

# Performance Appraisal of Nutritional Rehabilitation Centers in Central India: A Retrospective Facility-Based Descriptive Study

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## Abstract

**Background:** Nutritional rehabilitation centers (NRCs) were established with the objective of providing institutional care to malnourished children and building the capacity of the primary caregivers of these children. **Objectives and Methodology:** The objective of this study was to assess the effect of nutritional interventional measures undertaken at NRCs in improving the nutritional status of admitted children; a retrospective facility-based descriptive study was conducted using the monthly performance reports (March 2015 to November 2019) of all NRCs in Dhamtari district, Chhattisgarh. **Results:** Of the 3171 children registered in the NRCs, the majority were 1–3 years of age (59.22%), female children (55.50%), and from Other Backward Class caste category (56.79%). The district records a cure rate of 56.12%, death rate of 0.03%, and defaulter rate of 4.71%, with an average length of stay being 16.5 days. NRCs of Dhamtari district had less than acceptable level of recovery/cure rate though death rate and defaulter rate were within acceptable standards. **Conclusion:** Lower cure rate along with lower defaulter rate and death rate with more than recommended length of stay reflects the below-average performance of the NRCs in the district.

**Keywords:** Children, India, malnutrition, nutritional rehabilitation

## INTRODUCTION

Globally in 2018, wasting threatened the lives of an estimated 7.3% or 49 million children under 5. Stunting affected an estimated 21.9% or 149 million under-five children. This means that more than 1 in 3 children are not growing well, particularly in the first 1000 days – from conception to the child's second birthday – and often beyond. Over 340 million children are suffering from deficiencies of essential micronutrients resulting in at least 1 in 2 children with hidden hunger.<sup>[1]</sup>

Undernutrition results in poor growth, increased rate of infections and death, poor cognition, school readiness and school performance, and poor earning potential later in life, whereas hidden hunger results in poor growth and development, poor immunity and tissue development, poor health, and risk of death.<sup>[2]</sup> The global nutrition targets (Global Nutrition Report 2018) set to be achieved by 2025 are six in number, of which two are directly related to undernutrition in children.<sup>[1]</sup>

Target 1: Forty percent reduction in the number of children under 5 who are stunted

Target 6: Reduce and maintain childhood wasting to <5%.

Of the WHO regions, Southeast Asia region (49.9%) followed by African region (37.97%) has the highest prevalence of under-five children who are not growing well.<sup>[1]</sup> The situation in India is not encouraging either. The prevalence of wasting is 21%, stunting is 38.4%, underweight is 35.7%, and overweight is 2.4%. Although the nutritional status has improved over years (National Family Health Survey [NFHS]-3 to NFHS-4), the rate is not satisfactory to achieve the global targets. In Chhattisgarh, the prevalence of wasting is 23.1%, stunting is 37.6%, and underweight is 37.7% – all at or above the national average.<sup>[3]</sup> Also, little progress made in recent decades has been threatened by the unprecedented SARS-CoV-2 pandemic. The Government of India under

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the National Health Mission came up with 1151 nutritional rehabilitation centers (NRCs) established all across the country to provide facility-based care for children with severe acute malnutrition (SAM) (weight-for-height/length Z-scores below  $-3$  standard deviation (SD) of the median WHO child growth standards, mid-upper arm circumference  $<115$  mm, or presence of nutritional edema) and medical complications.<sup>[4]</sup>

### Functioning of nutritional rehabilitation centers

Active and early case finding is an important determinant of case fatality rate, program coverage, and its impact. Community mobilization is crucial for active and early case finding. The auxiliary nurse midwives, Anganwadi workers (AWWs), and accredited social health activists (ASHAs)/mitanins (in Chhattisgarh) are the field workers who screen and mobilize SAM children to the nearest NRC along with their mothers, for which they receive an incentive of 100 rupees/SAM child referred. In the NRC, the child is given treatment and management for medical complications, appropriate feeds based on locally available foods, and monitored  $24 \times 7$  for a total period of 2 weeks. The weight is monitored to achieve the target weight gain of 15%. Mothers are also provided nutritional support and 150 rupees/day as wage compensation. They are counseled (family planning, hygiene, psychosocial care and development, and kitchen garden) and trained to make nutrient-dense foods from locally available ingredients at the lowest possible cost. After discharge, a follow-up chart is prepared for child, which has four follow-up visits (on day 15, day 30, and then monthly for 4–6 months till the child weight for height reaches  $-1$  SD). The field workers receive 50 rupees for accompanying the child during each follow-up visit.<sup>[4]</sup>

It has been almost a decade after rolling out these NRCs and its high time to assess the effect of nutritional interventional measures undertaken at NRCs in improving the nutritional status of admitted children, particularly in a state like Chhattisgarh with predominant tribal population (30.6% of total population of state).<sup>[5]</sup> The objective of the study was to assess the effectiveness of nutritional interventional measures in improving the nutritional status of children admitted to NRCs of Dhamtari district, Chhattisgarh.

