

# CALL FOR PROVISION OF THERAPEUTIC NUTRITION AND INPATIENT CARE FOR ADULTS WITH TB WITH VERY SEVERE UNDERNUTRITION IN INDIA

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## Abstract

**BACKGROUND:** In India, 34% of annual estimated incident TB are attributed to undernutrition and the burden of very severe undernutrition among adults with TB is high. Patients with very severe undernutrition should not be provided and cannot tolerate high protein solid diet (called as TB diet in some hospitals). If we are to achieve the SDG 2030 targets to reduce TB deaths by 90% (when compared to 2015), we call for investment in facilities for therapeutic nutrition and inpatient care for those with very severe undernutrition at TB diagnosis. Therapeutic nutrition involves liquid formula feeds that can be prepared in hospital kitchen using available ingredients and is in line WHO and Central TB Division recommendations. This should be done in medical college hospitals and district head quarter hospitals. We have also used this opportunity to share the information and tools required for provision of therapeutic nutrition.

**KEYWORDS :** Adults with TB, adult TB patients, formula feed, very severe undernutrition, India

## INTRODUCTION

Adults with a body mass index (BMI) less than 18.5 kg/m<sup>2</sup> are considered undernourished, those with BMI less than 16 kg/m<sup>2</sup> (or mid upper arm circumference (MUAC) less than 19 cm) are considered severely undernourished and those with BMI less than 14 kg/m<sup>2</sup> (or MUAC less than 16 cm) are very severely undernourished. Severely undernourished (BMI 14-15.9 kg/m<sup>2</sup> or MUAC 16-18.9 cm) adults along with inability to stand without support or bilateral pedal oedema or poor appetite are also classified as very severely undernourished.<sup>1,2</sup> MUAC is used for nutritional assessment only if BMI cannot be relied upon (patient not able to stand).<sup>2</sup>

Undernutrition is prevalent among general population in India, 18.7% of women and 16.2% of men are undernourished.<sup>3</sup> Globally, India also has the highest tuberculosis (TB) burden. Undernutrition is closely related to TB, creating a bidirectional relationship. Globally, undernutrition stands out as the predominant risk factor for TB, accounting for nearly 21% of annual estimated incident TB (34% in India).<sup>4,5</sup> Undernourished people with TB are also more likely to have unfavourable outcomes.<sup>6</sup>

The 2030 Sustainable Development Goal (SDG) targets for TB include 90% reduction in TB-related deaths (reference year 2015).<sup>7</sup> The crucial step to achieve this is to enhance the nutritional status of people with TB thereby reducing mortality associated with TB. Most of TB deaths occur during the first two months of intensive phase of TB treatment.<sup>8</sup> For every one-unit increase in baseline BMI, the incidence of TB deaths decreased by 23%.<sup>8</sup> Weight gain,

particularly in the first 2 months (at least 5% weight gain from baseline weight), was associated with a substantially decreased hazard of tuberculosis mortality.<sup>8</sup>

Way back in 2013, the WHO recommended to integrate nutritional assessment and care into standard TB treatment and the same was re-iterated recently by The Union Nutrition-TB Working Group.<sup>6,9</sup> In the southern Indian state of Tamil Nadu, since April 2022, the Tamil Nadu Kasanoi Erappila Thittam (TN-KET, meaning TB death-free initiative in Tamil) has implemented a system of triaging adult TB patients at diagnosis for severe illness in routine health system settings. Those with very severe undernutrition, respiratory insufficiency or poor performance status (called as tirage-positive, see Box) are identified and prioritized for comprehensive clinical assessment and inpatient care.<sup>10,11</sup> Among 11,599 adults assessed in the first quarter of implementation (April to June 2022), 25% had severe undernutrition, while 6.3% had very severe undernutrition (BMI < 14 kg/m<sup>2</sup> or <16 with leg swelling) at TB diagnosis.<sup>11</sup> As nutritional assessment (BMI measurement at TB diagnosis) and TN-KET like triaging based differentiated TB care picks up as a part of routine TB care in other states of India, we



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will have routinely generated information on burden of very severe undernutrition at TB diagnosis in other states. When compared to national figures, Tamil Nadu has relatively lower levels of undernutrition among adults in general population.<sup>3</sup> Hence, the burden of very severe undernutrition among people with TB in other states is expected to be higher than Tamil Nadu. In 2023, based on a nationally representative study, the burden of very severe undernutrition at diagnosis among adults with TB from high-risk (marginalised and vulnerable) populations was 15% (unpublished data).

