

# Performance Analysis of Nutritional Rehabilitation Centers in Purulia District of West Bengal, India

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## Abstract

**Introduction:** Severe acute malnutrition (SAM) is a life-threatening condition affecting under-five children. Nutritional rehabilitation centers (NRC) were designed to provide comprehensive clinico-social management of SAM children at an institutional setting. **Materials and Methods:** The study was based on record analysis of 6 years between 2014 and 2019 after obtaining ethical and administrative approval. The objectives were to compare indices such as admission rate, bed occupancy, and sex-differentials over time as well as among different NRCs. **Results:** A total of 7316 children were admitted in the 9 NRCs. Quarterly admission ranged between 181 and 389. Gender parity index was higher for girls. Cure rate ranged between 39.8% and 70.9%; subtle modification in diet helped in improving cure rate. Bed-occupancy rate varied from 72.55% to 85.95%. **Conclusion:** Variability of performance of NRCs could be associated with factors such as available manpower, attitude of providers, and supply of logistics. Regular interaction with community and counseling is necessary to increase admission and hospital stay.

**Keywords:** Bed occupancy, program evaluation, review, severe acute malnutrition, tribal

## INTRODUCTION

A recently published document<sup>[1]</sup> ranked India 71<sup>st</sup> out of 113 countries in food security index. However, if we go into details, it is seen that the country ranks 29<sup>th</sup>, much higher in aspect of availability and 40<sup>th</sup> in natural resources and resilience. It lost its ground in domains of affordability (80<sup>th</sup> rank) and quality and safety (74<sup>th</sup> rank). The pattern is indicative of an equity gap.

National level estimate, NFHS 5 shows that more than 1/3<sup>rd</sup> of under-five Indian children is stunted. Inter-state variation is substantial, ranging from 20% in Puducherry to 47% in Meghalaya. Figure in West Bengal is marginally better than national average.

Malnutrition has always posed challenge for policy-makers owing to multidimensionality of its aetiology and impact. Along with understanding and treatment of pathophysiology of the problem, simultaneous attention to socio-cultural determinants is crucial, to achieve sustainable reduction of the problem. Around 45% of deaths among children under

5 years of age are linked to undernutrition (WHO). Globally, 45.4 million or 6.7% under-five children are wasted, and 149.2 million (22%) children are stunted.<sup>[2]</sup> Purulia district is located along the border with Jharkhand in the western part of the state of West Bengal. Malnutrition has been a point of concern for the district over the years in the past. Even now 46.3% of under five children are underweight, 36.9% stunted, and 29.4% wasted.<sup>[2]</sup> The figures were several percentage points more in earlier surveys. The improvement though falls short of expectation, nevertheless, is a welcome change. This belt, traditionally inhabited by the indigenous tribal population was stamped as underperforming district and known as hotbed for left-wing extremism. Improvement in infrastructure and developmental strategies over the years, appear to be bearing fruits.

According to the data of National Family Health Survey-5, in India, 7.7% of children are severely wasted, 19.3% are

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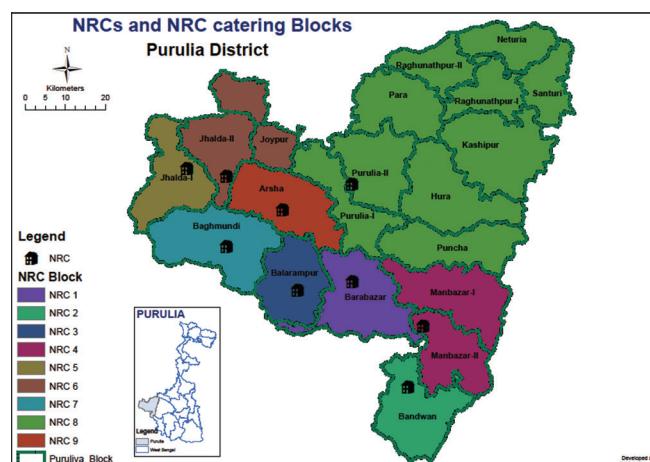
wasted, and 35.5% are stunted.<sup>[3]</sup> ICDS and the health system of our country deal with the nutrition-related issues of children. Different Govt. schemes have been introduced under these departments to tackle preventive and curative measures for the problem of malnutrition. Among them, nutritional rehabilitation centers (NRC) play a critical role in prevention of deaths due to under-nutrition and promotion of growth and development of children with severe acute malnutrition (SAM).

