Family Medicine Approach to a 21-Month-Old Child with Tuberculosis and Stunting

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Abstract
Approximately 205,000 children die annually from tuberculosis (TB), 90% of these deaths occurring in undiagnosed and untreated cases. This disease also weakens nutrition, and conversely, poor nutrition increases the risk of developing TB. The prevalence of malnutrition in children with TB ranges from 7.1% in resource-rich South Africa to 75.2% in Pakistan. Childhood stunting has profound long-term consequences, including physical growth and impaired cognitive development. The visit was conducted in July–August 2025 as part of a comprehensive family medicine management program within the Cikupa Community Health Center (Puskesmas) area. We provided patient-centered interventions with a family and community approach. Within the following month, we observed improvement in the patient's symptoms, a return to normal leukocyte levels, and increased appetite, height, and weight after implementing a comprehensive and holistic treatment plan. This case demonstrates that holistic and comprehensive management using a family medicine approach addresses not only the medical diagnosis but also related family and community factors.

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Abstrak
Sekitar 205.000 anak meninggal setiap tahunnya karena Tuberkulosis (TB), 90% dari kematian ini terjadi pada kasus yang tidak terdiagnosis dan tidak diobati. Penyakit ini juga memperburuk gizi dan sebaliknya gizi buruk juga meningkatkan risiko terkena TB. Prevalensi kekurangan gizi pada anak-anak yang terkena TB berkisar dari 7,1% di wilayah Afrika Selatan yang kaya sumber daya hingga 75,2% di Pakistan. Stunting pada masa kanak-kanak membawa konsekuensi jangka panjang yang mendalam, termasuk pertumbuhan fisik, yang mencakup gangguan perkembangan kognitif. Kunjungan dilakukan bulan Juli – Agustus 2025 sebagai bagian dari manajemen komprehensif pendekatan kedokteran keluarga di wilayah kerja Puskesmas Cikupa. Kami menyediakan intervensi yang berfokus pada pasien dan pendekatan keluarga dan komunitas. Dalam bulan berikutnya, kami melihat perbaikan pada gejala pasien, kembali ke kadar leukosit normal, dan peningkatan nafsu makan, tinggi badan, dan berat badan setelah penerapan rencana terapi yang komprehensif dan holistik. Kasus ini menunjukkan bahwa manajemen holistik dan komprehensif menggunakan pendekatan kedokteran keluarga tidak hanya menangani diagnosis medis tetapi juga faktor keluarga dan komunitas terkait.

I. INTRODUCTION

Tuberculosis (TB) represents a catastrophic threat to childhood health globally, with approximately 205,000 children dying annually from TB, and tragically, 90% of these deaths occur in undiagnosed and untreated cases (Reuter et al., 2020; WHO, 2025). Stunting is height below two standard deviations of WHO child growth standards, this condition affects 148.1 million children globally, representing a chronic manifestation of malnutrition that undermines immune competence and development (PAHO, 2023). These two conditions converge in vulnerable populations, creating a syndemic crisis wherein malnutrition precipitates TB susceptibility while TB disease simultaneously perpetuates nutritional deterioration.

The burden concentrates in resource-limited settings across Southern sub-Saharan Africa, Eastern Europe, and South Asia, where poverty and malnutrition are endemic (Zhong et al., 2025). The Southeast Asia Region bears 34% of the global TB burden, positioning the region as a critical epidemiological hotspot where TB and stunting converge (WHO, 2025). Among children aged 0 to 4 years without access to proper treatment, the mortality risk from TB is alarming, with case fatality ratios reaching 43.6% (95% CI: 36.8%–50.6%), substantially higher than the

14.9% observed in children aged 5 to 14 years (Jenkins et al., 2017).

Within this region, Indonesia represents the epicenter of both crises. In 2024, Indonesia recorded approximately 885,000 new TB cases nearly 10% of the world's total with 135,000 cases occurring in children aged 0-14 years, equivalent to approximately 14 deaths hourly from this preventable disease (Indonesian Ministry of Health, 2025a). Study showes TB in children remains substantially underdiagnosed and underreported, with children representing approximately >50% of all estimated TB cases (Tobing et al., 2023). Simultaneously, national stunting prevalence of 19.8%, down from 21.5% in 2023, yet this figure still represents millions of Indonesian children facing compromised physical and cognitive development (Indonesian Ministry of Health, 2025b).

Malnutrition prevalence in TB-affected children ranges dramatically across contexts, from 7.1% in resource-rich South African settings to 75.2% in Pakistan (Vonasek et al., 2022). This variability reflects differing definitions and diagnostic capacities, yet all studies document that malnutrition substantially increases TB mortality; systematic review of six studies demonstrated unadjusted mortality odds ratios ranging from 2.1 to 9.6 for malnourished children with TB compared to normally nourished counterparts (Vonasek et al., 2022). The epidemiological intersection between TB and stunting is not incidental but rather reflects shared social determinants poverty, food insecurity, overcrowding, and limited healthcare access—that simultaneously drive both conditions in childhood populations (Marais et al., 2014).

