3%	3.3%	100.0%
		% within Sd_A	75.0%	45.7%	58.8%	100.0%	52.6%
	Male	Count	1	19	7	0	27
		% within Sex1	3.7%	70.4%	25.9%	.0%	100.0%
		% within Sd_A	25.0%	54.3%	41.2%	.0%	47.4%
Total	Count	4	35	17	1	57	
	% within Sex1	7.0%	61.4%	29.8%	1.8%	100.0%	
	% within Sd_A	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 4: Chi-square test.**

	Value	DF	Asymp. Sig. (2 sided)
Pearson chi-square	2.636 <sup>a</sup>	3	P=0.451
Likelihood ratio	3.064	3	0.382
Linear-by-linear association	0.229	1	0.633
No of valid cases	57		

<sup>a</sup>4 cells (50.0%) have expected count less than 5; the minimum expected count is 47.

The mean mid arm circumference was 11.74 with standard deviation of 0.613. Majority of children were identified at pediatric OPD (41%), 5% from RBSK, 8% from Asha /AWW and 12% were approached by parents themselves.

At the time of admission, majority of children were  $<-3$  SD (61.4%) weight for height (WFH),  $<-2$ SD were 29.8%, 7% were  $<-4$ SD and 1 child was  $<-1$ SD (1.8%) with severe loss of appetite and associated anemia (Table 5).

**Table 5: SD for WFH at the time of admission.**

		Frequency	Percent	Valid Percent	Cumulative percentage
Valid	-4	4	7.0	7.0	7.0
	-3	35	61.4	61.4	68.4
	-2	17	29.8	29.8	98.2
	-1	1	1.8	1.8	100.0
	Total	57	100.0	100.0	

WFH at the time of discharge were, children with <-3SD were 19.3%, <-4SD were 1.8%; 57.9% children reached <-2SD and 21.1% children reached <-1SD (Table 6).

**Table 6: SD for WFH at the time of discharge.**

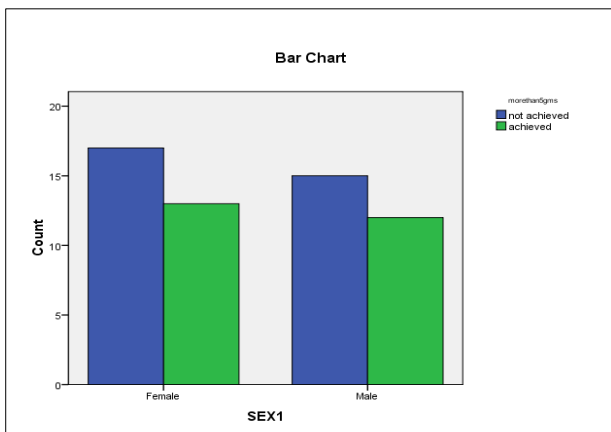
	f	%	Valid %	Cumulative %
Valid	-4	1	1.8	1.8
	-3	11	19.3	21.1
	-2	33	57.9	78.9
	-1	12	21.1	100.0
	Total	57	100.0	100.0

Five (8.7%) among 57 children could gain weight of >8 gram/kg/day in 14 days NRC care; as per quantitative indicator of satisfactory weight gain (Table 1). 25 among 57 children (43.9%) could sustain weight gain of >5grams/kg/day as per one of the discharge criteria (Table 7).

**Table 7: Weight gain >5g/kg/day.**

		f	%	Valid %	Cumulative %
Valid	Not achieved	32	56.1	56.1	56.1
	Achieved	25	43.9	43.9	100.0
	Total	57	100.0	100.0	

13 were females and 12 were males (Figure1).