NRCs provide facility-based management of children below 5 years suffering from SAM with medical complications. Children are admitted and treated in NRCs until they reach catch-up growth and are free from medical complications. During stay at NRC therapeutic feeding and micronutrient supplementations are given to the children. Other than these, attention is also given on sensory stimulation and emotional care of children.

Capacity building of mothers on childcare and feeding practices is also promoted, so that child continues to receive adequate care at home after discharge. Demonstration and practice-by-doing on the preparation of energy dense food using locally available, culturally acceptable and affordable food items is a regular activity for mothers staying with children. Earlier study also mentioned that if a NRC operated effectively, it becomes a very economical way to treat SAM children.<sup>[4]</sup>

Purulia is a district at the south-western tip of West Bengal, situated on the Chhotanagpur plateau. Birth rate per 1000 population is 21.32 and the infant mortality rate per 1000 live births is 38.34 (as per reported death). Malnutrition indicators of the district reveal 46.3% underweight, 29.4% wasted, and 36.9% stunted.<sup>[3]</sup>

NRC in West Bengal was first established in Purulia district in collaboration of UNICEF and District Health and Family Welfare Department. Figure 1 shows the points of established NRC.



**Figure 1:** Distribution of nutritional rehabilitation centers. NRCs: Nutritional rehabilitation centers

Criteria include NRCs should be established within the premises of BPHC or RH or upgraded PHC but not to the vicinity of the labor room, male/female ward, or isolation ward. Admission of a child of ages 6 months to 59 months in NRC was based on the presence of edema and/or MUAC <115 mm and/or W/H <3SD and/or MUAC <115 mm with W/H <3SD.

Staff structure was designed as one nutrition counselor, one accountant/medical-social worker, one nursing staff, one cook, four helpers, and one sweeper. The Medical Officer in charge of NRC is expected to supervise the activities in addition to clinical management of the admitted patients, every day. All staffs were trained on protocol of SAM management.

The Anganwadi worker/ Accredited social health activist (AWWs/ASHA) are primarily responsible to encourage SAM children from the community to get admitted to NRC; they are given Rs. 50/- as transportation cost for accompanying sick children to NRCs. The food for the patients and their mother/ attendant of the admitted children is provided by the respective NRC. Again mother/attendant of the admitted children is eligible to get Rs. 100/- per day as wage compensation by completion of treatment of the child at NRC. During follow-up, check-up caregivers/parents are getting Rs. 50/- as transport-allowance.<sup>[5]</sup>

On World Food Day 2014, Department of Food and Supplies, Government of W.B has initiated a scheme to provide free ration to the discharged cured children for 1 year.<sup>[5]</sup>

At present, Purulia has the highest number of NRCs among 51 numbers of NRCs all over the state established in 23 districts. In Purulia, all nine NRCs were established during the period 2010–2013.<sup>[6]</sup> During the period of study, NRC were situated in 2 PHCs, 6 BPHCs, and one in District Hospital (recently upgraded as Medical College Hospital).

Data reveal that during 2011, the district had 6.3% severely malnourished children which have come down to 0.8% in 2020.<sup>[7]</sup> A sharp reduction in malnutrition within a decade indicates the usefulness of different government schemes one among them may be the NRC. In this study, the performances of the NRCs in respect of admission rate, cure rate, and bed occupancy between 2014 and 2019 were looked into to find out the role of NRC in improving malnutrition indices over time.