A comprehensive 2024 cross-sectional study in Bandung examining 169 under-five children with stunting found that 59.76% (101 children) were diagnosed with active pulmonary TB, with an additional 2.37% (4 children) diagnosed with latent TB infection (Nataprawira et al., 2024). The relationship between stunting severity and TB risk demonstrates a clear dose-response pattern. Stunted children carry 3.5 times increased TB risk (adjusted OR = 3.54, P = 0.004), while severely stunted children face a 9-fold elevated TB risk (adjusted OR = 9.06, P = 0.001) compared to normally nourished peers (Jahiroh et al., 2013).

Stunting in childhood carries profound long-term consequences extending far beyond physical growth, encompassing impaired cognitive development, reduced educational achievement, diminished adult productivity and earnings, and increased susceptibility to chronic diseases in adulthood (de Onis & Branca, 2016). The purpose of this study is to treat a child with TB and stunting comprehensively using a family medicine approach.

II. METHOD

We conducted a family medicine approach on a child patient with TB and stunting in the Cikupa Community Health Center working area. Three home visits were conducted between July and August 2025. In our family medicine approach, we used a genogram to identify inherited diseases and the relationship between the patient and their family. We also used a mandala of health to identify several related factors that could influence the patient's health condition. Additionally, we used the APGAR and SCREEM scores to evaluate the family's physiological and pathological functions, respectively. Our holistic diagnosis encompassed five aspects: personal, clinical, internal, external, and functional. We use interventions through a family approach by providing education regarding the patient's condition, treatment, nutrition and dietary plans, and support and assistance from the family, which can increase the success of therapy.

III. HASIL DAN PEMBAHASAN

A. Hasil Penelitian

A 21-month-old girl came to the Cikupa Community Health Center complaining of a cough that had been present for 1 month. The complaint was accompanied by weight loss and cold sweats at night. The patient first sought treatment in January 2025 with a cough that had difficulty producing phlegm for 1 week, accompanied by a fever with a non-specific pattern, and was given antibiotics, paracetamol, ambroxol, and CTM by the midwife. The patient was advised to undergo a Mantoux test, but her parents refused. The patient returned to the community health center in February 2025 with a cough that had been present for 1 month, accompanied by additional lung sounds in the form of rhonchi. A Mantoux test was performed, and the patient's mother agreed. Two days later, the Mantoux test was read, and a positive induration of 19 mm was obtained. The patient is currently taking OAT FDC in the fifth month. During the treatment for pulmonary TB, the patient's mother reported a decrease

in appetite. In May 2025, the patient was referred to Harapan Mulia Hospital due to shortness of breath and decreased appetite. The patient was hospitalized for approximately 5 days. During treatment, the patient used an NGT for feeding.

Allergy history was denied. Previous similar complaints from the patient and family were denied. The patient's grandmother (who does not live in the same house) was known to have lung disease, but the disease experienced by the patient's grandmother could not be identified. The patient's basic immunization was only up to the age of 4 months, giving the impression that the basic immunization was incomplete. The patient is the second of two siblings. The patient was born full-term vaginally, assisted by a midwife, at 38 weeks gestation with a birth weight of 2885 gram and a body length of 48 cm. During pregnancy, the patient's mother regularly attended ANC and was treated for anemia. Currently, the patient's mother uses an IUD after giving birth to the patient. Based on child development screening using KPSP, the patient's development is in accordance with children of the same age.

The patient was exclusively breastfed until 6 months of age. Breastfeeding continued until 16 months of age, along with complementary foods. Currently, the patient is consuming family foods such as boiled potatoes, biscuits, bread, and eggs. Since teething, the patient has become difficult to feed. The patient's mother stated that the patient often doesn't finish his food, and when he doesn't want to eat, he has a habit of throwing or spitting out the food he is given. The patient regularly drinks SGM Eksplor Gain Optigrow milk as recommended by his pediatrician. The patient's mother makes the milk by mixing 2 spoons of powdered milk with 90 ml of water. The patient is given milk 5 times a day.

The patient lives with his parents, older sibling, grandparents, and grandparents in a one-story house measuring 6 x 12 meters. There are three bedrooms, two separate kitchens, a living room, a family room, a storage room, a multi-purpose room, a front yard, and a toilet. Each room has windows and ventilation. The patient's and his parents' rooms are lit by lamps and do not receive sunlight. Each room has one lamp and one window. Permanent and incidental ventilation in the patient's home are 4.8% and 32.57%, respectively. Clean water is obtained from a water satellite/satellite pump. Daily water consumption is obtained from refilled gallon water. Garbage is disposed of by burning in the backyard, and waste is discharged into the gutter behind the patient's house.