## METHODOLOGY

A retrospective facility-based descriptive study was conducted with records from all the NRCs of Dhamtari district, Chhattisgarh. The district has four NRCs: three at community health center (CHC) level (Kurud, Nagri, and Magarlod) and one at District Hospital (DH) level (Dhamtari). This gave an opportunity to obtain a holistic view of the nature of functioning of these NRCs at two tiers of service delivery institutions, DH, and CHCs and also to compare and learn best practices.

With the objective to assess the functioning of NRCs, the monthly performance reports from March 2015 to November 2019 were collected after due permission from the Chief Medical Officer (CMO), DH, Dhamtari, and respective medical officers (MOs) of NRCs. Each monthly report constituted the

unit of observation, 56 in total. The data were entered and analyzed using Microsoft Excel.

## RESULTS

The total number of children registered in the NRCs of Dhamtari district, Chhattisgarh, from March 2015 up to November 2019 was 3171. Most of the children were between 1 and 3 years of age (59.22%), and maximum registrations (29.42%) were in the NRC of DH, Dhamtari. The male children were 1411 (44.49%) and female children were 1760 (55.50%) in number. Majority of the children were of Other Backward Class caste category (56.79%) and 42.10% were from Scheduled Castes (SCs) and Scheduled Tribes (STs) combined [Table 1].

Majority of the referrals were from the field workers, 1266 (39.92%) from Anganwadi centers/AWWs, and 1065 (33.58%) were from mitanins. Maximum children (2727, 87.62%) were admitted to NRC as per weight-for-height/length ( $<-3$  SD) criteria. Out of 3171 children, 1129 (36.27%) children satisfied two criteria for admission, whereas 96 (3.08%) satisfied all the three criteria for admission to NRC. The total number of SAM children admitted to NRC was 2778 (89.26%), whereas the total number of SAM children with medical complications was 1888 (60.66%). The NRC at DH, Dhamtari, had the maximum number of admissions for children with SAM and SAM with complications, 742 (26.70%) and 863 (45.70%), respectively [Table 2]. On an average, there were 14 admissions per month in the NRCs of the district, with NRC at DH having the most admissions per month (16 per month). The average number of NRC days per month was 226 days, with NRC at Magarlod having the least number (168.5 days).

The total number of discharges in the study period was 2972 with maximum number of discharges from NRC, DH. Maximum number of discharges were after 15 days of admission (2247 [75.60%]), and this holds the same for all the four centers. The number of children discharged with target weight gain being achieved (15% of the weight at admission) was 1523 (51.24%), whereas the number of children with weight gain more than or equal to 8 g/kg/day was 1285 (43.23%). More than half (1668, 56.12%) children were discharged as being cured, whereas 4.71% were defaulters and 1099 (36.97%) were nonresponders. On an average, there were 13 discharges per month. The number of children referred to a higher facility was 64 (2.15%), and only one death has been recorded in the study period [Table 3].

The district records a cure rate of 56.12%, death rate of 0.03%, and defaulter rate of 4.71%, with an average length of stay being 16.5 days [Table 4].

## DISCUSSION

The study results show that major proportion of children registered in NRC are between 1 and 3 years of age. Possible reasons for this could be incorrect complementary feeding

**Table 1: Distribution of children admitted to nutritional rehabilitation centers based on sociodemographic determinants**