We estimate the functional parameters affecting the NRC performance and to find out the factors affecting NRC performance over a period of 6 years.

## MATERIALS AND METHODS

### Study design

The study was a mixed-method explanatory sequential type of study with integration at result of quantitative and qualitative components. Quantitative data constituted records of 6 years between 2014 and 2019, followed by explanatory qualitative study with meta inference.

## Study setting

Retrospective data analysis with confirmatory input from NRC staff of the enlisted NRC centers total of 9 such in the duration of study in the district of Purulia. Meta inference from these two components was used identify the role of NRC in malnutrition management in children. Data were available from NRC reports maintained by the records section of Office of Chief Medical Officer of Health, District Health and Family Welfare, Government of West Bengal with due permission.

**IRB:** The study was approved by the IRB committee of Shidhu-Kanu-Birsha University, Purulia. Permission for secondary data used has been obtained from Office of Chief Medical Officer of Health, District Health and Family Welfare, Government of West Bengal.

Figure 1 shows the geographical distribution of community development blocks and nine NRCs in the district of Purulia.

## Sample size

Data from the admission and follow-up of the 9 NRC centers established (total enumeration) came to be 7316 over 5 years. Figure 2 gives the year wise percentage of admission per NRC in each of the 9 NRC. Six in-depth interviews were conducted among service providers (nursing staff 3, administrative official 2, and medical personnel 1), one FGD among frontline workers accompanying mothers to NRC centers (9 participants age range from 29 to 52 years) of NRC centers.

## Data collection

Copies of the reports as available in the record section were retrieved for all the NRCs in Purulia district for the period of 2014–2019. Data were compiled in Microsoft Excel spreadsheet manually from the monthly reports. The data for year wise NRC wise admission trends, distribution of gender, demographic features of the admitted children, distribution of children in respect of admission criteria, bed occupancy rate, output indicators, and duration of stay at NRC were analyzed for the documentation.

Owing to policy-guided change in reporting format over the study period, only those parameters were considered for full duration of the study were included in the analysis. The

statistical measure gender parity index (GPI) was used to get the numerical value of female-to-male ratio. Gender parity score equal to one implies no disparity in gender. If the score is greater than zero, but less than one implies gender disparity in favor of males and if greater than one, it indicates gender disparity in favor of females.

Interview guide and detailed transcript of interviews were used. Median score of certain indicators for analyzing the performances of the NRCs based on code numbers 1 to 9 (nine NRCs) has been used in discussion.

## RESULTS

### Quantitative analysis

Total number of children admitted in nine NRCs during the period 2014–2019 was 7316. Thirty-one percent belonged to general caste, 29% to scheduled tribe, 21% to scheduled caste, and rest 19% were from other backward classes.

The admission rate in nine NRCs for each year is graphically represented in Figure 2. NRCs are numbered from 1 to 9, masking the exact names to ensure confidentiality.

Figure 2 reflects a comparative picture of annual proportion of admissions in the NRCs. It ranged between 13.9% in 2019 and 19.2% in 2014. Maximum drop was noted in NRC 8 while NRC2 showed a relatively stable trend of admissions over years.

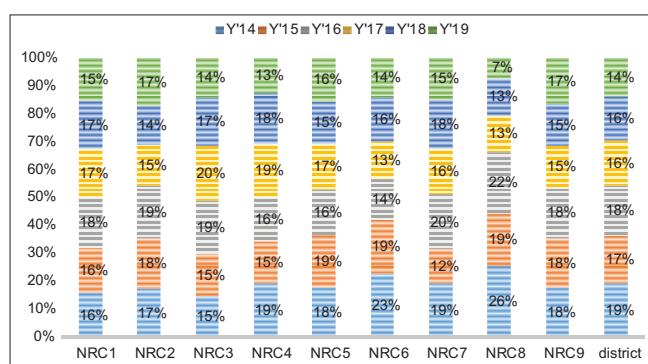
During 6 years' time span, 47% male children were admitted compared to 53% female children. The value of GPI for each NRCs are mostly more than hundred percent. Findings in this study are implied that girl child is more prone to malnutrition and thus admitted to NRC

Analysis of the diagnostic criteria used for admission purposes shows that 61.1% of children admitted under the criteria W/H  $<-3SD$  and 29.7% of the children admitted were diagnosed with both the condition MUAC  $<115$  and W/H  $<-3SD$ . The children having MUAC  $<115$  found only 8.8% and diagnosis with edema was very negligible (0.4%). There were three deaths recorded.