The patient's relationship with her family was good. The family's physiological functioning was assessed using the APGAR score, which consists of adaptation, partnership, growth, affection, and resolve. An APGAR score of 8 indicated good physiological functioning. The family's pathological functioning was assessed using the SCREEM, which consists of social, cultural, religious, educational, economic, and medical criteria. The patient's economic status was considered pathological due to her lower-middle-class family.

Physical examination revealed compos mentis consciousness, no blood pressure measurements, and other vital signs were within normal limits. The patient weighed 8 kg and was 73 cm long. Her nutritional status was good, but she was very short. A chest x-ray revealed rhonchi in both lung fields. Laboratory blood tests revealed microcytic hypochromic anemia (Hb = 10.6 g/dL, MCV/MCH/MCHC = 72/25/35) and leukocytosis (18,900/µL).

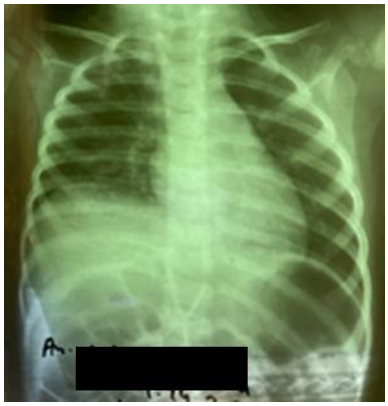

Figure 1. Thorax X-ray of the patient shows bronchopneumonia

From the history and examination that has been carried out, the patient's holistic diagnosis includes (Table 1):

Table 1. Holistic Diagnosis of the Patient

Aspect I (Personal)	Cough for 1 month accompanied by night sweats and weight loss.
Aspect II (Clinical)	Main diagnosis: Pulmonary TB Additional diagnosis: Stunting, Anemia
Aspect III (Internal)	- Lack of knowledge about the disease experienced by the patient. - The patient has difficulty eating and does not finish his food. - The patient is a child who makes himself a population that is vulnerable to a disease. - Incomplete immunization history.
Aspect IV (External)	- Lack of education and knowledge of parents regarding the disease experienced by the patient. - Lack of family knowledge about the importance of basic immunization for patients. - Lack of implementation of clean and healthy living behavior in the patient's family. - Total permanent ventilation in the patient's home is not ideal. - Inadequate waste processing and disposal of household waste. - The socioeconomic status of the patient's family is lower middle class. - The patient's home environment is densely populated.
Aspect V (Functional)	Cannot be assessed yet.

A comprehensive and holistic management plan is implemented for patients. Interventions are patient-focused, with a family and community approach (Table 2).

Table 2. Holistic and Comprehensive Patient Management Plan

Holistic and Comprehensive Patient Management Plan	
Patient-focused Intervention	- Continuing OAT FDC therapy for Children Category and administering symptomatic medication according to the patient's complaints and symptoms. - Educate to use masks and practice proper cough etiquette. - Educate to consume foods high in protein, calorie, and iron. Avoid consuming ice, tea, snacks, and chocolate.
Family-approach Intervention	- Explaining the patient's illness. - Explaining he importance of parental and family support for the patient's recovery. - Educate regarding the importance of basic immunization for patients. - Encourage patient's mother to monitor her children's growth and development regularly at the nearest Community Health Center or Integrated Health Post. - Educate families to improve clean and healthy living behavior. - Educate families not to manage household waste by burning it in the backyard. - Provide patients with small but frequent meals high in protein, calories, and iron. - Separate the patient's eating utensils and personal items from other family members. - Conduct TB disease tracing around the patient's family and check her grandmother's condition regarding chronic lung disease.
Community-approach Interventions	- Collaborate with local cadres and RT to conduct home visits due to financial constraints of the patient's family. - Conduct TB disease tracing around the patient and their residence.

B. Discussion

This case illustrates the profound diagnostic challenge that TB presents in very young children, a reality that global health experts increasingly recognize as a critical barrier to TB control in pediatric populations. The persistent cough and failure to thrive that characterized this 21-month-old girl's presentation are deceptively nonspecific symptoms that could easily be attributed to numerous other common childhood conditions, such as upper respiratory tract infections or aspiration, thereby delaying diagnosis and allowing disease progression (Tristram & Jain, 2024). The patient's initial encounter in January 2025 when seeking treatment for a one-week cough with fever and receiving broad-spectrum antibiotics exemplifies how pediatric TB frequently mimics other infections, causing clinicians to treat presumptively for bacterial bronchitis or pneumonia rather than suspecting mycobacterial disease (WHO, 2020).

