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CHILD RIGHTS AND YOU

Pediatric Tuberculosis Referral, Linkages and Treatment Services for **Severe Acute Malnutrition (SAM) in Children**

Insights from Bihar, Karnataka and Madhya Pradesh

CONTENT

ACRONYMS AND ABBREVIATIONS

ADR	Adverse Drug Reaction
AE	Adverse Event
AIC	Airborne Infection Control
ART	Anti-Retroviral Treatment
ARV	Anti-Retroviral
ATT	Anti-Tubercular Treatment
CBNAAT	Cartridge-Based Nucleic Acid Amplification Test
CTD	Central TB Division
CT	Computed Tomography
DBT	Direct Beneficiary Transfer
DOT	Directly Observed Treatment
DR-TB	Drug-Resistant Tuberculosis
DR-TBC	Drug-Resistant Tuberculosis Centre
DTO	District TB Officer
EPTB	Extrapulmonary Tuberculosis
IAP	Indian Academy of Pediatrics
MDD	Minimum Dietary Diversity
MDR-TB	Multi-Drug Resistant TB
MoHFW	Ministry of Health And Family Welfare
MRI	Magnetic Resonance Imaging
NAAT	Nucleic Acid Amplification Test
NPY	Nikshay Poshan Yojana
NRC	Nutrition Rehabilitation Centres
NTEP	National Tuberculosis Elimination Programme
PMDT	Programmatic Management Of Drug-Resistant Tuberculosis
R; RMP	Rifampicin
SAM	Severe Acute Malnutrition
SHG	Self Help Group
STLS	Senior Tb Laboratory Supervisor
STS	Senior Treatment Supervisor
TB	Tuberculosis
TDC	TB Detection Centre
TBHV	TB Health Visitor
TPT	Tuberculosis Preventive Treatment
TST	Tuberculin Skin Test
WHO	World Health Organization
XDR-TB	Extensively-Drug Resistant TB

KEY DEFINITIONS

A second-line TB drug This agent is reserved for treating drug-resistant TB. First-line TB drugs used to treat drug-susceptible TB – ethambutol, isoniazid and pyrazinamide – may also be used in MDR-TB regimens (streptomycin is now considered a second-line TB drug and used only as a substitute for amikacin when amikacin is not available or there is confirmed resistance to it).

Active case finding (ACF) Programmatically defined as systematic screening for TB disease through outreach activities outside health facility settings.

At-risk Group Any group of people in whom the prevalence or incidence of TB is significantly higher than in the general population.

Child For programmatic purposes in India, a child is a person up to 18 years of age. (This includes adolescents aged 10–18 years).

Contact Any individual exposed to a person with active TB disease.

Close contact This person is not in the household but shares an enclosed space, such as at a social gathering, workplace or facility, for extended periods during the day with the index TB patient during the three months before the commencement of the current TB treatment episode. This Group will be included for all interventions applicable to household contacts in these guidelines.

Drug susceptibility testing DST refers to in-vitro testing using either of the phenotypic methods to determine susceptibility.

Drug resistance testing DRT refers to in-vitro testing using genotypic methods (molecular techniques) to determine resistance.

Extensively drug-resistant TB (XDR-TB) TB caused by Mycobacterium tuberculosis strains that fulfil the definition of MDR/RR-TB and are also resistant to any fluoroquinolone (levofloxacin or moxifloxacin) and at least one additional Group A drug (presently to either Bedaquiline or linezolid [or both]).

Index patient of TB This is the initially identified person of any age with new or recurrent TB in a specific household or other comparable settings in which others may have been exposed. (An index TB patient is someone on whom a contact investigation is centred but is not necessarily the source).

Mono-resistant TB (MR TB) A TB patient whose biological specimen is resistant to only one first-line anti-TB drug.

Multidrug-resistant TB (MDR-TB) A TB patient whose biological specimen is resistant to both H and R with or without resistance to other first-line anti-TB drugs. MDR-TB patients may have additional resistance to any/all FQ or any other anti-TB drug.

Presumptive TB This refers to a person with any of the symptoms or signs suggestive of TB. (Diagnosis of TB is problematic in certain vital groups of the presumptive TB patients like extra-pulmonary, PLHIV, children, smear-negative/NA with x-ray suggestive of TB, other vulnerable groups as defined in TOG-2016 and DR-TB contacts; hence, NAAT is offered upfront for diagnosis of TB among these presumptive TB patients).

Presumptive DR-TB It refers to the patient eligible for rifampicin-resistant screening at the time of diagnosis OR/and during treatment for DS-TB or H mono/poly DR-TB. [This includes all notified TB patients (Public and private), follow-up positive on microscopy including treatment failures on standard first-line treatment and H mono/poly DR-TB regimen and any clinical non-responder including pediatric].

Tuberculosis (TB) is a disease that occurs in someone infected with M. tuberculosis. (It is characterised by signs or symptoms of TB disease, or both, and is distinct from TB infection, which occurs without signs or symptoms of TB. In this document, it is commonly referred to as "active" TB or TB "disease" to distinguish it from TB infection).

Tuberculosis infection (TBI) is a persistent immune response to stimulation by M. tuberculosis antigens with no evidence of clinically manifest TB disease. (There is no gold standard test for directly identifying M. tuberculosis infection in humans. Most infected people have no signs or symptoms of TB but are at risk for developing TB disease. TB infection is also known as "latent TB infection" (LTBI), although this term is being discarded given that infection cannot always be considered latent).

Underweight In adults and adolescents, underweight usually refers to a body mass index < 10 years to a weight-for-age < –2 z-scores.

EXECUTIVE SUMMARY

Tuberculosis (TB) represents a substantial public health challenge in India, constituting approximately 31% of the global childhood TB burden. The clinical presentation of TB in children differs significantly from that of adults, thereby necessitating distinct approaches to prevention, diagnosis, and treatment. Emerging evidence underscores a strong association between Severe Acute Malnutrition (SAM) and TB, with potential detrimental effects on the nutritional status of affected children. Evidence suggests that SAM is strongly associated with TB which can adversely impact their nutritional status. By early community detection of SAM children and connection to the Nutritional Rehabilitation Centre (NRC), TB diagnostic and treatment care center, the burden of morbidity and mortality from TB among children can be minimized. However, disruption of the government nutrition programs such as the Integrated Child Development Scheme (ICDS) and Mid-Day Meal (MDM) due to COVID-19 impacted health and nutrition services in India, which further exacerbated its adverse effects on children's nutritional status.

The objective of this study was to examine referral, linkages and treatment services for TB in SAM children post COVID-19 in India. This cross-sectional study was conducted among SAM children registered at the selected Nutrition Rehabilitation Centres (NRCs) and linked to collaborative health facilities. The secondary data of NRCs linked to collaborative health facilities was studied for the SAM children registered at the NRCs and received the diagnosis and treatment services during the past three years. This study highlighted the social and systemic reasons and gaps obstructing children being reported by ICDS, as per the norms laid down and the referral system in place, for screening, diagnosing, and treatment.

This was a mixed method study in which structured interviews were conducted with 62 mothers of SAM-TB children across intervention areas in Karnataka, Bihar, and Madhya Pradesh, with the majority from East Champaran (43.5%), Shivpuri (40.3%), and Bangalore (16.1%). Household demographics revealed that 88.7% reported no history of Tuberculosis. Fathers of SAM children exhibited high rates of tobacco and alcohol consumption (74%), spending an average of INR 2016 monthly. The semi-structured in-depth interviews were conducted with different key stakeholders. . A total of 5 AWWs, 5 ASHAs, 9 ANMs, 1 STS, 1 MOTC, and 1 Pediatrician were interviewed for the qualitative data. The administrative staff, including 3 DTOs and 1 RCHO, were interviewed to understand the challenges and opportunities in the diagnosis and treatment of pediatric TB in the community.

The mothers of SAM children were, on average, 27 years old, with a significant portion (75.8%) having received no formal education. The majority were homemakers (67.7%), while 29% were involved in daily wage labor. Despite a high rate of pregnancy registration (90%), only 19.3% of mothers undergone at least four Antenatal Care (ANC) check-ups, although 85.4% completed their first ANC visit in the first trimester, exceeding the national average of 70% (NFHS-5). However, consumption of Iron Folic Acid (IFA) supplementation (25.8%) and calcium tablets (24.1%) during pregnancy was remarkably low compared to WHO guidelines.

Almost half of the SAM child birth occurred in public medical facilities (53.2%) and less than half of the births were at home (41.9%). About 31% of the children were born pre-term i.e., before 37 weeks of the gestational period. About half of the mother (48.3%) did not receive postnatal care within two days of delivery. Moreover, the first and second postnatal visits after the delivery were reported to be only 15% and 10%, respectively. Most mothers did not consume IFA (54.8%) and calcium (58.0%) tablets after the delivery.

Despite high rates of early breastfeeding initiation (90%), exclusive breastfeeding was practiced by only 60% of SAM children mothers. The introduction of complementary feeding was often delayed (82.2% initiated post six months), and there was the inadequate frequency of feeding sessions per day for children aged 12- 24 months (32% received less than the recommended 2-3 meals per day). According to the 24-hour dietary recall, cereal-dominated diets (79%) were prevalent among SAM children, with low consumption of essential food groups like fruits, vegetables, and proteins. The Minimum Dietary Diversity (MDD) was calculated for children aged 6 to 23 months and we included only 21 children for this analysis., oOf the children surveyed, only one child from Bangalore reported consuming foods or beverages from at least five of the eight predetermined food groups within the preceding 24-hour period.