The percentage of children admitted  $<7$  days or  $<15$  days, either for the reason of defaulter or medically transferred was decreased in subsequent years. Length of stay exceeding 2 weeks ranged from 79.9% in 2016 to 91.2% in 2019 indicating better service and provision. Admission figures show number ranging from 1406 in 2014 with slight raise the next couple of years with a final downward slope in 2019. Bed occupancy consistently hovered between 70% and 80% indicative of public acceptance of measures delivered.

### Relative performance of each nutritional rehabilitation centers against median score of the district

In addition to absolute performances indices of NRCs, we showed the relative performances of every individual NRC based on the five parameters, namely admission, bed occupancy, cure rate, medical transfer, and nonrespondent



**Figure 2:** Annual proportion of admitted children per nutritional rehabilitation centers in each calendar year. NRCs: Nutritional rehabilitation centers

against median score of the district has been calculated and shown in Figure 3. The performances were categorized as poorer (P) and better (G) on the basis of their median score. Primary care-based NRC1 showed poor performances in all respect. However, in case of bed occupancy, it has shown better

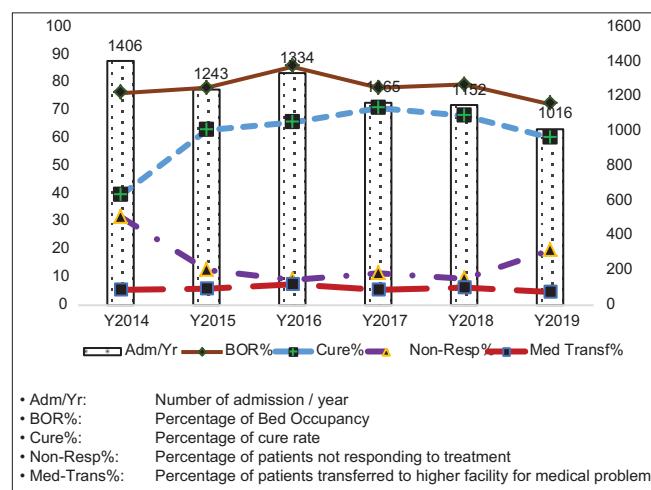
during 2016 onwards. Similar trend was reflected in secondary tier care-based NRC2 in 2014; however, it had revived its performances in 2015. NRC3 was also started with poorer rate of parameters, although it revived its performances 2016 onward, although initially, medical transfer rate was low up to 2017, but it increased 2018 onward. In the case of NRC4, the rate of nonrespondent stood better during 2014 to 2019, whereas the medical transfer rate was better in alternative years. Alternatively, admission and bed occupancy rate found better only in the year 2014 and 2016 and cure rate dropped down in 2019. In NRC5, except admission rate, overall performance was better. In case of NRC6, all the parameters were better (other than medical transfer), although admission was increased after 2017. Admission and bed occupancy rate was better in NRC7, but the cure rate and nonrespondent were poorer and gratiously medical transfer rate lowered from 2016 onward. NRC8 which was situated in tertiary tier hospital always had a poorer cure rate and better medical transfer. In the initial years, NRC8 had better admission and bed occupancy, admission rate declined in 2019 and bed occupancy deteriorated from 2016 onward. The average rate of performances of NRC9 was better in terms of all parameters.