Variable	NRC, Kurud (n=765), n (%)	NRC, Nagri (n=814), n (%)	NRC, Magarlod (n=659), n (%)	NRC, DH (n=933), n (%)	Total (n=3171), n (%)
Age					
6 months to 1 year	148 (19.3)	157 (19.3)	127 (19.3)	364 (39.0)	796 (25.1)
1-3 years	471 (61.6)	519 (63.8)	409 (62.1)	479 (51.3)	1878 (59.2)
>3 years	146 (19.1)	138 (16.9)	123 (18.7)	90 (9.6)	497 (15.7)
Sex					
Male	363 (47.5)	383 (47.1)	245 (37.2)	420 (45.0)	1411 (44.5)
Female	402 (52.5)	431 (52.9)	414 (62.8)	513 (54.9)	1760 (55.5)
Caste					
SC	89 (11.6)	35 (4.3)	23 (2.8)	107 (11.5)	254 (8.0)
ST	114 (14.9)	589 (72.4)	160 (19.7)	218 (23.4)	1081 (34.1)
OBC	549 (71.8)	188 (23.1)	472 (57.9)	592 (63.5)	1801 (56.8)
General	10 (1.3)	2 (0.2)	4 (0.5)	15 (1.6)	31 (0.9)
Others	3 (0.3)	0	0	1 (0.1)	4 (0.1)
Immunization status					
Complete	756 (98.8)	813 (99.8)	647 (98.2)	929 (99.6)	3145 (99.2)
Incomplete	9 (1.2)	1 (0.2)	12 (1.8)	4 (0.4)	26 (0.8)
Case referred to NRC by whom					
Own/self	135 (17.6)	33 (4.1)	34 (5.2)	5 (0.5)	207 (6.5)
AWC	263 (34.4)	386 (47.4)	237 (35.9)	380 (40.7)	1266 (39.9)
Mitanin (ASHA)	270 (35.3)	324 (39.8)	309 (46.9)	162 (17.4)	1065 (33.6)
ANM	18 (2.4)	10 (1.2)	1 (0.2)	5 (0.5)	34 (1.1)
NRC staff during VHND	1 (0.1)	15 (1.8)	32 (4.9)	0	48 (1.5)
OPD	29 (3.8)	8 (0.9)	8 (1.2)	226 (24.2)	271 (8.5)
Child ward	0	2 (0.2)	0	62 (6.6)	64 (2.0)
RBSK	32 (4.2)	0	22 (3.3)	65 (6.9)	119 (3.8)
Others	17 (2.2)	36 (4.4)	16 (2.4)	28 (3.0)	97 (3.1)

Parenthesis indicates percent values. NRC: Nutritional rehabilitation center, DH: District hospital, SC: Scheduled Caste, ST: Scheduled Tribe, AWC: Anganwadi center, ASHA: Accredited social health activist, ANM: Auxiliary nurse midwife, VHND: Village Health and Nutrition Day, RBSK: Rashtriya Bal Swasthya Karyakram, OBC: Other backward class, OPD: Out-patient department

**Table 2: Distribution of children admitted to nutritional rehabilitation centers based on admission criteria**

Variables	Admissions				
	Kurud (n=765), n (%)	Nagri (n=738), n (%)	Magarlod (n=676), n (%)	DH (n=933), n (%)	Total (n=3112), n (%)
Type of admission					
New	711 (92.9)	733 (99.3)	653 (96.6)	930 (99.7)	3027 (97.3)
Readmission	54 (7.1)	5 (0.7)	22 (3.3)	0	81 (2.6)
Relapse	0	0	1 (0.1)	3 (0.3)	4 (0.1)
Criteria for admission					
Weight for height/length (<-3 SD)	673 (87.9)	729 (98.8)	497 (73.5)	828 (88.7)	2727 (87.6)
MUAC (<11.5 cm)	184 (24.1)	187 (25.3)	210 (31.1)	665 (71.3)	1246 (40.0)
Edema (+++=severe)	18 (2.4)	2 (0.3)	74 (10.9)	4 (0.4)	98 (3.1)
With any 2 criteria	172 (22.5)	173 (23.4)	216 (31.9)	568 (60.9)	1129 (36.3)
With all 3 criteria	18 (2.4)	1 (0.1)	74 (10.9)	3 (0.3)	96 (3.1)
Total SAM	695 (90.8)	689 (93.4)	652 (96.4)	742 (79.5)	2778 (89.3)
Total SAM with complications	428 (55.9)	486 (65.9)	111 (16.4)	863 (92.5)	1888 (60.7)

Parenthesis indicates percent values. DH: District hospital, SD: Standard deviation, MUAC: Mid-upper arm circumference, SAM: Severe acute malnutrition

with the content and frequency of feeding.<sup>[6]</sup> In Chhattisgarh, the number of children aged 6–8 months receiving solid or semi-solid food and breast milk is only 53.8%. According to NFHS-4, in Chhattisgarh, only 11.1% of breastfeeding

children aged 6–23 months received an adequate diet, only 8.4% nonbreastfeeding children aged 6–23 months received an adequate diet, and only 10.9% of total children aged 6–23 months received an adequate diet.<sup>[3]</sup> Furthermore, in