Approximately 61% of mothers utilized Anganwadi Centers (AWCs), yet 27% reported never receiving Take Home Rations (THR), and only 31% received THR weekly. The weight of 48.3% of SAM children was measured regularly at AWCs. Consequently, 74.1% of SAM mothers were unaware of the growth chart. After the identification and diagnosis of SAM, 55% of children were referred to the NRCs, 19% to the Primary Health Centers (PHCs), and only 5% to the Community Health Centers (CHCs). Most SAM children were referred by local NGOs (64.5%) to the NRCs.The significant challenges included short stays (80.6% stayed <14 days) due to social stigma, financial constraints, and operational issues.

The majority (74%) of parents reported that the health workers (ASHA/ANM) did not come for the follow up home visits after discharge from NRCs. Only 11% and 8% of children received Iron Syrup, Vitamins and Folic Acid after discharge from the NRCs. Only 15% of children visited the NRCs for follow-up (one week after 21 days of admission and discharge). The children with SAM and TB conditions were diagnosed by sputum positive and Mantoux Skin Test. The SAM children experienced difficulty in breathing, cough for more than two weeks, and swelling in the neck, which led to the TB diagnosis. After that, the SAM-TB children were referred to the TB diagnosis and treatment centre for further diagnosis and treatment. In addition, a total of 85.4% of SAM TB parents reported that no other family members or close contacts had been diagnosed with TB.

Additionally, the study revealed the high prevalence of TB among these families with a significant portion (11.2%) of families reporting a history of Tuberculosis (TB). Moreover, while a high percentage (85.4%) registered for antenatal checkups, disparity exists in access. Only 27% received care during the crucial first trimester, indicating a need for improved communication strategies, especially for the illiterate mothers (75.8%).

Moreover, poor hygiene, limited access to Anganwadi services, and inadequate follow-up care for SAM children emerged as significant concerns.

To address these issues, the study recommends several interventions. These include improving TB treatment guidelines for SAM children, enhancing the tracking of TB cases, providing timely financial support to affected mothers, strengthening follow-up care for SAM children, fostering inter-departmental collaboration, promoting community-based nutrition interventions, improving Anganwadi services, and implementing effective counseling strategies. By implementing these recommendations and adopting a multi-pronged approach, the study emphasizes the potential to significantly improve maternal and child health outcomes in the studied regions.

01. Introduction

1.1 Background

The prevalence of Tuberculosis (TB) continues to be the world's top cause of morbidity and mortality in children of all ages, especially the younger ones. India is another nation with a sizable load of TB cases (Apsari Putu et al., 2020). The End TB Strategy, developed by the World Health Organization (WHO), defines milestones for 2020 and 2025 and aims to reduce the TB cases by 90% and deaths from the disease by 95% by 2035 (WHO, 2015). As opposed to this, the Indian government launched the National Strategic Plan, 2017–25, 2020-2025 and Tuberculosis (TB) Mukt Bharat Abhiyaan in 2021, with a bold and an ambitious goal to eradicate TB by 2025 in the country through its National Tuberculosis Elimination Programme (NTEP) (Central TB Divison, MoHFW, 2017).

Infectious diseases, including TB in infants and young children, can adversely impact their nutritional status. Undernourished children are more likely to suffer and die from infectious diseases. The correlation between TB and undernutrition is well established. Malnutrition and TB form a vicious cycle, where malnutrition predisposes a child to acquire TB, while TB could exacerbate undernutrition (Bhat et al., 2013). Severe Acute Malnutrition (SAM), defined by WHO as mid-upper arm circumference (MUAC) < 11·5 cm or low weight for length/height z score <-3, is strongly associated with TB (Ibrahim et al., 2017). In high TB burden countries, 2-24% of acutely malnourished children have been diagnosed with TB. Furthermore, children with SAM and TB are 40% more likely to die than SAM children without active TB disease. This indicates a need for TB screening, referral, and treatment services in SAM children.

Childhood tuberculosis is an enormous issue in India, accounting for about 31% of the global burden (Central TB Divison, MoHFW, 2014). Despite this, the majority of attention was on the adult population. However, it quickly became apparent that there was a need to enhance the diagnosis and treatment of children with TB, as well as the prevention of TB in children and their involvement in the execution of National TB Programmes. TB in children varies from TB in adults in ways that significantly affect childhood TB prevention, diagnosis, and treatment. Screening the household contacts of an infectious source is advised to identify children with TB and allow prompt treatment. Additionally, children who do not have TB should receive isoniazid preventive treatment. By early community detection of SAM children and connection to the Nutritional Rehabilitation Centre (NRC), TB diagnostic and treatment care center, the burden of morbidity and mortality from TB among children can be minimized.

1.2 CMM and TB Management

The Community-Based Management of Acute Malnutrition (CMAM) approach enables community volunteers to identify and initiate treatment for children with acute malnutrition before they become seriously ill. Most children with SAM are treated at home by caregivers with Ready-to-Use Therapeutic Foods (RUTF) and standard medical care. When more extensive care is required, children with SAM who either have medical issues or lack of appetite are admitted to in-patient facilities. CMAM programs also aim to incorporate several other longer-term interventions with the treatment. These aim to enhance public health and food security while lowering the prevalence of malnutrition in a sustainable way.

As part of the National Health Mission, the Ministry of Health & Family Welfare in India has created several Nutrition Rehabilitation Centers (NRCs) nationwide to manage acute malnutrition in children effectively. Children with SAM discovered in the villages are regularly directed to these NRCs for comprehensive management. These specialised clinics have a pediatrician and dedicated staffs and are set up to treat SAM kids and identify infectious illnesses like TB. After being admitted, SAM children undergo initial evaluation at NRCs before being connected to TB diagnosis and treatment centres. Thus, aggressive and prompt actions are required to reduce the incidence.

In 2022, the Ministry of Health and Family Welfare (MoHFW) laid out interventions for the management of TB cases in SAM children in its Pediatric TB management guidelines, which were to be implemented by NTEP in collaboration with NRCs (Nutrition Rehabilitation Centres).

1. TB Screening: Children with SAM should be screened for TB using appropriate diagnostic tools such as the tuberculin skin test or the interferon-gamma release assay. This should be done as part of the routine assessment of children with SAM.

2. Referral systems: There should be a transparent referral system in place for children with SAM who are found to have TB or are suspected of having TB. This may involve referral to a TB diagnostic centre or a hospital that provides TB treatment services.

3. Linkages with TB treatment services: It is essential to ensure linkages between SAM treatment centres and TB treatment services to ensure that children with SAM who are diagnosed with TB receive appropriate treatment. This may involve setting up a system to track TB treatment outcomes among children with SAM.

4. Nutritional support during TB treatment: Children with SAM who are undergoing TB treatment may require nutritional support to help them recover. This may involve providing therapeutic feeding or micronutrient supplements to ensure they receive adequate nutrition during treatment.

5. Integration of Services: To ensure timely and comprehensive care, it may be beneficial to integrate TB screening, referral, and treatment services with SAM treatment services. This can involve setting up co-located clinics or establishing referral pathways between the two services.

6. Training and capacity Building: Health workers caring for children with SAM should be trained on TB screening, referral, and treatment services to ensure they can identify and manage TB cases effectively.

02. Study Objectives

2.1 Rationale

Evidence suggests that SAM is strongly associated with TB. However, it did not get the consideration it merited. Only 11% of total children aged 6-23 months receive an adequate diet, according to the National Family Health Survey 2019-21. Disruption of the government nutrition programs such as the Integrated Child Development Scheme (ICDS) and Mid-Day Meal (MDM) due to COVID-19 impacted health and nutrition services in India, which further exacerbated its adverse effects on children's nutritional status (MoHFW, 2019).

With this background, we conducted a cross sectional study on SAM children registered at the selected NRCs linked to collaborative health facilities to examine referral, linkages and treatment services for TB in SAM children post COVID in India.

2.2 Objectives

1. To study the nutritional status and TB treatment progress among SAM children, especially in post-COVID scenarios, including the dietary pattern followed and Community Nutritional Needs Assessment (CNNA).

2. To examine the current status of diagnostics protocol for pediatric TB samples (availability of upfront molecular diagnostics) and availability of child-friendly formulations for managing pediatric drug-sensitive (DS) and drug-resistant (DR) TB cases

3. To document the gaps, challenges, and opportunities related to screening, diagnosing, and treating TB among SAM children and the collaborative Framework between NTEP and NRC (Nutrition Rehabilitation Centres) by examining the linkages and collaborative health facility from identification at the community level to treatment.

03. Methodology

The primary data from beneficiaries and different stakeholders was collected using a mixed-method approach, i.e., the structured interviews with the TB beneficiaries and semi-structured in-depth interviews with stakeholders. The areas of enquiry with beneficiaries were focused on food intake, food security status and dietary diversity, initiation of TB investigation, treatment, follow-up, and referral. The semi-structured, in-depth interviews with different stakeholders mainly assessed their perspective on SAM and TB integration, strengths and weaknesses

in implementation, constraints, and opportunities for improving the program, and best practices and lessons learned. The secondary data (retrospective data) of NRCs was studied to assess the prevalence of diagnosis and treatment services received by the SAM children registered at the NRCs during the past three years.

3.1 Study Area and Target Population

The study was conducted in one district from each of the three selected States in intervention regions of Child Rights and You (CRY). One district from each state was selected based on the percentage of children with SAM in the district. The study was conducted in Bihar in the East, Madhya Pradesh from the North region, and Karnataka in the South. The target population for this study was children in the age group of 0-5 years diagnosed with SAM and registered at NRCs linked to collaborative health facilities. Children were selected based on the cohort of children at different stages of treatment for the prospective study.

