



Original Research Article

GAP ASSESSMENT OF MALNUTRITION TREATMENT UNITS OF GWALIOR DISTRICT

Jay Sharma¹, Ajay Kumar Gaur², Satendra Singh Rajput³

¹Junior Resident, Department of Pediatrics, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India

²Professor and Head, Department of Pediatrics, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India

³Assistant Professor, Department of Pediatrics, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India

Received : 12/02/2026
Received in revised form : 03/04/2026
Accepted : 20/04/2026

Corresponding Author:

Dr. Satendra Singh Rajput,
Assistant Professor, Department of Pediatrics, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India.
Email: drsatyendra08march@gmail.com

DOI: 10.70034/ijmedph.2026.2.200

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 1185-1190

ABSTRACT

Background: Severe Acute Malnutrition (SAM) affects 47 million children globally, with India bearing the highest burden. Despite establishing 1,151 Malnutrition Treatment Units (MTUs), including 318 in Madhya Pradesh, progress remains limited. NFHS-5 data shows only slight improvements in child nutrition. This study evaluates the structure and functioning of MTUs in Gwalior district to identify gaps and enhance their effectiveness.

Materials and Methods: A qualitative study was conducted over a period of 2 years. Total 4 out of 30 malnutrition treatment units were selected via purposive sampling method. Outcome report was also evaluated for each of the selected MTUs. A focussed group discussion was done with MTU staff to identify barriers in facility-based management of SAM. A checklist was used to evaluate the availability of human resources, infrastructure and logistical capabilities of each of these units. Further, A quick assessment checklist was created to expedite the assessment of MTUs.

Results: Total Defaulters were very high (218) 50.93% in all four MTUs. There were deficiencies in terms of logistic, infrastructure and human resources. 17 posts of nursing staff were vacant. This study identified barriers to SAM management in public healthcare through four focussed group discussions, highlighting issues in the health system, hospital settings, and demand side.

Conclusion: This gap analysis highlights the issues and challenges in the functioning of malnutrition treatment units of Gwalior district. The high prevalence of malnutrition in the region warrants the need to understand the deficiencies in the functioning of these units and intervention for effective functioning of MTUs.

Keywords: Malnutrition treatment units (MTU), severe acute malnutrition (SAM), Quick Assessment Checklist (QuAC).

INTRODUCTION

Severe acute malnutrition (SAM) remains to be a significant global public health problem affecting around 47 million children under age of five years and contributing to nearly one million deaths annually.^[1] The burden of the problem is disproportionately higher in developing nations. Although India has achieved remarkable levels of economic growth yet it continues to host the highest number of malnourished children in the world,^[2] with the prevalence of underweight children in India (48%) being almost twice as high as those of 26 sub-Saharan African countries (25%). The proportion of

underweight children of <5 years ranges from 20% in Sikkim and Mizoram to 60% in Madhya Pradesh.^[3]

To fight with SAM, the collaboration of WHO and UNICEF advocated the concept of facility-based dietary management which is accepted and adopted by the Government of India.^[4] In alignment of which Malnutrition treatment units (MTUs) were established across the country. An MTU is a unit where SAM children are admitted as per the defined admission criteria and are provided medical and therapeutic nutritional care along with capacity building of mothers and other caregivers. Around 1151 MTUs have been established across the country to provide facility-based care for children with SAM with medical complications. Madhya Pradesh has the

highest number of MTUs (n=318) in the country. Despite all these efforts at national and regional levels, a lack of substantial improvement has been noted in the situation. According to NFHS-5 (2019-21) data, the prevalence of underweight (weight for age) children < 5 years of age in India is 32.1% which was 35.8% in NFHS-4 (2015-16). Similarly, the prevalence of stunting (height for age), wasting (weight for height) and severe wasting is 35.5%, 19.3% and 7.7% respectively in NFHS-5 in comparison to NFHS-4 which was 38.4%, 21% and 7.5%.^[5] The above statistics clearly show systemic gaps in implementation of interventions at the ground level and highlights the importance of their identification and rectification. The evaluation of MTUs exists as an underexplored area, with limited evidence available on their operational effectiveness in India, especially in Madhya Pradesh. Realizing this, the present study tried to analyse the structure and functioning of MTUs of Gwalior district of Madhya Pradesh.