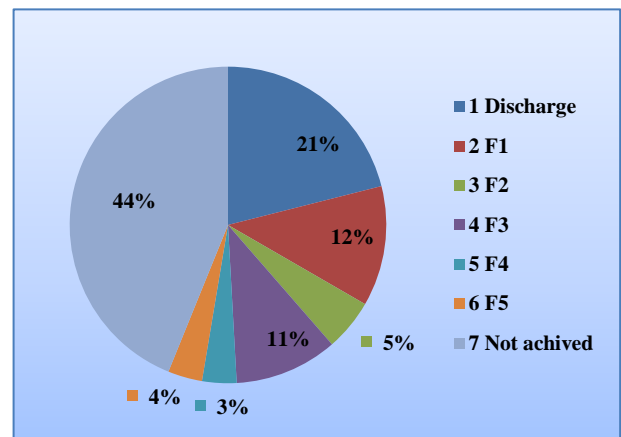
**Figure 1: Weight gain of >5g/kg/day in males and females.**

Sex ratio gaining >5g/kg/day, Chi-square test for independence, Hypothesis: There is no association between sex of child and gaining weight. Chi-square test for independence showed no association between sex of child and gaining weight (p=0.933) (Table 8).

**Table 8: Symmetric measures.**

	Value	Approx. Sig.
Nominal by nominal Contingency coefficient	0.011	0.933
No. of valid cases	57	

Those children who could achieve ≤1SD during entire programmed including follow up were 32(56%) among 57 admissions. 15 (46.8%) were females and 17 (53.1%) were males. 12 children (21%) reached ≤1SD at the time of discharge, 7(12%) at the time of first follow up visit (7<sup>th</sup> day), 3(5%) at second follow up visit (14<sup>th</sup> day) , 6 (11%) at third follow up visit(1month), 2 (3%) children at 2<sup>nd</sup> month and 2 (4%) children one month later (Figure 2).



**Figure 2: Children achieved WFH ≤1SD.**

Associated factors at the time of admission were, Anemia in 41children (71.9%), anorexia in 13 children, infection in 6 children, 3 with RTI and 3 with enteric fever. Vitamin A deficiency noted in 2 children and nutritional dermatitis in 2 children. Using chi-square test for independence test authors get p value as 0.933 at 1% level of significance authors do not reject hypothesis and authors conclude that there is no association between sex and weight gain.

## DISCUSSION

There was no statistically significant gender difference either in number of admissions or severity of malnutrition. There was no significant gender difference in completion of facility care or sustained weight gain and follow ups as it is important to know the gender discrimination in the society. Pillai VK et al, gives a result where there is significant difference in the mean level of stunting in girls and boys and the says that gender preference for boys bears a net negative effect on stunting level of girls.<sup>7</sup> Sahu SK et al, concluded that the overall development, enhancement of level of education and, low gender inequality is one of the key factors for improvement in the health status of Indian children.<sup>8</sup> Bharathi P et al, found that there was a significant rural-urban as well as gender difference in growth and nutritional status of Indian preschool children.<sup>9</sup> As compared to above mentioned studies, in present study there was no gender variation in either number of children admitted with severe acute malnutrition or number of children who successfully completed the programmed. This can be compared to NFHS-4 report of Karnataka, where there is no significant sex difference in acute severe malnutrition.<sup>10</sup>

The limitations of the study were the study involved the review of existing hospital records, the complete reliability of which is questionable. The education levels, economic status, religion and caste of the parents, order of birth of the child which are important in determining under-5 malnutrition was not recorded in detail. The children represented entire district and did not segregate as from rural and urban areas.

## CONCLUSION

In-patient care at NRC was effective in improvement in medical illnesses and management of general health and there was satisfactory weight gain achieved as per national programme requirement both during inpatient care or during follow up visits. Complete cure of associated medical illnesses at NRC with sustained weight gain, children reaching <-1SD during facilitation care as well as during follow up visits among 56% of children and good adherence to the follow up to 2 months and beyond in >93% of children were positive factors contributing to the success of the programme. There was no gender variation in either number of children admitted with severe acute malnutrition or number of children who successfully completed the programme.

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