3.2 Sampling

To understand the process of examining TB referral, linkages, and treatment services for SAM in children post-COVID, personal interviews were conducted with key stakeholders at the community, facility, and administration levels. The interviews were conducted in two separate schedules to collect quantitative and qualitative information. The line listing of SAM children was created based on the database provided by the agency or their local partner organization in all selected states except Karnataka. The challenge was faced by the enumerators to collect the data of SAM TB children due to state government restrictions to share such details. However, the mothers of SAM children who were present at the NRC were interviewed with permission from the respective heads of the department. In Bihar, based on the details provided by CRY's partner organization CHARD and through snowball sampling technique, only 27 SAM children were identified and interviewed in which none of them reported with TB or a past history of TB. On the other hand, a total of 34 SAM children were identified by local NGO in Madhya Pradesh. Out of 34 identified beneficiaries, nine children were not interviewed as they were not at home during visits.

04. Key Findings

4.1 Household and Respondent Profile

The structured interviews were conducted with mothers of beneficiaries (SAM-TB children) in three selected intervention areas of Karnataka, Bihar, and Madhya Pradesh. A total of 62 mothers were interviewed with the maximum number from East Champaran 27 (43.5%) followed by Shivpuri 25(40.3%) and Bangalore 10 (16.1%).

Figure 1: Households Surveyed in Selected Schools (in %)

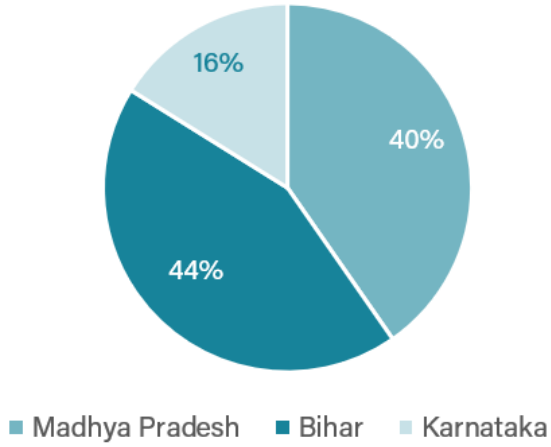


Figure 1 presents the number and share of households (in per cent) surveyed according to the availability and consent of respondents.

Table 1 presents insights into the demographic characteristics of households within the surveyed locations. In religious groups, majority households (93.5%) belonged to the Hindu community. The most of the beneficiaries were from Scheduled Tribes (38.7%), followed by Scheduled Castes (33.4%) and Other Backward Classes (22.5%). About 65% were from BPL households. The majority of the households had no reported history of Tuberculosis (88.7%).

Table 2 provides a snapshot of the mothers' demographic characteristics. The average age of the mothers was 27 years; the majority (75.8%) never went to school, and the majority (75.8%) never went to school. Most mothers were homemakers (67.7%), followed by daily wage labour (29%).

Tobacco and alcohol consumption among beneficiaries' fathers was very high (74%). They spend an average of 2016 INR on such products on a monthly basis (Figure 2).

Figure 2: Consumption of tobacco or smoke among mothers and fathers (in %)

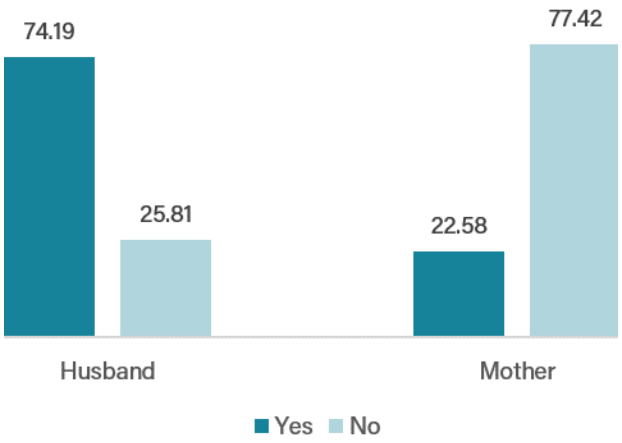


Table 1: Details of Households' Profile

Household Characteristics	Number (%)
Religion	
Hindu	58 (93.5)
Muslim	4 (6.4)
Social category	
General	2 (3.2)
Other backward Class	14 (22.5)
Scheduled Caste	22 (33.4)
Scheduled Tribe	24 (38.7)
Family Type	
Joint	30 (48.3)
Nuclear	32 (51.6)
BPL Cards	
No	22 (35.4)
Yes	40 (64.5)
Past TB History	
No	55 (88.7)
Yes	7 (11.2)

4.2 Status of ANC and PNC Services

Out of 90% who had registered their pregnancy, majority (85.4%) visited antenatal care (ANC) check-ups in the first trimester, which was higher than the National average of 70% (NFHS-5). However, only 19.3% had at least four ANCs and mothers who consumed IFA (25.8%) and calcium tablets (24.1%) for at least 180 days during their pregnancy as per the guidelines was very low (Table 3).

Table 2: Details of Mothers' Profile

Indicators	Number (%)
Education	
Graduate	1 (1.6)
Higher Secondary (XI-XII)	3 (4.8)
Illiterate / Never went to school	47 (75.8)
Primary (I-V)	6 (9.6)
Secondary (IX-X)	1 (1.6)
Upper Primary (VI-VIII)	4 (6.4)
Occupation	
Daily wage labourer	18 (29.0)
Housewife	42 (67.7)
Private service	2 (3.2)
Parity	
P1	11 (17.7)
P2	14 (22.5)
P3	13 (20.9)
P4	11 (17.7)
P5 and above	13 (20.9)
Gravida 1	7 (11.2)
Gravida 2	17 (27.4)
Gravida 3	14 (22.5)
Gravida 4	12 (19.3)
Gravida 5 and above	12 (19.3)

Table 3: Details of the utilisation of Antenatal check-up services by the beneficiaries

Status of ANC Services	Number (%)
Antenatal check-up in the first trimester	53 (85.4)
Total antenatal visits last pregnancy	
1	9 (14.5)
2	17 (27.4)
3	20 (32.2)
≥4	12 (19.3)
None	4 (6.4)
IFA tablets consumption	
≥1 month	18 (29.0)
≥6 months	16 (25.8)
1st trimester	9 (14.5)
Others	13 (20.9)
Do not remember	6 (9.6)
Consumption of Calcium tablets	
≥1 month	16 (25.8)
≥6 months	15 (24.1)
1st trimester	5 (8.0)
Others	16 (25.8)
Do not remember	10 16.1)
Gravida 2	17 (27.4)
Gravida 3	14 (22.5)
Gravida 4	12 (19.3)
Gravida 5 and above	12 (19.3)

Half of the childbirth occurred in public medical facilities (53.2%), and less than half of the births were at home (41.9%). About 31% of the children were born pre-term, before 37 weeks of the gestational period. About half of the mothers (48.3%) did not receive postnatal care within two days of delivery. Moreover, the first and second postnatal visits after the delivery were reported to be only 15% and 10%, respectively (Table 4). Most mothers did not consume IFA (54.8%) and calcium (58.0%) tablets after the delivery.

Table 4: Details of the utilisation of Postnatal check-up services by the beneficiaries

Status of PNC Services	Number (%)
Postnatal care within two days of delivery	
Yes	32 (51.6)
No	30 (48.3)
Postnatal visits in last pregnancy	
1	9 (14.5)
2	6 (9.6)
3	13 (20.9)
≥4	5 (8.0)
None	29 (46.7)
IFA tablets after delivery	
≥1 month	12 (19.3)
≥6 months	6 (9.6)
1st trimester	4 (6.4)
Others	34 (54.8)
Do not remember	6 (9.6)
Calcium tablets after delivery	
≥1 month	8 (12.9)
≥6 months	4 (6.4)
1st trimester	4 (6.4)
Others	36 (58.0)
Do not remember	10 (16.1)
Gravida 4	12 (19.3)
Gravida 5 and above	12 (19.3)

4.3 IYCF Practice and Dietary Diversity

Eventhough almost 90% of mothers breastfed their children within one hour of birth, about 40% did not exclusively breastfed their children (Table 5). According to UNICEF and WHO guidelines, a baby should be fed a minimum of 8-12 times within a 24-hour period, which means after every 2-3 hours, or it should be breastfed on need. It was observed that only 24% of SAM children were breastfed every 2-3 hours, whereas 46.7% of mothers breastfeed whenever the child cries. Most mothers (82.2%) of SAM children initiated complementary feeding just after six months of age. It was found that 32% of SAM children aged 12-24 months received inadequate diet (only 2-3 meals per day). Regarding hygiene and hand washing, only half (54.8%) of mothers wash their hands with only water before feeding the child.