Aim: To evaluate performance of Malnutrition Treatment Units of Gwalior district.

Primary objective-

- a. To identify the existing bottlenecks and propose recommendations to address them.
- b. To prepare audit tool for malnutrition treatment units.

Secondary objective-

- a. To assess status of logistics, infrastructure and human resource of MTUs.
- b. To appraise the knowledge of the Human resources regarding management of malnourished patients in MTUs.
- c. To assess facility readiness and barriers to managing children with SAM.

MATERIALS AND METHODS

A qualitative study has been conducted in the malnutrition treatment units of Gwalior district.

Study setting: Out of the total 30 functional malnutrition treatment units (MTUs) in Gwalior Division four MTUs were selected from four different locations of Gwalior utilizing purposive sampling method. Permission was taken from the authorised officials and ethical committee clearance was obtained before initiating the study.

The selected MTUs were:

1. SMTU (Gajra Raja Medical College)
2. Barai
3. Dabra
4. Thatipur

The study was conducted over a period of two years, from 1st August 2022 to 31st July 2024.

Study tools: Data was collected under the following 3 domains [Figure 1]

- a) A checklist based on Government of India norms was developed to assess infrastructure, logistics, and human resources. Data on existing staff, infrastructure, medical equipment, food supplies,

record-keeping materials, laboratory services, and drug availability at the MTUs were collected through non-participant observation.

- b) Outcome indicators: one year outcome data was collected from all four MTUs. Data for indicators like number of admissions, recovered patients, number of relapses, mortality and number of defaulters were collected.
- c) Focused group discussion (FGD) with staff- A qualitative study used FGD to assess facility readiness and barriers to managing children with SAM. Healthcare providers in MTUs were purposefully selected. Interviews were recorded, transcribed, and analyzed using thematic coding. Barriers were categorized into supply and demand issues, with key quotes translated from Hindi to English.

A quick assessment checklist was developed based on these domains, comprising four key evaluation points. Each point was scored according to its impact on outcome indicators and the overall efficiency of the MTUs. These four key areas were logistics and infrastructure (20 points), human resources (20 points), staff knowledge (20 points)- Knowledge of all caregivers including doctors, nurses and feeding demonstrators was evaluated using pre tested semi structured knowledge questionnaire. Their responses were recorded and according to their response score was used to assess knowledge and perception of staff regarding management of SAM patients and functioning of NRCs., and managerial quality (20 points). Each area was further divided into subcategories with assigned scores, totalling to 80 points. Based on the QuAC score, MTU performance was classified as excellent (>70), good (61–70), average (40–60), or below average (<40). The QuAC form was validated by experts.

Methodology: Prior to study the study participants were explained about study protocol and informed written consents were taken.

All the four MTUs were visited at 4 months interval during the study period of 2 years. The study tools were administered by the investigators during each visit to gather information.

On the basis of relative importance of various factors which were collected during the study, a concise tool was prepared and proposed to be used for analysing MTUs.

Ethics approval - Institutional Ethics Committee, Gajra Raja Medical College, Gwalior. (IEC approval certificate: 93/IEC-GRMC/2022).