## ISSUE OF INTEREST

Considering the high burden, if India is to achieve the SDG 2030 targets of reducing TB deaths by 90% (when compared to 2015), one of the many strategies should be to identify (at diagnosis), admit and provide therapeutic nutrition (orally or using Ryle's tube) along with other medical management for adults with very severe undernutrition.<sup>1,2,7</sup> Post-discharge, this should be followed by other steps like food baskets and doubling of monthly family rations through the public distribution system.<sup>2</sup>

Therapeutic nutrition involves liquid formula feed F75 to stabilize the patients in the first week followed by rehabilitation using F100 or high protein diet.<sup>1,2</sup> Most patients with very severe undernutrition should not be provided and cannot tolerate high protein solid diet (called as TB diet in some hospitals) or any solid diet. TB diet should be used among TB patients without very severe undernutrition. Therapeutic nutrition involves liquid formula feeds that can be prepared in hospital kitchen using available ingredients and is in line WHO and Central TB Division recommendations.<sup>1,2</sup> Currently, even medical colleges hospitals and district headquarter hospital in states having relatively better public hospital infrastructure lack isolation beds for severely ill people with TB along with facility for therapeutic nutrition for those with very severe undernutrition. We feel that having this facility in medical colleges hospitals and district headquarter hospitals may be preferred over stand-alone TB hospitals (exceptions to this are the centres for excellence for TB care across India) as in former, various specialists are available to guide inpatient management. Most of these hospitals and relevant medical staff are also not aware of the need for therapeutic nutrition among adults with TB with very severe undernutrition. Paediatricians who manage TB among children are already sensitized to this concept as they commonly manage severe acute malnutrition. Hence, the focus in this article is on adults with very severe undernutrition and the need for assessment,

classification of undernutrition status followed by therapeutic nutrition for those with very severe undernutrition.

Not only patients with very severe undernutrition but also those with severe undernutrition should be prioritized for food baskets and doubling of rations.<sup>2</sup> They should be closely followed up for weight gain with a target of at least 5% weight gain from baseline at the end of two months.<sup>8</sup> Proportion of patients with very severe and severe undernutrition who do not gain 5% of their baseline weight at two months (those with unfavourable outcome should also be considered in the numerator) should be monitored as a TB program indicator.

Assessment of undernutrition among adults with TB using BMI (and MUAC if required, especially in inpatient setting), classification of undernutrition along with therapeutic nutrition for those with very severe undernutrition should not only be implemented but also be made part of graduate and postgraduate medical training, specifically, included in respiratory medicine and other related postgraduate medical training. For existing physicians managing TB, orientation trainings are required.

Tamil Nadu through TN-KET<sup>10-12</sup> and Delhi through 'Delhi: Triage and Treat TB (D-TAT)' initiative have taken a step in the right direction. For details, see the Supplementary Material: a two-page TN-KET standard operating procedure containing links to the tools used. This includes details on preparations of F75 in hospital kitchen, flow diagram summarising therapeutic nutrition and an F75 clinical tracking tool for use during stabilization phase (Figshare: <https://doi.org/10.6084/m9.figshare.24564403>).

## CONCLUSION

We call for investment in facilities for therapeutic nutrition and inpatient care for those with very severe undernutrition at TB diagnosis in India. We are using this opportunity to bring this to the attention of state health policy makers, state TB program managers and physicians managing TB in India.

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- Box 1. Triage tool to assess severe illness at diagnosis among adult pulmonary TB patients (13)\*
- If any one of the following is present, then the person with TB has to consider having severe illness, and referred for detailed clinical assessment (confirmation of severe illness) and inpatient care**

  1. Body mass index (BMI) less than or equal to ( $\leq$ ) 14.0 kg/m<sup>2</sup> ^
  2. BMI less than or equal to ( $\leq$ ) 16.0 kg/m<sup>2</sup> with leg swelling ^
  3. Respiratory rate more than ( $>$ ) 24 per minute \*\*
  4. Oxygen saturation less than ( $<$ ) 94% \*\*
  5. Not able to stand without support (standing with support / squatting / sitting / bed ridden) ^^
- \*Reprinted with permission from Shewade HD and Nagaraja SB et al(13) under a CC BY licence; Very severe undernutrition (indicator 1, 2)^, respiratory insufficiency (indicator 3,4)\*\* and poor performance status (indicator 5)^^ are known risk factors for death and have a strong association with TB mortality (1,2,14–16)