Table 5: Details of child feeding knowledge and practice

Child Feeding Practices	Number (%)
Newborns breastfeed within an hour of birth.	
Yes	56 (90.3)
No	6 (9.6)
Duration for breastfeeding	
More than six months	38 (61.2)
Up to 6 months	15 (24.1)
Less than six months	6 (9.6)
Do not remember	2 (3.2)
Did not breastfeed	1 (1.6)
Children exclusively breastfed	
Only breast milk	39 (62.9)
Cow milk	11 (17.7)
Formula milk	4 (6.4)
Others	8 (12.9)
Frequency of breastfeeding within 24 hours	
Whenever child cries	29 (46.7)
After every 2-3 hours	15 (24.1)
After every 1 hour	7 (11.2)
Whenever I feel like	3 (4.8)
Others	8 (12.9)
Feeding practices when child experiences illness	
Continue Breastfeeding	48 (77.4)
Continue feeding (other than breastfeeding)	10 (16.1)
Stop Breastfeeding	4 (6.4)
Initiation of complementary feeding	
After six months	51 (82.2)
Before six months	9 (14.5)
Do not remember	2 (3.2)
Meals recieved (12-24 months)	
2-3 meals	20 (32.2)
3-4 meals	31 (50.0)
4-5 meals	11 (17.7)
Hand washing practice before feeding a child	
Wash hands with only water	34 (54.8)
Wash hands with soap and water	20 (32.2)
Do not wash your hands	6 (9.6)
Others	1 (1.6)

Table 6: Details of diet diversity of SAM children as per 24-hour recall method

Diet Diversity	Number (%)
Breastfed yesterday during the day or at night	
Yes	37 (59.7)
No	23 (37.1)
NA	2 (3.2)
Infant formula	
Yes	11 (17.7)
No	37 (59.7)
Do not know	14 (22.5)
Milk from animal or powdered milk	
Yes	12 (19.3)
No	50 (80.6)
Cheese, paneer, curd, curd-based drinks such as lassi	
Yes	2 (3.2)
No	59 (95.2)
Do not know	1 (1.6)
Bread, roti/chapatti, rice, other made from grains	
Yes	49 (79.0)
No	12 (19.4)
Do not know	1 (1.6)
Pumpkin, carrots, red pepper, or sweet potatoes	
Yes	7 (11.2)
No	51 (82.3)
Do not know	3 (4.8)
NA	1 (1.6)
Potatoes, unripe banana, lotus root, turnip	
Yes	22 (35.4)
No	39 (62.9)
Do not know	1 (1.6)
Dark green leafy vegetables	
Yes	8 (12.9)
No	52 (83.9)
Do not know	2 (3.2)
Any foods made from beans, peas, lentils, or nuts	
Yes	30 (48.4)
No	31 (50)
Do not know	1 (1.6)
other vegetables lady finger, brinjal, bottle gourd	
Yes	14 (22.5)
No	47 (75.8)
Do not know	1 (1.6)
Vitamin A-rich fruits (Ripe mango, papaya, apricot.)	
Yes	3 (4.8)
No	58 (903.5)
Do not know	1 (1.6)
Any other fruits such as banana, apple, grapes, guava	
Yes	8 (12.9)
No	52 (83.9)
Do not know	2 (3.2)
Egg	
Yes	8 (12.9)
No	53 (85.5)
Do not know	1 (1.6)
Meat such as pork, lamb, goat, chicken	
Yes	4 (6.4)
No	57 (91.9)
Do not know	1 (1.6)

Note: NA: Not Applicable.

According to the 24-hour dietary recall, it was found that only 59.7% of the children were being breastfed. Cereals such as bread/roti/rice constituted the most significant proportion (79%) in the child's daily diet, followed by lentils/beans which accounted for 48%, and starchy roots and tubers at 35%. The consumption of otherf food groups such as other vegetables (22.5%), milk (19%), green leafy vegetbales (13%), Vitamin A-rich fruits (4.8%) and vegetables (11%), egg (13%) and meat (6.4%) were very low in the last 24 hours (Table 6).

Based on eight food groups of the WHO and UNICEF indicators for assessing IYCF practices, the MDD was calculated for children age 6 to 23 months and we included only 21 children for this analysis. Almost none of the children consumed foods or beverages from at least five out of eight defined food groups in the last 24 hours.

MDD (6 to 23 months)	Number	Percent
Low Dietary Diversity	20	95.24
Min Dietary Diversity	1	4.76
	21	**100**

4.4 ICDS Service Utilisation

Almost 61% of the mothers took their SAM children to the Anganwadi Centres (AWCs), and the rest (38.7%) responded that there was no AWC near their location. It was observed that 27% of beneficiaries never received THR from AWC, whereas only 31% received THR once a week. Of the respondents, 53% of SAM children do not consume the THR (Table 7), 67.7% of SAM children were completely immunised, and 20.9% were partially. The weight of 48.3% of SAM children was measured regularly at AWCs. The reasons for not recording the same were unavailability and non-functional weighing scales or machines at AWCs. So, 74.1% of SAM mothers were unaware of the growth chart.

4.5 Status of NRC Services

After the identification and diagnosis of SAM, 55% of children were referred to Nutritional Rehabilitation Centres (NRCs), 19% to Primary Health Centres (PHCs), and only 5% to Community Health Centres (CHCs). Most SAM children were referred by local NGOs (64.5%) to the NRCs.

Table 7: Details of ICDS service utilisation by SAM children

Service Utilisation	Number (%)
Children go to the Anganwadi Centre	
Yes	38 (61.2)
No	24 (38.7)
Frequency of THR received from Anganwadi Centre	
Once in a week	19 (30.6)
Once in a month	9 (14.5)
Rarely	6 (9.6)
Never	17 (27.4)
NA	11 (17.7)
THR consumed by the child	
Yes	27 (43.5)
No	33 (53.2)
Sometimes	2 (3.2)
Immunisation status as per MCP card	
Completed	42 (67.7)
Partially completed	13 (20.9)
Not available	7 (11.2)
The child received the BCG vaccine.	
Yes	58 (93.5)
No	4 (6.4)
Child weight is regularly measured at AWC.	
Yes	30 (48.3)
No	32 (51.6)
Awareness of growth chart among SAM mothers	
Yes	16 (25.8)
No	46 (74.1)

Majority SAM children (80.6%) did not stayed in the NRCs for less than 14 days. Some reasons given by the respondents were social stigma, financial constraints, lack of family support and non-functionality of NRCs. More than half SAM children (58%) never received nutritional support from AWC or SHG due to inaccessibility and non-operational AWCs, whereas only 23% received it once a week (Table 8).

Almost half of the mothers reported that they liked the food served at the NRCs, the utensils properly washed before serving meals, and the availability of safe drinking water at the NRCs. Only 40% of SAM children's parents received counselling at the NRCs on different themes including breastfeeding, family planning, and nutrition. However, 61% of the respondents reported that communication tools such as leaflets or pamphlets weren't used while counselling.

Services received by the children after discharge from the NRCs were suboptimal. The majority (74%) of parents reported that the health workers (ASHA/ ANM) did not come for the follow up home visits after discharge from NRCs. Only 11% and 8% of children received Iron Syrup, Vitamins and Folic Acid after discharge from the NRCs. Only 15% of children visited the NRCs for follow-up (one week after 21 days of admission and discharge).

Table 8: Details of NRC service uptake by SAM children

NRC Service Uptake	Number (%)
SAM children referred to	
NRC	34 (54.8)
PHC	12 (19.3)
CHC	3 (4.8)
Other	4 (6.4)
whom did the child get referred to the health facility	
ASHA	14 (22.5)
AWW	5 (8.0)
Medical Officer	3 (4.8)
Other	40 (64.5)
Total no. of days the child stayed in the NRC	
14 days	11 (17.7)
21 days	1 (1.6)
Less than 14 days	50 (80.6)
Children receive nutritional support (AWC / SHG)	
Never	36 (58.0)
Once in a week	14 (22.5)
Rarely	7 (11.2)
Once in a month	5 (8.0)
Child was fed Sugar Syrup to prevent Hypoglycaemia	
Yes	24 (38.7)
No	32 (51.6)
Do not know	6 (9.6)
Counselling received during the NRC visit	
Yes	25 (40.3)
No	37 (59.6)
Other	12 (19.3)
Any IEC used during counselling	
Yes	12 (19.3)
No	38 (61.2)
health worker came to house, discharge from NRC	
Yes	16 (25.8)
No	46 (74.1)
child received (2-3 month Iron Syrup)	
Yes	7 (11.2)
No	55 (88.7)
the child received (Vitamin and folic acid)	
Yes	5 (8.0)
No	57 (91.9)
Visited NRC for follow-up	
Yes	9 (14.5)
No	53 (85.4)

The potential ways to ensure TB referral, linkages, and treatment services for SAM children:

TB screening: Children with SAM should be screened for TB using appropriate diagnostic tools such as the tuberculin skin test or the interferon-gamma release assay. This should be done as part of the routine assessment of children with SAM.

Referral systems: There should be a transparent referral system in place for children with SAM who are found to have TB or are suspected of having TB. This may involve referral to a TB diagnostic centre or a hospital that provides TB treatment services.

Linkages with TB treatment services: It is essential to ensure linkages between SAM treatment centres and TB treatment services to ensure that children with SAM who are diagnosed with TB receive appropriate treatment. This may involve setting up a system to track TB treatment outcomes among children with SAM.

Nutritional support during TB treatment: Children with SAM who are undergoing TB treatment may require nutritional support to help them recover. This may involve providing therapeutic feeding or micronutrient supplements to ensure they receive adequate nutrition during treatment.

Integration of services: To ensure timely and comprehensive care, it may be beneficial to integrate TB screening, referral, and treatment services with SAM treatment services. This can involve setting up co-located clinics or establishing referral pathways between the two services.

Training and capacity building: Health workers involved in caring for children with SAM should be trained on TB screening, referral, and treatment services to ensure they can identify and manage TB cases effectively.

4.6 TB Screening of SAM Children

Presumptive Peadiatric TB refers to children suspected to be suffering from TB based on any of the following symptoms: persistent fever, cough for more than two weeks, and loss of weight. A definite weight loss (>5% loss in the past three months) or failure to gain weight in the past three months despite adequate nutrition with no other apparent cause should prompt detailed history, examination and investigation, including investigations for TB. Moreover, presumptive TB cases (Pulmonary or Extrapulmonary) would often have known contact with an infectious TB patient. In a symptomatic child, contact with a person with any form of active TB within the last two years may be deemed significant.