RESULTS

Assessment of selected indicators of the admitted children at the MTUs

Total number of recovered patients were 218 from four selected MTUs in a period of 1 year. Amongst all, highest recovery rate was noted in Barai (81.25%) and lowest was in SMTU (24.80%). Total relapse cases were 12 (3.58%) in all four MTUs. There was

no death noted in all four MTUs. Total Defaulters were very high (218). Amongst all, highest defaulter rate was 71.60% which was noted in SMTU and lowest was in Barai (16.66%). [Table 1]

Status of logistic, infrastructure and human resources of MTUs

The total number of beds in the four MTUs (Dabra, SMTU, Barai, Thatipur) were 10, 20, 6 and 20 respectively. There was no adequate bed spacing in the MTUs of Barai and Dabra. Further, there were no beds with grill and cleanliness, adequate lightening and safety arrangements for mothers in Barai. There was no space in the kitchen for imparting nutrition education to mother in Dabra, Barai and SMTU but was present in Thatipur MTU. Separate counselling area was present only in Dabra MTU. Out of all four MTUs only SMTU Gajra Raja Medical College was proximate to a Pediatric ward or Pediatric ICU. Other infrastructural facilities like lab services, attached bathroom, sanitation and safe drinking water, child friendly painted walls, IEC material were available as per GOI guidelines.

All the kitchen equipments, food products, essential medicine record material, ward equipments and toys, were available in all four MTUs. However, there was a non-availability of resuscitation kit at Barai, Dabra and Thatipur MTUs. Admission criteria, appetite test, growth charts, counselling time table were not displayed in MTU at GR Medical College. Counselling time table was also not displayed in Thatipur. Lack of sufficient number of human resources was found to be common across all four MTUs – 2 posts of medical officer and 17 posts of nursing staff were vacant. Feeding demonstrator, caretaker, cook and cleaners were present in sufficient numbers.

Barriers to the facility-based management of childhood SAM on the basis of focussed group discussion with staff.

This study identified barriers to facility-based SAM management in public healthcare through focussed group discussions. Analysis revealed challenges related to the health system, hospital settings, and demand-side factors. Table 2 outlines these barriers with key respondent quotes

a) Health system barriers - Major challenges include inadequate training, high staff turnover, limited workforce, and non-adherence to national guidelines. Only 50% of clinicians were aware of proper SAM management protocols. Staff shortage in MTUs and frequent reassignments further disrupt care. Many providers rely on personal judgment over guidelines, as reflected in respondent quotes.

- b) Facility related barriers - Facility-related barriers included lack of space, inadequate hygiene, and poor infrastructure in all four MTUs. Barai's unit operated in a cramped quarter without space for beds or counselling. SMTU had a shared play and counseling area, and no kitchen space for nutritional education. Only SMTU Gajra Raja Medical College was near a pediatric ward or ICU.
- c) Demand side barriers - Key demand-side barriers included overcrowding, financial constraints, lack of awareness about malnutrition, and unwillingness to complete treatment. Delayed healthcare seeking also affected outcomes. Table 2 highlights provider dissatisfaction due to increased patient load and caregivers' limited understanding, which hindered child rehabilitation.

Quick Assessment Checklist (QuAC)

The MTUs were analysed under the headings of – Infrastructure and logistics, Human resources, Knowledge of staff and Quality of care. The overall total score was 80, any score below 40 was considered “Below average”, between 40 - 60 as “Average”, between 60 – 70 as “Good” and 70 and above value as “Excellent”. In this study, the assessed MTUs of Barai, Dabra, SMTU, GR Medical College and Thatipur had the scoring of 56 (average), 60 (average), 66 (good) and 71(good) respectively. [Table 3]

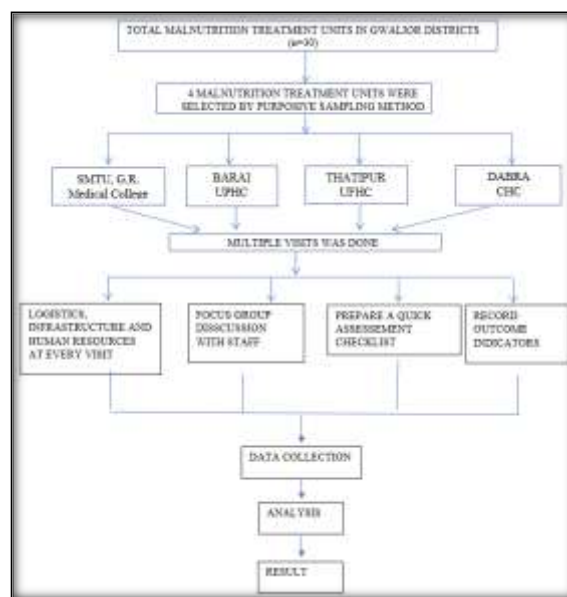


Figure 1: Study Flow Chart

Table 1: outcome indicators of all four MTUs and their comparison with operational guidelines