### Qualitative analysis

Qualitative analysis of the cause performance of all NRCs from 2014 to 2015 in respect of specified indicators [Figure 4] was by means of in-depth interview with relevant stakeholders. In-depth study of factors affecting service such as presence of doctor, senior nursing personnel, and duration of set up of NRC, it was seen that 2016 was the best performing year with a downward performance subsequently. The irregularity can be attributed to workforce crisis with no fresh recruitment of nutritionist since 2018, lack of senior fully functional nursing staff at some NRC. *Ad hoc* nursing care irregular service

NRC	Indicators	Y'14	Y'15	Y'16	Y'17	Y'18	Y'19
NRC1	Admission	P	P	P	P	P	P
NRC1	Bed occupancy	P	P	G	G	G	G
NRC1	Cure rate	P	P	P	P	G	P
NRC1	Medical Transfer	G	P	P	P	P	P
NRC1	Non respondent	P	P	P	P	P	P
NRC2	Admission	P	G	G	P	P	G
NRC2	Bed occupancy	P	G	P	P	P	P
NRC2	Cure rate	P	G	G	P	P	P
NRC2	Medical Transfer	P	G	P	G	G	G
NRC2	Non respondent	G	G	G	P	P	P
NRC3	Admission	P	P	G	G	G	G
NRC3	Bed occupancy	P	P	G	G	G	G
NRC3	Cure rate	P	P	P	P	G	G
NRC3	Medical Transfer	G	G	G	P	P	P
NRC3	Non respondent	P	P	P	P	P	G
NRC4	Admission	G	P	P	G	P	P
NRC4	Bed occupancy	G	P	P	G	P	P
NRC4	Cure rate	G	P	G	G	G	P
NRC4	Medical Transfer	G	P	G	P	G	P
NRC4	Non respondent	G	G	G	G	G	G
NRC5	Admission	P	G	P	P	P	P
NRC5	Bed occupancy	G	G	G	G	G	G
NRC5	Cure rate	G	G	G	G	G	G
NRC5	Medical Transfer	P	G	G	P	P	G
NRC5	Non respondent	G	G	G	P	G	G
NRC6	Admission	G	G	P	P	G	G
NRC6	Bed occupancy	G	G	P	P	G	P
NRC6	Cure rate	G	G	P	G	P	P
NRC6	Medical Transfer	P	P	P	P	P	G
NRC6	Non respondent	G	G	P	G	P	G
NRC7	Admission	G	P	G	G	G	G
NRC7	Bed occupancy	G	P	G	P	G	G
NRC7	Cure rate	P	P	P	P	P	G
NRC7	Medical Transfer	P	P	G	G	G	G
NRC7	Non respondent	P	P	P	P	P	P
NRC8	Admission	G	G	G	G	G	P
NRC8	Bed occupancy	G	G	P	P	P	P
NRC8	Cure rate	P	P	P	P	P	P
NRC8	Medical Transfer	G	G	G	G	G	G
NRC8	Non respondent	P	P	P	G	G	P
NRC9	Admission	G	G	G	G	P	G
NRC9	Bed occupancy	P	G	G	P	G	P
NRC9	Cure rate	G	G	G	G	G	G
NRC9	Medical Transfer	G	G	P	G	G	P
NRC9	Non respondent	P	P	G	G	G	P

G indicating good and P indicating poor



**Figure 4:** Trend of indices on nutritional rehabilitation centers utilization over 2014–2019. NRCs: Nutritional rehabilitation centers. Adm/Yr: Number of admission/year, BOR%: Percentage of bed occupancy, Cure%: Percentage of cure rate, Non-Resp%: Percentage of patients not responding to treatment, Med-Trans%: Percentage of patients transferred to higher facility for medical problem

provision as also junior nursing staff acting as replacement also affected ultimate outcomes. Inadequate maintenance of infrastructure also affected service delivery which reflected adversely. NRC 8 was compromised in hygiene and sterility conditions owing the adjacent labor wards with huge footfall. Stakeholders opine that stricter administrative discipline could have provided a better situation