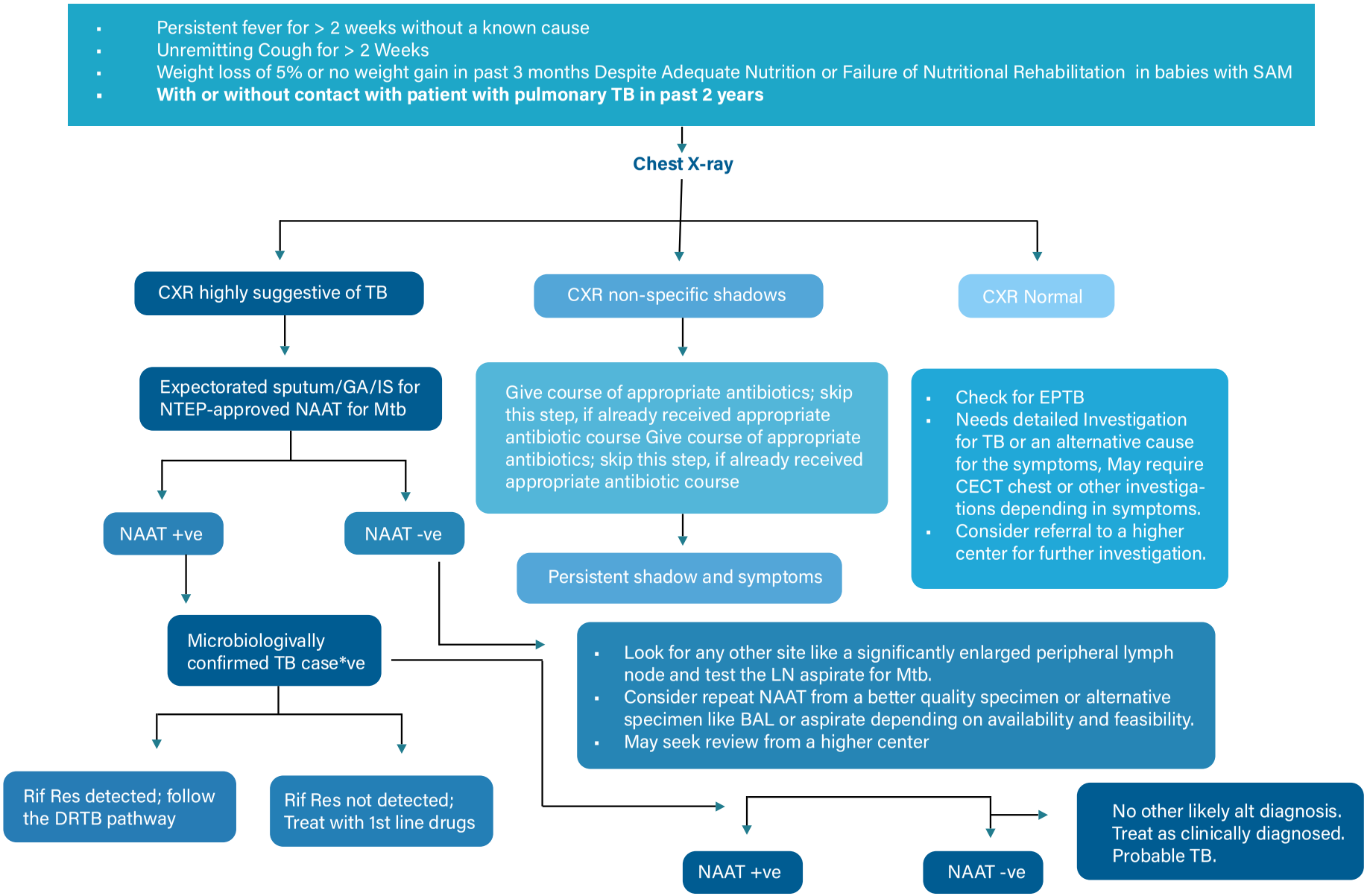
The diagnostic algorithm below gives the recommended pathway for diagnosing intrathoracic Tuberculosis in children. Experts believe that while the symptoms suggestive of TB can be mimicked by several other diseases if they are properly characterised, the probability of finding those with TB improves. Persistent cough and fever for two weeks or more without a known cause is an excellent clinical marker, particularly if associated with weight loss or a history of exposure to a case of active TB. Weight loss or not gaining weight should always be documented with appropriate and proper weighing. The patient should always be weighed with minimal clothing and without shoes. All these presumed cases are subjected to further investigation for TB. The initial specific investigation recommended is a Frontal Chest Skiagram. Repeating testing is not routinely recommended if a recent good-quality Chest X-ray film is available. This is a significant shift from the earlier guidelines, where a sputum smear examination was the initial recommended test. Below is a schematic diagram for the diagnosis of TB.

» The first recommended course of investigation is a frontal view chest radiograph, essential to diagnose pulmonary pediatric TB. NAAT is currently the only WHO and NTEP-approved diagnosis test for MDR and XDR TB patients.

In our study sample, children with SAM and TB conditions were diagnosed by sputum positive and Mantoux Skin Test. The SAM children experienced difficulty in breathing, cough for more than two weeks, and swelling in the neck, which led to the TB diagnosis. After that, the children were referred to the TB diagnosis and treatment centre for further diagnosis and treatment. There were no significant clinical side effects reported among SAM TB children. In addition, A total of 85.4% of SAM TB parents reported that no other family members or close contacts had been diagnosed with TB.

Below are the brief on the Collaborative Framework between NRC and the National Tuberculosis Elimination Program:

Figure 1 : Recommended Pathway for Diagnosis of Tuberculosis in Children



*HIV Testing should be offered to all children diagnosed with TB

Source: Pediatric TB Management Guideline (2022), MoHFW

1. Screening: Preliminary tuberculosis screening is done by taking the case history and performing a physical examination.

2. Sample collection and transportation- The sample should be collected via gastric aspirate/ lavage or induced sputum. The sample needs to be collected in a Falcon Tube in normal saline. The concerned NRC staff may send the collected sample to the nearest linked NTEP diagnostic facility. Otherwise, the linked NTEP facility may also be informed to collect the sample from the NRC.

3. NTEP referral: After identifying the presumptive Tuberculosis case, the child needs to be linked to an NTEP facility for further management.

4. Recording and reporting: All collaborative activities should be documented using standard records and reports at prescribed intervals

4.7 Qualitative Insights

The semi-structured in-depth interviews were conducted with different key stakeholders such as frontline workers, medical officer, pediatrician, district TB officer etc. The areas of enquiry with different stakeholders mainly assessed their perspective on SAM and TB integration, strengths and weaknesses in implementation, constraints and opportunities for improving the program and best practices and lessons learned.

A total of 5 AWWs, 5 ASHAs, 9 ANMs, 1 STS, 1 MOTC, and 1 Pediatrician were interviewed for the qualitative data. The administrative staffs including 3 DTO, and 1 RCHO were interviewed to understand the challenges and opportunities in diagnosis and treatment of pediatric TB in the community.

All the TB centres had screening and diagnosis facilities for children. All the TB health facilities were equipped to provide care and treatment for pediatric TB (Drug-resistant and Drug-sensitive). However, the barriers to TB treatment are still prevailing.

4.7.1 *Barriers to TB Diagnosis and Treatment*

The above-described direct detection methods have formed the basis of TB diagnostics. However, a shift has recently occurred towards molecular or immunological methods. Further methods have been combined with culture to successfully diagnose TB, including the chest X-ray and the Tuberculin Skin Test. Nevertheless, their efficacy was relatively poor compared to other modern methods, which utilise molecular or immunological techniques. In our survey, all the assessed health facilities had smear microscopy and chest X-ray services.

4.7.2 Identification SAM TB

During the interviews, the healthcare workers reported that the challenges faced by them include- women experiencing financial and physical dependence, lower general literacy, and household stigma. In contrast, men faced work-related financial and physical barriers and community-based stigma. Men also reported workplace, community, and marital prospect-related stigma, whereas women reported stigma with family members as well as psychosocial consequences, feelings of isolation, and lack of proper care from the family. In TB centres, health workers felt that women experienced more difficulties than men as a result of such barriers (including cost, travel, and lack of privacy at treatment or diagnosis centres).

In regards to TB identification, NRC Pediatrician, Bangalore, shares:

"The X-ray, CBC, and DRD tests are done here, but the CBNET and Mantoux Tests facilities are unavailable. The unhygienic and improper feeding practices can be seen mostly among the Muslim community. We face the challenges of sharing information regarding TB positives with the patient's house. The major challenge for us is to inform and follow up the TB treatment if a woman gets TB positive. We give medicine to that TB patient woman without informing her family due to stigma and gender discrimination."

These findings support prioritising the gender empowerment framework that WHO, UNFPA, and other international organisations advocated. In addition to balancing research, it aims to create a more balanced power structure between men and women in health care. Overcoming gender-specific sociocultural barriers is an overarching problem that requires intervention, but this remains a significant and challenging task. Importantly, stigma and health literacy are related, and gender-specific interventions to improve TB-related health literacy may overcome some barriers due to individual-level stigma.

Diagnostic Protocol for TB Children:

- Cough: A persistent cough lasting more than two weeks is one of the most common symptoms of TB. The cough may be dry or productive and may be accompanied by phlegm or blood.
- Fever: A low-grade fever that persists for several weeks may be a sign of TB. Night sweats and chills may accompany the fever.
- Weight loss: Unexplained weight loss of more than 3–4 kilograms over a few weeks or months can be a sign of TB.
- Night sweats/fatigue: Night sweats and chronic fatigue or weakness are also common symptoms of TB. People with TB may feel tired and run down even after getting enough rest.