**Table 3: Distribution of children admitted to nutritional rehabilitation centers based on discharge criteria**

Variables	Children discharged				
	Kurud (n=724), n (%)	Nagri (n=721), n (%)	Magarlod (n=614), n (%)	DH (n=913), n (%)	Total (n=2972), n (%)
Duration of stay (days)					
Discharge <7	28 (3.8)	22 (3.1)	13 (2.1)	29 (3.2)	92 (3.1)
Discharge between 7-15	93 (12.8)	152 (21.1)	170 (27.7)	218 (23.9)	633 (21.3)
Discharged >15	603 (83.3)	547 (75.9)	431 (70.2)	666 (72.9)	2247 (75.6)
Children discharged, who achieved target (15%) weight gain	432 (59.7)	336 (46.6)	252 (41.0)	503 (55.1)	1523 (51.2)
Children achieved weight gain >8 (g/kg/day)	267 (36.9)	354 (49.1)	254 (41.4)	410 (44.9)	1285 (43.2)
Output (after discharge from NRC)					
Cured	498 (68.8)	416 (57.7)	252 (41.0)	502 (54.9)	1668 (56.1)
Defaulter	28 (3.9)	25 (3.5)	43 (7.0)	44 (4.8)	140 (4.7)
Nonrespondent	197 (27.2)	270 (37.4)	272 (44.3)	360 (39.4)	1099 (36.9)
Referred to higher facility	1 (0.1)	10 (1.4)	47 (7.7)	6 (0.7)	64 (2.2)
Death in NRC/follow-up	0	0	0	1 (0.1)	1 (0.0)

Parenthesis indicates percent values. DH: District hospital, NRC: Nutritional rehabilitation center

**Table 4: Nutritional rehabilitation centers based on acceptable levels of care**

Indicators	NRC, Kurud	NRC, Nagri	NRC, Magarlod	NRC, DH	Acceptable	Not acceptable
Recovery/cure rate (%)	68.8	57.7	41.0	54.9	>75	<50
Death rate (%)	0.0	0.0	0.0	0.1	<5	>15
Defaulter rate (%)	3.9	3.5	7.0	4.8	<15	>25
Weight gain (g/kg/d)	13.6	NA	9.6	NA	>8	<8
Length of stay (days)	18	17	14	17	1-4	<1 and >6

NA: Data not available, NRC: Nutritional rehabilitation center, DH: District hospital

Central India, the minimum dietary diversity is only 12%, minimum meal frequency is only 32%, and minimum acceptable diet is only 5%.<sup>[3,7]</sup> The other factors associated with poor complementary feeding practices are age of mother, socioeconomic status, birth order, number of antenatal care visits, place of delivery, access to mass media, maternal education, and women’s autonomy over finances and household decisions.<sup>[8]</sup>

The sex ratio of 1.24 shows an increased predilection for female children to be malnourished/admitted to NRCs, and most of the children (98.89%) were from marginalized populations such as SCs, ST, and Other Backward Class. This is in line with NFHS-4 and other similar works like that of Dhanalakshmi and Gayathri Devi and Taneja *et al.*<sup>[9,10]</sup>

The field workers such as AWWs and ASHAs/mitanins were responsible for majority of the referrals (73.44%), reflecting their role in combating childhood malnutrition, as robust understanding of screening methods, referral pathways, and counseling by these field workers is imperative. The number of referrals by NRC staffs during Village Health and Nutrition Days (VHNDs), Rashtriya Bal Swasthya Karyakram (RBSK) reflects respective poor program functioning; low self/own referral reflects poor knowledge regarding feeding practices and signs, symptoms of malnutrition in the community, especially mothers.<sup>[11,12]</sup>

Majority of the children were admitted based on weight-for-height/length (<-3 SD) criterion (87.62%) which shows the ease of using a quantitative criterion than a subjective criterion like edema (3.14%). Almost two-third of the children admitted (60.66%) had complications along with SAM – failure of health-care system resulting in delayed diagnosis and treatment.

Majority of the children were discharged (75.60%) after 15 days of admission, and the average length of stay in all NRCs of Dhamtari district was 16.5 days. This was much higher than that reported in other studies.<sup>[9,10,13,14]</sup>

The nutritional interventional measures undertaken at NRCs in improving the nutritional status of admitted children resulted in 1523 (51.24%) children achieving the target weight gain of 15%, whereas an additional 1285 (43.23%) children had a weight gain of more than or equal to 8 g/kg/day which is considered to be adequate for a child during stay at the NRC. Importance should also be given to 1099 (36.97%) children who were nonresponders. The NRCs of Dhamtari district, Chhattisgarh, have less than acceptable level of recovery/cure rate though death rate and defaulter rate are within acceptable standards.

Lower cure rate along with lower defaulter rate and death rate with more than recommended length of stay reflects on the ineffectiveness of nutritional interventions at NRC or

inability to identify coexisting morbidities or the inadequate recommended length of stay.

## CONCLUSION

1. Positively reinforce field workers toward screening, referral, and counseling of malnourished children and their mothers
2. To strengthen other modes of referral (VHND, RBSK, and knowledge of mothers to increase self/own referral)
3. To identify nutrient-dense foods from locally available ingredients, at low cost possible, and to study their effectiveness in improving weight and thus cure rate
4. Training and capacity building of MOs, staff nurses, and nutritional counselors of NRC
5. Further treatment and intervention for nonresponders at the NRCs.

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## Conflicts of interest

There are no conflicts of interest.

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