	BARAI No. (%)	Dabra No. (%)	SMTU No. (%)	Thatipur No. (%)	Total No. (%)	Acceptable	Not
Recovered	39(81.25)	49(72.05)	62(24.80)	48(77.41)	198(46.26)	> 75	< 75
Relapse	1(2.08)	2(2.94)	9(3.60)	0(0)	12(2.80)		
Deaths	0(0)	0(0)	0(0)	0(0)	0(0)	< 5	>5
Defaulters	8(16.66)	17(25)	179(71.60)	14(22.58)	218(50.93)	< 15	>15

Table 2: Barriers to the facility-based management of childhood SAM

Domain	Specific barriers	Illustrative quotes
Health system barriers	Inadequate manpower	‘We do not have enough staff to ensure proper services. We are less in number to perform our duties in the ward. We don't get leave. If there are less people then it becomes very difficult to get leave.’ (FGD caretaker-1 SMTU) ‘Human resources should increase. As of now, ANM is being recruited, there is a huge shortage of staff nurses.’ (FGD doctor Thatipur MTU)
	Rapid turnover of staff	‘When it comes to the care of patients with SAM, physicians and nurses must be extremely involved. Our training program is still in progress. That training is being given to the healthcare personnel. However, those who were trained have been relocated from their intended position to another location. For us, this kind of change is a difficulty. For doctors, the quick turnover is more typical. On a smaller scale, nurses are also departing, though.’ (FGD FD Dabra MTU)
	Increased workload	‘There should be a separate doctor for MTUs. We have other work like watching OPD, doing MLC.’ (FDG Doctor Barai MTU)
	Lack of training	‘Sir (doctor) has not been given training yet by the Government. There should be regular training on how to treat a patient of SAM.’ (FGD FD Barai MTU) ‘When a patient comes, his weight is taken. mid arm circumference is taken and if it is less than 15 then he is treated like SAM.’ (FGD Doctor Barai MTU)
Facility barriers	Lack of space	‘Nutritional Rehabilitation Center is built in one quarter. If a separate building was built then the space shortage would have been solved.’ (FGD FD Barai MTU) ‘There is no separate counselling area, and there is no playing area. S.M.T.U. is built in one room. There should be a proper space.’ (FGD FD SMTU)
	Unavailability of essential medicines	‘Although all the medicines are available but sometimes syrups like multi vitamins and vitamins A are not there in the supply.’ (FGD Nurse Dabra MTU)
	Proximity to pediatric ward	‘NRC is too far from the pediatric ward and should be shifted.’ (FGD FD Thatipur MTU)
	Lack of cleanliness and hygiene	‘The cleanliness of the ward is not as it should be. Bed sheet is not clean.’ (FGD FD SMTU)
Demand-side barriers	Increased number of attendants affecting services	‘There is just one patient and four, five, or six attendants. They make no effort to comprehend the issue of the ward's congestion. They ignore our requests, no matter how politely we ask them. In the same ward, they eat lunch and drink tea.’ (FGD Nurse SMTU)
	Insufficient knowledge of the caregivers on malnutrition and proper feeding	‘The child is not fed correctly by the caregivers. Occasionally, they give the child shuji. Instead of offering the infant breastfeeding, they give it other types of milk to drink. Even the other milk solutions are not properly prepared by them. They frequently don't add the appropriate amount of water to the solution. Thus, the baby's incorrect nourishment causes him to become SAM.’ (FGD FD Dabra MTU)
	Lack of motivation and compliance to complete the treatment regimen by caregivers	‘Working in a hospital presents numerous challenges. Our primary responsibility is to provide extensive counselling to patients. SAM patients, in particular, prefer short-term stays. The carers lack the patience to complete the procedure. The mothers become annoyed. However, we aim to keep them here through counselling.’ (FGD Doctor SMTU)
	Getting admitted only when the patient develops serious complications as parents are not motivated to seek early help	‘The majority of SAM youngsters arrive at our facility quite sick. We frequently see that these kids are also diagnosed with other conditions, like heart failure, septicemia, or pneumonia. We have to refer them to higher center.’ (FGD Doctor Dabra MTU)
	Poverty of parents	‘These children usually belong to ultra-poor families. The family members don't realize that their child is lean and thin, and he/she can die from this illness. They are even unaware of the future consequences if the child survives. They keep saying that their cattle at home are unattended, so they have to leave early from the hospital.’ (FGD FD SMTU)