During the field visit, it was observed that the district TB centre is following the standard guideline procedure for diagnosis of TB. The Medical Officer of TB Control (MOTC) Shivpuri said, "There are two main tests conducted at the centre. One is a Chest X-ray, and the second is Sputum CBNAAT. Two containers are provided for sputum: one for CBNAAT and a second for Line Probe Assay (LPA) at the genetic level. The LPA is sent to the Gwalior, and the CBNAAT test is conducted at the TB centre in Shivpuri."

However, in Sadar District Hospital of Bihar, the following diagnostic procedure was to examine "persistent cough or fever for more than 14 days or history of unexplained weight loss in past three months; or a positive test result of the combination of skin test and chest radiograph" (District TB Officer, Sadar Hospital, Bihar).

One of the most significant issues India faces is malnutrition. The term malnutrition is commonly used to describe undernutrition and usually refers to under and overnutrition. Undernutrition results from inadequate consumption, poor absorption, or excessive loss of nutrients, and overnutrition results from excessive energy and fat intake. The guidelines for the management of nutrition of children are explained in the schematic diagram below

During the field survey, it was observed that AWWs/ ASHAs/ANMs conducted the anthropometry screening (weight, height, and MUAC) to identify the SAM children in the community. The combined efforts of AWW, ASHA, and ANM, along with the involvement of medical officers and support from organisations, create a well-structured pathway for identifying and addressing SAM in children. This approach highlights the importance of community-level healthcare workers and collaborations in tackling malnutrition issues, ultimately contributing to the well-being of the affected children. Coordination with field health workers and local Non-Government Organisations (NGOs) in assisting families with the NRC admissions procedure is essential to this process. Collaboration with external groups improves the system's overall efficiency, ensuring that identified children receive timely and appropriate care.

In this regard, NRC Nutrition Counsellor Motihari, Bihar, shares: "The AWW/ASHA/ ANM identify children with SAM using simple mid-upper arm circumference (MUAC) tape and are trained in recognising pitting oedema. Growth monitoring at the Anganwadi Centre is also done for the child. After identification, the SAM children are further checked by the medical officer and referred to the NRC."

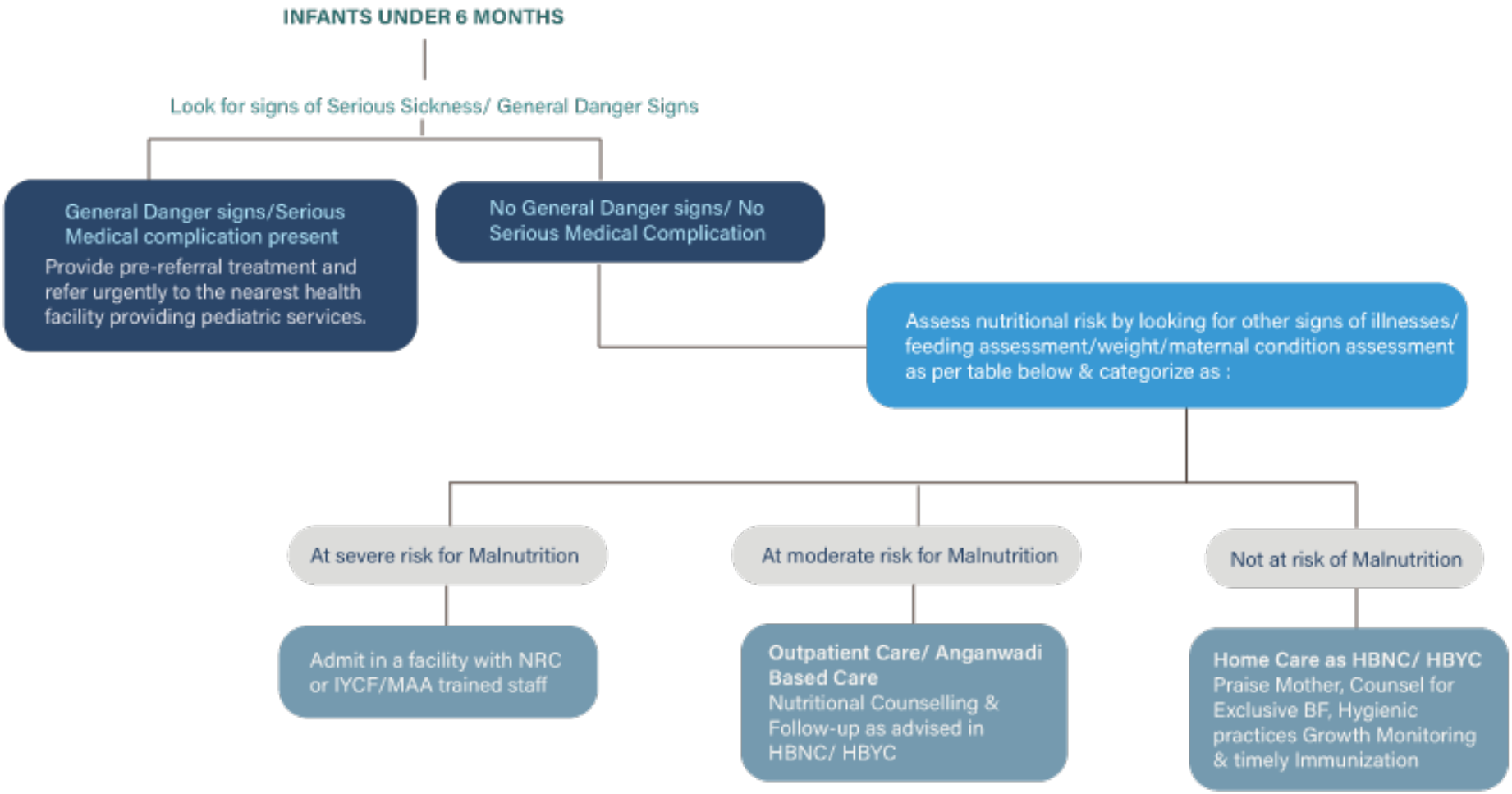
Moreover, during the survey, it was found that field health workers or the CHARD organisation help families with the NRC admissions procedure after they have been referred.

4.7.3 Community Nutrition need for SAM TB Children

Nutrition education is a fundamental component of community health promotion initiatives. Understanding needs and wants can help better plan community-based health programs in a geographical setting. A comprehensive Community Needs Assessment (CNA) can clarify these needs and wants and serve as a foundation for planning and evaluating nutrition and health programs. The study considered the multi-component CNA model, which included review existing studies, secondary data analysis of the target population, beneficiaries' feedback (focus group), and critical informant or stakeholder interviews (District TB officers, Pediatricians, Frontline workers, STS, etc.). The study examined the information from these diverse sources, seeking convergence of issues.

According to the NHM guidelines, frontline workers, especially ASHA, play a crucial role in mobilising the community and facilitating access to health

Figure 2: Recommended Protocols for Management of Malnutrition in Children



Source: Protocol for the Management of Malnutrition in Children, MoHFW, India.

and health-related services at the Anganwadi/ Sub-centre/PHC. In particular, the services must include immunisation, antenatal check-ups (ANC), postnatal check-ups, supplementary nutrition, sanitation, and other services the government provides.

This study aims to assess the implementation of screening and treatment of SAM-TB children. In this regard, an assessment of "when" the cases were detected at the village level during the Village Health Nutrition Day (VHND) session. They were sent to the Nutrition Rehabilitation Centre after being rechecked by the concerned medical staff (Medical Officer at PHC/CHC) as per the criteria. The cases were followed up immediately within two to three days. The process was done in consultation with NRC staff and the medical officer. Most of the frontline workers mentioned that information regarding the SAM children should be shared at the Anganwadi Centre by the NRC staff. In return, this will help to ensure follow-up visits after discharge from NRC. It was reported that the supply of nutrients is insufficient, and the children often do not consume the THR if the mother is working. The AWWs believed that the specially planned diet drastically improves the nutritional status. So, the supply of nutritional supplements should be ensured.

"ASHA and AWW workers conduct the community nutritional needs assessment. It would be better if all the information regarding the child is given in the Anganwadi and some nutritional help is provided."- AWW Bangalore.

4.7.4 Substance Abuse and TB Treatment

Gender-specific interventions that address individual-level stigma and health literacy barriers are critical to improving access to TB services. Similarly, substance abuse is the most commonly reported behavioural risk factor among patients with TB. Substance use is associated with high discontinuation of tuberculosis treatment, which is a barrier to tuberculosis control. Treatment discontinuation significantly increases the risk of poor treatment outcomes in both drug-susceptible and multidrug-resistant tuberculosis patients. TB treatment can also be complicated for drug users and alcohol abusers. The reason is- that the combination of these and TB medication may lead to liver toxicity, which is that it is particularly dangerous for people who drink too much alcohol. Studies show the risk of active Tuberculosis, re-infection of TB, and TB treatment non-adherence is increased in people who have an alcohol use disorder. Most of the frontline workers mentioned that they faced challenges with TB patients who drank alcohol during the treatment phase. This may result in an increased chance of liver damage among TB patients and alter the metabolism of antibacterial drugs.

"We face more challenges in providing the treatment and following up with female TB patients than male TB patients. If a person who drinks alcohol is suffering from TB disease, then we motivate him to stop drinking alcohol, and educate him that if he does not stop drinking alcohol, then TB disease will not be cured. However, some people take DOTS tablets and also drink alcohol." - ASHA Bangalore.