Two major events occurred in 2015. First, the post of Medical Social Worker was created to assist nutritionist in NRC activities. Second, nutritionists had made some modification in diet pattern of the children after complication phase. Protocol for SAM children mandates feeding of therapeutic salt less food. Consumption of such food was not encouraging and was reflected as poor cure rate. With addition of home-based foods, 2–3 times per day within prescribed 8 meals on advise of nutritionist yielded better result 2015 onwards. The progress also decreased the rate of nonrespondent transfer of children to higher facility, although rate varying between NRCs other plus points were children from both sexes and different socioeconomic classes were treated. Frontline health-care workers participation in counseling family members were recommendable.

Thus, a metainference drawn from the two strands reveal that the factors playing a role in final outcome to be availability of adequate workforce, attitude of providers, and supply of logistics.

## DISCUSSION

The NRCs were established with an aim to provide facility-based nutritional support to the severely acute malnourished children. Chief findings from this study were subjects more of female with tribal preponderance. Admission was more due to multiple criteria than one with a follow-up from 8 to 15 days Data from postaddition of home-based food had better compliance. Adequate appropriate workforce can improve that functions were felt by stakeholders. A mere 4% of the targeted population of malnutrition was reached. Only 30 children with oedema were admitted indicating some loss of cases. Similar loss was seen by Tandon *et al.*<sup>[8,9]</sup>

Collected data show, 47% were male children, whereas 53% children were female children. This simulates studies in different parts of India; Chhattisgarh, Gulbarga, Rajasthan, and Gujarat.<sup>[7,10-13]</sup> As also, a gender reversal of afflicted children was also seen in some studies.<sup>[14-17]</sup>

The study shows gradient of admission as highest among tribals followed other backward classes and scheduled castes with least number of children from general. This can be explained by placement of the NRC predominantly in belts inhabited by the above-mentioned population rather than general caste and category. A reversed image can be seen in a study at Cuttack where tribal children were least numbered.<sup>[17]</sup> Katole<sup>[18]</sup> in their study found that majority were 1–3 years of age (59.22%), female children (55.50%), and from Other Backward Class caste category (56.79%).

Comparing admission criteria that were followed in the study population which was more inclusive rather than a single parameter criteria. More than 60% children were admitted following criteria W/H <-3SD. similar to findings in Cambodian study.<sup>[13]</sup>

NRC admission mandates stay of subject at NRC till catch up growth and cure from infection which was evidenced at an average of 15 days. Other studies show this to be 8–14 days.<sup>[11,15-18]</sup> Bhujade<sup>[19]</sup> found that after discharge rate of improvement in anthropometric parameters was less. Thus, attention needs to be focused on sustained care even after discharge. This is also supported that Ulahanan<sup>[20]</sup> in their study which suggest urgent policy and programmatic action to strengthen the Anganwadi system, community based management of acute malnutrition.

## CONCLUSION

NRCs are part of a holistic approach to reduce the mortality and morbidity owing to malnutrition in children. Katole<sup>[21]</sup> states that factors affecting nutritional rehabilitation that are complex and require a more integrated management in the health system and community Existence of substantial numbers of SAM children calls for better utilization of existing NRCs. The study on comparing indices governing performance indicates most of the deterrents are related to supervisory or managerial challenges. Program managers should follow the guidelines for establishment or renovation or relocation of NRCs. This will help to keep NRCs away from an unhygienic environment. Periodic evaluation on NRCs' activities and taking immediate action accordingly should be done to maintain the standard of the services of NRCs. Health administration should expedite filling up the vacancy position of staff, especially nutritionist. Clinical audit of cases can help in identifying the challenges in case management and generate local evidence for betterment of care. Community-based awareness generation and follow-up activities need to be strengthened for make the yields of hospital based care sustainable in the long run. Over and above policy prescriptions should be issued on community level nutrition rehabilitation for discharged children and nonadmitted SAM children at NRCs.

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## Conflicts of interest

There are no conflicts of interest.

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