Table 3: Quick Assessment Checklist

Quick Assessment Check List for Malnutrition Treatment Unit				
Assessment Points	Score			
	BARAI	DABRA	SMTU	THATIPUR
1. Infrastructure and Logistic, Present – 2 ; Absent – 0				
Adequate bed & spacing	0	2	2	2
Child friendly painted walls	2	2	2	2
Adequate lightening	0	2	2	0
Separate Counselling area	0	0	0	2
Play area	2	2	0	2
Separate kitchen with adequate food supply	2	2	2	2
IEC material	2	2	2	2
Record material/ stationary	2	2	2	2
Water sanitation and hygiene	2	2	2	2
Proximity to pediatric ward/PICU	0	0	2	0
2. Available Human Resource #				
Medical officers	4	4	2	2
Nurses staff	1	2	1	1
Feeding demonstrators	2	4	4	4
Cook cum caretaker	1	4	4	4
Cleaners	2	2	2	4
3. Knowledge of Staff # @				
Medical officers	1	2	2	4
Nurse staffs	4	3	4	4

Feeding demonstrators	4	4	4	4
Cook cum caretakers	4	4	4	4
Cleaners	1	1	1	2
4.Quality of Management, Present – 4 ; Absent – 0				
Adequate stock of medicine	4	4	4	4
Ward equipment's including for anthropometry	4	4	4	4
Properly filled case sheets	4	4	4	4
Availability of displayed material	4	4	0	4
Lab services	4	4	4	4
Total Score	56	66	60	69

< 25% 1 Marks, 26-50% 2 Marks, 51-75% 3 Marks, > 75% 4 Marks

@ percentage based on pretest knowledge questionnaire for each staff

DISCUSSION

The purpose of MTUs extend beyond clinical management and mortality reduction—it also aims to promote the physical and psychosocial development of affected children, build caregivers' capacity in proper feeding and care practices, and identify underlying social determinants contributing to malnutrition.

As per operational guidelines performance indicators, acceptable cured rate should be >75%, death rate <5% and defaulter rate <15%,^[6] [Table 1] In this study, although there was no mortality recorded during the study period, but the observed recovery rate was only 46.26% and defaulter rate was quite high (50.93%). In comparison to our results, the cured rate in studies done by Teferi et al,^[7] and Hossain et al,^[8] was in the acceptable range but in other recent studies,^[9-11] it was observed to be below the acceptable range. A study by Rawat and Marskole et al,^[12] from Madhya Pradesh, found that 66.3% of children recovered/cured and only 8% were defaulters.

All four MTUs showed deficiencies in infrastructure and logistics. A designated counselling area was available only at the Dabra MTU, while the others had a shared space for both play and counselling activities. Since children with SAM receiving facility-based care are at high risk of clinical deterioration and may require intensive care, it is essential to establish a strong linkage between MTUs and Paediatric ICUs but except for the MTU at GRMC, none were located near the Paediatric Ward or ICU, making the transfer of critically ill patients challenging. A deficiency of human resources was noted in all four MTUs. Overall, 17 posts of nursing staff were vacant. A study done by Tondon M et al,^[13] from Chhattisgarh also found similar deficiency.