4.8 Challenges in TB Screening, Diagnosis and Treatment

In India, significant challenges to controlling TB include poor primary healthcare infrastructure in rural areas of many states and unregulated private healthcare. Social stigma, such as reluctance to disclose about a family member being infected with the disease to others, also remains high. During the field visit, significant gaps and challenges were observed regarding healthcare infrastructure, including a shortage of human resources, diagnostic facilities, and resources for TB patients. Tuberculosis in children may be underdiagnosed as symptoms overlap with that of other diseases—difficulty in managing coordination between public and private sectors. Treatment may be delayed due to the social beliefs related to Tuberculosis. Screening tuberculosis patients is also challenging as it is difficult to check on every village in the district.

Tuberculosis remains a significant health problem in India, particularly amongst the disadvantaged and marginalised groups. Tuberculosis is a significant public health problem among the Saharia community of Shivpuri district. In this regard,

District TB Officer Shivpuri said: "The Saharia tribal community is the main challenge as convincing

them to accept treatment is difficult. Defaulter cases are very high in this community. Patients take treatment for 15 days; if they notice less infection, they discontinue the treatment process."

Similarly, Medical Officer Tuberculosis Control, Shivpuri, said: "It is difficult to find out whether ASHA, ANM and Anganwadi are working according to the guidelines provided. It is challenging for us to visit every village as the district is big, consisting of 9 blocks, and every block population ranges between 1.5 to 1.75 lakhs."

The field inquiry also observed that a limited workforce and limited resources are significant challenges that affect effective functioning. Fewer healthcare professionals are available to attend to the population's needs, leading to delays in diagnosis, treatment, and healthcare delivery. Limited finances often increase the inability to invest in infrastructure expansion, training initiatives, and essential equipment. Under such conditions, screenings and diagnostic processes get compromised. Also, families in remote areas face additional difficulties in getting their children the proper treatment and care on time because of limited transportation alternatives and lack of awareness. The distance to the nearest medical facility often becomes a significant obstacle, leading to delayed or neglected medical care.

"There is a shortage of workforce and finances, which usually affects screening and diagnostic process. It is difficult for us to educate the family about SAM and the connection between SAM and Tuberculosis. Children living in rural areas have little access to medical service," as shared by Senior Treatment Supervisor, Bihar.

Similarly, the District TB Officer Sadar Hospital, Bihar, shared, "People may not have access to TB diagnostic tests. It is difficult for us to collect and obtain the samples. One important point is that symptoms overlap with other common diseases, especially among children."

"Sometimes TB medications can cause weight gain in some children, which can give false results. It is difficult for us to administer doses to young and severely malnourished children. Lastly, SAM children may be at higher risk for other infections, which makes the treatment process more difficult." - STS, Sadar Hospital Bihar.

4.9 Community Based Approach

A community-based approach can help reduce the spread of Tuberculosis. It can also support diagnosis and treatment in communities. This is accomplished by educating the public and health workers. It helps find people with TB symptoms and get them diagnostic and other services, reduces stigma, offers daily support for those taking the medicines, advocates for improved services, and many other ways.

Community health workers are essential to these efforts because they are frequently the first point of contact for people in the community. Their contribution to raising awareness about Tuberculosis, promoting early diagnosis, and facilitating treatment is essential. By engaging the community at the grassroots level, these workers can assist in removing barriers to healthcare access and ensure that individuals receive essential information and support.

The "TB Mukt Gram Panchayat" campaign, which involves community health workers, the National Tuberculosis Elimination Programme, the Panchayati Raj Administration, and Non-Governmental Organisations (NGOs), demonstrates a community-centric approach towards Tuberculosis. Such multi-stakeholder activities are critical for developing long-term solutions to eliminate Tuberculosis.

"Our Community health workers play a crucial role in this. The National Tuberculosis Elimination Programme (NTEP) and the Panchayati Raj department organised a "TB Mukt Gram Panchayat" campaign to eliminate Tuberculosis. The campaign aims to create awareness regarding TB disease, early diagnosis, and treatment of TB patients, promoting TB detection, and supporting tuberculosis patients and their families. Also, NGOs like JEET and "Doctors for You" help screen the patients at the community level." - DTO, Sadar Hospital, Bihar

"There is coordination with the post office adjacent to the TB centre. Every TB patient has to open an account without waiting in queue with the help of a health supervisor and only pay Rs. 100 for account open. Another issue faced was linking the mobile number with the Aadhar card of the patient. Recently, Ladli Behana Yojana, under which

beneficiaries must link their mobile number, which is also helpful for me. Earlier, this process used to take months." - DTO, Shivpuri

4.10 Monitoring and follow up of SAM TB Children

Early diagnosis and treatment for TB reduces the risk of disease transmission from one individual to others in the family or close contact. Early initiation of treatment also improves TB treatment outcomes and reduces the complications and out-of-pocket expenditure incurred by individuals and their families. Shortfalls in the number and capacity of frontline healthcare workers weaken the last mile in delivering TB care services.

Field Health Workers (FHW) have enabled the task-shifting of a variety of TB program responsibilities to optimise capacity utilisation of the public health system. These decentralised tasks include active case finding, sputum collection and transport, slide fixing and other laboratory support, and treatment support, such as community-based directly observed treatment (DOT) and psychosocial support. As a result, the deployment of FHWs in TB programs has been linked to improved patient treatment outcomes, increased case notification, and decreased treatment loss to follow-up (LTFU). A community-based approach using community health workers can significantly increase contact investigation coverage.

"When we see in the community that a person is suffering from symptoms of TB, we first inform STS, and then they come and refer that person to the TB department for diagnosis. Then we discuss it in the unit and follow up after the diagnosis."- ANM, Bangalore.

Nutrition Rehabilitation Center (NRC) is a health facility where children with Severe Acute Malnutrition (SAM) are admitted and managed. Children are admitted to NRC as per the defined admission criteria. Once discharged from the NRC, the child remains in the Nutrition Rehabilitation program until she/he attains the defined discharge criteria. In addition to curative care, particular focus is given to timely, adequate and appropriate feeding for children and on improving the skills of mothers and caregivers in complete age-appropriate caring and feeding practices. In addition, efforts are made to build the capacity of mothers/caregivers through counselling and support to identify their child's nutrition and health problems. The SAM children admitted continue their stay in NRC for 14-21 days. Four follow-ups of the children discharged from NRC are done at an interval of 15 days. The criteria for discharge of children 6m-60m from the programme is 15% weight gain of the admission weight.

Admission Criteria: Problem of breastfeeding: the infant is too weak to suck and/or the mother has not enough milk and/or bilateral pitting oedema and/or W/H or W/L <-3 Z score (WHO-2005 standards)

Discharge Criteria

- The child is gaining weight on breast milk alone, regardless of current weight or W/H%.
- No medical Complications
- Absence of Bilateral Oedema for at least the past ten days

During the field visit, it was observed that "Child stays in NRC for seven days. Further, we follow after every two months and ask if there is any problem" - Feeding Demonstrator, NRC, Shivpuri.

"During my tenure, only one child that was brought to the NRC was diagnosed with Tuberculosis. After thorough investigation, the child was referred to Sadar Hospital for further treatment." - NRC Nutrition Counsellor, Bihar.

05. Discussion

The findings of this study provide valuable insights regarding maternal and child health, nutrition, and healthcare-seeking patterns in households located in Bihar, Madhya Pradesh, and Karnataka. The study also highlights the practices,, challenges, and opportunities for SAM-TB diagnosis, treatment, and follow-up considering the different factors such as gender lens, economic situation, maternal education, etc.

The occurrence of tuberculosis within families found significant, with 11.2% reporting a history of TB. This emphasises the need to consider the broader health context when tackling maternal and child health concerns, as chronic diseases in families can influence overall health results.

The prevalence of tobacco or smoke consumption among fathers of SAM children was reported 74.1%, whereas, only 22.5% mothers reported that they consume any form of tobacco. Similarly, the studies found that prevalence of current smokeless tobacco use in pregnant women was lowest in the European region and highest in the Southeast Asian region (Caleyachetty et al., 2014; Singh et al., 2022). Another study showed the prevalence of tobacco use among currently married pregnant and lactating women was 2.5% and 3.2%, respectively (Virk et al., 2023).

The average age of mothers was 27 years, with a high percentage (75.8%) being illiterate. While a significant proportion (85.4%) registered for antenatal check-ups and had first ANC check-up done during the first trimester. According to NFHS-5, only 70% mothers had an antenatal check-up in the first trimester in India. The disparity in education levels calls for an emphasis on developing effective communication strategies to raise knowledge about the necessity of prenatal care.

The study highlights disparities in adherence to UNICEF and WHO guidelines for breastfeeding, which recommend; (i) early initiation of breastfeeding within 1 hour of birth; (ii) exclusive breastfeeding for the first 6 six months of life; and (iii) introduction of nutritionally-adequate and safe complementary (solid) foods at 6 months together with continued breastfeeding up to 2 years of age or beyond. The study found that 62.9% of children under age 6 months were exclusively breastfed, which is almost similar to the findings (63.7%) of NFHS-5 in India.

The reasons behind inadequate breastfeeding practices among this specific group should be addressed further to develop targeted strategies. Additionally, the initiation of complementary feeding beyond six months and insufficient diet for a significant portion of SAM children underscores the importance of nutritional counselling and support. Also, the introduction of supplemental feeding after six months, as well as an inadequate diet for a large proportion of SAM children, highlights the significance of nutritional consultation and support.

The hygiene practices play a crucial role in Infant Young Child Feeding Practices (IYCF) during first 1000 days which considered as window of opportunity for optimum growth and development.