Similar to the observations in the study by F Shah Mohammad et al,^[14] and Billah SM et al,^[15] This study also found low training coverage for healthcare providers in SAM management, likely due to limited funding, remote locations, and high staff turnover. Further investigation is warranted to identify the underlying reasons for the inadequate training of healthcare workers. However, it is likely that this lack of sufficient training contributed to poor adherence to the nationally recommended management protocols. Previous studies have demonstrated that supervised and structured training not only enhances healthcare

workers' understanding but also significantly improves compliance with standard treatment guidelines.^[16-18] Interestingly, unlike other units, the SMTU staff at the medical college level were observed to follow the national guidelines for the management of childhood SAM more consistently. This may be attributed to the presence of dedicated healthcare personnel who had undergone repeated training and regular updates.

The study identified lack of space, and hygiene as key facility barriers in all four MTUs. The Barai MTU had no separate counselling and sleeping areas, while SMTU had shared spaces for counselling and play. Kitchens lacked space for nutrition education and did not meet the recommended standards. These findings were comparable with the study by F. Shah Mohammad et al,^[14] but in contrast to their study we did not find any deficit in the essential supplies in the MTUs, except for occasional shortages of multivitamins (vitamin A).

This study identified carers' unwillingness to complete treatment, lack of awareness about nutrition, poverty, and overcrowding as key barriers in SAM management. Effective counselling by trained healthcare providers and multiple nutrition education sessions using behaviour modification tools can enhance caregiver's knowledge and adherence.

Currently, the government evaluates MTUs primarily using outcome indicators such as recovery, default, relapse, and mortality rates.^[6] By this limited assessment, the Barai MTU was considered high-performing owing to its highest recovery and lowest default rates among the centres evaluated. However, when assessed using the QuAC score—which includes additional dimensions like infrastructure, staffing, staff knowledge, and management quality—Barai scored 56, placing it only in the average category. This difference underscores the limitations of solely relying on outcome indicators and highlights the need to for comprehensive evaluation framework. Therefore, we propose a quick, user-friendly assessment tool that is feasible for field use and effectively captures both quantitative outcomes and qualitative aspects of care delivery in MTUs.

CONCLUSION

This gap- analysis highlights the problem areas in the functioning of MTUs of Gwalior district. Key issues

include a shortage of trained personnel, inadequate bed capacity and their spacing, lack of designated counselling area, improper hygiene, inadequate safety arrangements for mothers or caregivers, irregular supply of equipment and consumables and limited knowledge among care givers. All these factors contribute to the high prevalence of defaulter population from these malnutrition units.

Therefore, even though the MTUs play an important role in managing and improving the outcomes of malnourished children, the persisting/existing high prevalence of malnutrition in the region warrants the need to understand and address the operational gaps and to identify which, the QuAC tool proposed by this study shows promising potential and warrants further validation through multicentric studies.

REFERENCES

- Kambale, R. M., & Francisca, I. N. (2022). Optimising the management of acute malnutrition. *The Lancet Global Health*, 10(4), e453–e454. [https://doi.org/10.1016/s2214-109x\(22\)00087-0](https://doi.org/10.1016/s2214-109x(22)00087-0)
- Naudet J, Dubost CL. The Indian exception: the densification of the network of corporate interlocks and the specificities of the Indian business system (2000–2012). *Socio-Economic Review*. 2017 Apr 1;15(2):405-34.
- Lim SL, Ong KC, Chan YH, Loke WC, Ferguson M, Daniels L. Malnutrition and its impact on cost of hospitalization, length of stay, readmission and 3-year mortality. *Clinical nutrition*. 2012 Jun 1;31(3):345-50
- (Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS, Bellagio Child Survival Study Group, et al. How many child deaths can we prevent this year? *Lancet* 2003;362:65-71.)
- Pradhan J, Ray S, Nielsen MO, Himanshu. Prevalence and correlates of multidimensional child poverty in India during 2015–2021: A multilevel analysis. *Plos one*. 2022 Dec 22;17(12):e0279241.
- Operational Guidelines for Facility based management of Children with Severe Acute Malnutrition (SAM), Ministry of Health and Family welfare, Government of India, 2011.
- Teferi E, Lera M, Sita S, Bogale Z, Datiko DG, Yassin MA. Treatment outcome of children with severe acute malnutrition admitted to therapeutic feeding centers in Southern Region of Ethiopia. *Ethiopian J Health Dev*. 2010; 24: 234-38.
- Hossain MI, Dodd NS, Ahmed T, Miah GM, Jamil KM, Nahar B, Alam B, Mahmood CB. Experience in managing severe malnutrition in a government tertiary treatment facility in Bangladesh. *J Health Popul Nutr*. 2009 Feb;27(1):72-9.
- Singh K, Badgaiyan N, Ranjan A, Dixit HO, Kaushik A, Aguavo VM, et al. Management of children with severe acute malnutrition in India; Experience of nutritional rehabilitation centre in Uttar Pradesh, India. *Indian Pediatr*. 2013; 51: 21-5.
- Maurya M, Singh DK, Rai R, Mishra PC, Srivastava A. An experience of facility-based management of severe acute malnutrition in children aged between 6-59 months adopting the World Health Organization recommendations. *Indian Pediatr*. 2014 Jun;51(6):481-3.
- Gupta PK, Mulla S, Baig VN. Malnutrition Treatment Centre in District Baran, Rajasthan Appraisal of Performance. *Indian Journal of Community Health*. 2015 Sep 30;27(3):341-5.
- Rawat R, Marskole P. A study to evaluate the effect of nutritional intervention measures on children with severe acute malnutrition admitted in nutrition rehabilitation center at civil hospital Bairagarh, Bhopal, Madhya Pradesh. *Journal of Evolution of Medical and Dental Sciences*. 2015 Feb 26;4(17):2937-43.
- Tandon M, Quereishi J, Prasanna R, Tamboli AF, Panda B. Performance of nutrition rehabilitation centers: A case study from Chhattisgarh, India. *International journal of preventive medicine*. 2019 Jan 1;10(1):66.
- Fahim SM, Islam MR, Rasul MG, Raihan MJ, Ali NM, Bulbul MM, Ahmed T. A qualitative assessment of facility readiness and barriers to the facility-based management of childhood severe acute malnutrition in the public healthcare settings in Bangladesh. *Public Health Nutrition*. 2022 Nov;25(11):2971-82.
- Billah SM, Saha KK, Khan AN, Chowdhury AH, Garnett SP, Arifeen SE, Menon P. Quality of nutrition services in primary health care facilities: Implications for integrating nutrition into the health system in Bangladesh. *PloS one*. 2017 May 18;12(5):e0178121.
- Bailey C, Blake C, Schriver M, Cubaka VK, Thomas T, Hilber AM. A systematic review of supportive supervision as a strategy to improve primary healthcare services in Sub-Saharan Africa. *International Journal of Gynecology & Obstetrics*. 2016 Jan 1;132(1):117-25.
- Manongi RN, Marchant TC, Bygbjerg IB. Improving motivation among primary health care workers in Tanzania: a health worker perspective. *Human resources for health*. 2006 Dec;4:1-7.
- Hoque DE, Arifeen SE, Rahman M, Chowdhury EK, Haque TM, Begum K, Hossain MA, Akter T, Haque F, Anwar T, Billah SM. Improving and sustaining quality of child health care through IMCI training and supervision: experience from rural Bangladesh. *Health policy and planning*. 2014 Sep 1;29(6):753-62.