The study found that 32.2% mothers of SAM children wash their hands with soap and water, whereas, 54.8% mothers wash their hands with water only. A study by Borah et al., 2016 found a statistically significant association between mother's educational status and practice of hand washing with soap (HWWS) during childcare. It was also observed that mother's HWWS practice during childcare leads to reduced incidence of diarrhoea in children. In Ethopia, a research study also revealed significant proportion of mothers of under five children had a poor hand washing practice at critical times (Dagne et al.., 2019). Therefore, it is essential to increase safe water accessibility and to improve the knowledge and attitude of mothers to improve their hand-washing practice.

The data found a substantial consumption of staple carbohydrates, significant reliance on protein rich diet, and a relatively lower intake of milk or milk products (3.2%), vegetables (22.5%), Vitamin A rich fruits (4.8%), and meat (6.4%). This is align with the NFHS-5 findings where 11.3% children age 6-23 months receiving an adequate diet in India.

The study highlights the utilization of ICDS services by beneficiaries, where 30.6% receive the THR from Anganwadi centre once in a week and 27.4% were those beneficiaries who never receive the THR. This emphasizesthe need to strengthen the ICDS services and schemes to reach the last mile by building the capacity of frontline workers and create an enabling environtment to access the health services.

The referral and support system for SAM children seems to be compromised with social stigma, financial limitations, and low human resources. Lack of follow-up from health workers post-discharge and limited use of communication tools during counselling sessions indicate gaps in the continuity of care and information dissemination. These findings highlight the importance of addressing systemic barriers to ensure comprehensive and sustained support for SAM children.

In conclusion, this study gives insight into maternal and child health, nutrition, and healthcare-seeking behaviour. The identified challenges and gaps emphasise the need for targeted interventions, community engagement, and improved healthcare infrastructure to enhance the overall well-being of mothers and children in the studied regions. Future

research and programmatic efforts should address these issues to contribute to more effective and equitable maternal and child health outcomes.

06. Conclusion and Recommendations

6.1 Summary of Key Findings

» A significant finding in the study reveals that 80.6% of SAM children did not stay in NRCs for more than 14 days. This short duration is attributed to several factors: social stigma surrounding malnutrition leads families to avoid prolonged stays, financial constraints make it difficult to manage the costs associated with extended care, and a lack of family support can overwhelm caregivers, inadequate staffing and resources.

» Majority (74%) of parents reported that the health workers (ASHA/ANM) did not come for the follow up home visits after discharge from NRCs. Only 11% and 8% of children received Iron Syrup, Vitamins, and Folic Acid after discharge. Only 15% of children visited the NRCs for follow-up (one week after 21 days of admission and discharge). Most of the frontline workers mentioned that the NRC staff should share information regarding the SAM children at the AWC to ensure follow-up visits.

» The study found that delivery of SAM children's mothers predominantly occurred in public medical facilities, accounting for 53.2% of births, while a significant portion, 41.9%, took place at home. Alarmingly, approximately 31% of these births were pre-term. Moreover, the first and second postnatal visits after the delivery were reported to be only 15% and 10%, respectively.

» Approximately 61% of mothers utilized Anganwadi Centres (AWCs), yet 27% reported never receiving Take Home Rations (THR), and only 31% received THR weekly. It was reported that the supply of THR is insufficient, and the children often do not consume the THR if the mother is working. The AWWs believed that the specially planned diet drastically improves the nutritional status, therfore, the supply of nutritional supplements should be ensured.

» It was found that 32% of SAM children aged 12- 24 months received inadequate diet (only 2-3 meals per day). Bread/Roti/Rice constitutes the most significant proportion (79.03%), while lentils/beans and dark green leafy vegetables account for only 48.3% and 12.9%. Community-engaged nutrition-sensitive and specific interventions can increase household diet diversity.

» Mostly, SAM children were referred by local NGOs (64.5%) to the NRCs. Across the study areas, it was observed that the combined efforts of AWW, ASHA, and ANM, along with the involvement of medical officers and support from organisations, created a well-structured pathway for identifying and addressing SAM in children. Coordination with field health workers and local Non-Government Organisations (NGOs) in assisting families with the NRC admissions procedure is essential to this process.

» Such multi-stakeholder activities are critical for developing long-term solutions to eliminate Tuberculosis. The "TB Mukt Gram Panchayat" campaign, which involves community health workers, the National Tuberculosis Elimination Programme, the Panchayati Raj Administration, and Non-Governmental Organisations (NGOs), demonstrates a community-centric approach towards Tuberculosis in Bihar. Also, NGOs like JEET and "Doctors for You" help in the TB screening of patients at the community level.

» In study sample, children with SAM and TB conditions were diagnosed by sputum positive and Mantoux Skin Test. The SAM children experienced difficulty in breathing, cough for more than two weeks, and swelling in the neck, which led to the TB diagnosis. After that, the children were referred to the TB diagnosis and treatment centre for further diagnosis and treatment. No significant clinical side effects were reported among SAM TB children. In addition, a total of 85.4% of SAM TB parents reported that no other family members or close contacts had been diagnosed with TB.

» In Madhya Pradesh, the Saharia tribal community is the main challenge to convince them to take TB treatment; consequently, the defaulter cases are very high in this community.

The qualitative findings revealed that families in remote areas face additional difficulties in getting their children the proper treatment and care on time because of limited transportation alternatives and lack of awareness. The distance to the nearest medical facility often becomes a significant obstacle, leading to delayed or neglected medical care.

» Mothers with at least four antenatal visits are 19.3%, and 32.2% have at least three antenatal visits. Children whose mothers have fewer than four ANC visits during their last pregnancy are more likely to be malnourished. It was also observed that mothers consuming IFA and Calcium tablets for ≥6 months of their pregnancy had a proportion of 25.8% and 24.1%, respectively.

6.2 Main Recommendations

- Medication Sourcing Gap in Pediatric TB Guidelines The Guideline on Pediatric TB 2022 fails to specify where medications should be sourced for treating tuberculosis in children under five with severe acute malnutrition (SAM). This lack of clarity poses challenges in ensuring timely treatment. Addressing this gap in the guideline could improve healthcare delivery and enhance the overall effectiveness of TB management strategies in this particularly vulnerable demographic.

- Limitations in Tracking TB Cases for Under-Five Children in Ni-kshay Portal The "Ni-kshay Mitra Dashboard" portal is designed to track tuberculosis (TB) cases, including pediatric TB, for individuals aged 0 to 14 years. However, it currently does not provide specific data on TB cases among children under the age of five years. It is challenging to implement targeted interventions and allocate resources effectively to manage pediatric TB children. (https://dashboards.nikshay.in/community_support/overview_dashboard)

- Compensation Delays The delays in receiving this compensation pose significant challenges for the SAM-TB children mothers, who often rely on their daily wages to support their families. Without timely payment, they may face financial strain and difficulty meeting essential expenses such as food and transportation. Addressing this issue is crucial to ensuring that mothers can fully focus on their child's nutrition health status without added financial stress, thereby supporting better outcomes for both mother and child during their stay at the NRC.

- Strengthen Follow-Up Care Post-NRC Discharge Majority (74%) of parents reported that the health workers (ASHA/ANM) did not come for the follow up home visits after discharge from NRCs. Only 11% and 8% of children received Iron Syrup, Vitamins and Folic Acid after discharge from the NRCs. Only 15% of children visited the NRCs for follow-up (one week after 21 days of admission and discharge). Most of the frontline workers mentioned that information regarding the SAM children should be shared at the Anganwadi Centre by the NRC staff. Subsequently, this will help to ensure follow-up visits after discharge from NRC.

- Inter-sectoral coordination: The gap in inter-sectoral coordination between NRC and District TB centers was reported by health workers. Regular inter-departmental meetings should be organized to strengthen the diagnosis, treatment and follow-up of pediatric SAM TB to address the inter-departmental coordination challenges.

- Referrals and Collaborative Efforts Mostly SAM children were referred by local NGOs (64.5%) to the NRCs. Across the study areas, it was observed that the combined efforts of AWW, ASHA, and ANM, along with the involvement of medical officers and support from organisations, created a well-structured pathway for identifying and addressing SAM in children. Coordination with field health workers and local Non-Government Organisations (NGOs) in assisting families with the NRC admissions procedure is essential to this process.

- Promote diet diversity and nutrition interventions Bread/Roti/Rice constitutes the most significant proportion (79.03%), while lentils/beans and dark green leafy vegetables account for only 48.3% and 12.9%. Community-engaged nutrition-sensitive and specific interventions can increase household diet diversity. The nutrition education, improved income and livelihoods from kitchen gardens, women's empowerment and gender equality can be

effective strategies to increase food security and diet-diversity.

- Take Home Rations (THR) utilization and distribution It was observed that 27.4% of beneficiaries never received THR from AWC and 38.7% responded that there was no AWC near their location whereas only 30.6% received THR once a week. Of the respondents, 53.2% of SAM children do not consume the THR. It is important to provide, good quality THR product having nutritive value rather than ensuring only calories and proteins. Production and distribution should be monitored through digital systems (e.g., barcoding) at each step to enhance transparency and accountability and minimize leakage.

- Counselling support at NRC using IEC materials Only 40.3% of SAM children's parents received counselling during NRC visits on themes such as breastfeeding, family planning, and nutrition. 61.2% of these children's parents, there were no communication tools- leaflets or pamphlets used during counselling. There is need to ensure the counselling sessions on different thematic issues on daily basis through IEC materials to create awareness so that the child does not repeatedly fall sick.

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