The patient's parents' initial refusal of the Mantoux test reflected a common challenge in pediatric TB programs, parental hesitance regarding diagnostic testing yet this refusal delayed confirmation until February 2025, underscoring how missed diagnostic opportunities in the first months of illness can result in prolonged disease duration, increased symptoms, and continued transmission within the household (Maphalle et al., 2022). When the Mantoux test was finally performed and demonstrated an

induration of 19 millimeters, this result provided objective evidence of TB infection; the tuberculin skin test, while sensitive with specificity varying based on BCG vaccination status and environmental mycobacteria exposure, confirmed TB infection in this young child (Loh, 2011). The positive Mantoux test combined with the clinical presentation of chronic cough, weight loss, and night sweats, together with radiological evidence of bronchopneumonia on chest X-ray, fulfilled diagnostic criteria for pulmonary TB despite the absence of microbiological confirmation (Marais et al., 2010).

The child lived in a three-generation household with her parents, sibling, and paternal and maternal grandparents, creating household crowding and multi-generational contact with older family members. Regardless of the existence of social vulnerability, the use of the genogram contributes to the promotion of the child's complete health care (Leoncio et al., 2017). The genogram documented that the paternal grandmother, who does not live in the same house, was known to have unidentified chronic lung disease, representing a potential TB exposure risk that required investigation and clarification regarding whether this grandmother had been a household contact or source of infection (Bahar et al., 2022). The genogram further documented the family's lower-middle-class socioeconomic status and the mother's history of anemia during pregnancy, contextualizing the nutritional insufficiency and anemia predisposing the child to both TB and stunting (Bahar et al., 2022).

The mandala of health assessment systematically identified contributing factors across multiple ecological domains affecting this child in a crowded household (Bahar et al., 2022). Biologically, the child had incomplete immunization (vaccines only until 4 months of age), documented anemia, leukocytosis, and bronchopneumonia on imaging. Psychologically, the child exhibited feeding difficulties and food refusal behaviors since teething that limited nutritional intake. Socially, the family lacked knowledge regarding TB transmission, treatment adherence, and immunization importance (Bahar et al., 2022). Environmentally, the home had inadequate permanent ventilation (4.8%), improper waste disposal through backyard burning, household crowding with multiple family members in limited space, and insufficient water/sanitation infrastructure obtained from satellite pumps—factors enabling TB transmission and perpetuating malnutrition (Bahar et al., 2022).

The family APGAR score of 8 out of 10 indicated good physiological functioning in adaptation, partnership, growth, affection, and resolve—suggesting the family possessed relational strengths that could support the sick child despite economic constraints (Takenaka et al., 2016; Bahar et al., 2022). The SCREEM assessment identified critical areas requiring intervention: educational deficits regarding TB disease and immunization; lower-middle-class economic status creating material deprivation in food, housing, and water access; and healthcare barriers including distance and limited-service utilization (Bahar et al., 2022). The SCREEM assessment clarified that the family's poverty directly drove both TB and stunting through inadequate nutrition, crowded housing, and limited healthcare engagement (Bahar et al., 2022).

Patient-focused interventions centered on continuation of child-friendly fixed-dose combination anti-TB therapy ensuring accurate dosing and adherence (WHO & UNICEF, 2017). Symptomatic medications addressed respiratory symptoms and fever, while education on mask use and cough etiquette promoted infection control (WHO, 2020). Nutritional interventions specified foods high in protein, calories, and iron while avoiding appetite suppressors, addressing the child's documented anemia and malnutrition (Hartadi & Suryaningsih, 2025). The patient's hospitalization requiring nasogastric tube feeding highlighted the need for intensive nutritional support during severe TB (Indonesian Ministry of Health, 2025a).

Family approach intervention operationalized the five family health tasks essential for TB management (Syamsir et al., 2024). Task 1 identifying health problems with addressed through clear TB education explaining transmission from the grandmother, disease progression, and curability through treatment (WHO, 2020). Task 2 informed decision-making with emphasized family support as essential to treatment success and involved collaborative problem-solving (Syamsir et al., 2024). Task 3 providing care included training

on medication administration, recognition of danger signs, and emotional support throughout the 6-month treatment course (Syamsir et al., 2024). Task 4home environment adaptation with addressed identified environmental hazards through education on handwashing, respiratory hygiene, improved ventilation, and proper waste disposal (WHO, 2020; Bahar et al., 2022). Task 5healthcare service utilization and encouraged regular growth monitoring at community health facilities as objective measures of treatment response and nutritional recovery (Bahar et al., 2022).

Community-level interventions recognized that documented economic constraints limited the family's facility-based care access, making home visits by community health workers (cadres) and neighborhood leaders (RT) an essential strategy for equitable TB management (Bahar et al., 2022; Salazar-Austin et al., 2025). Home-based TB contact management demonstrates substantially superior outcomes compared to facility-based care, with 73% TB preventive therapy completion versus 63% in facility-based approaches, translating to meaningful improvement in treatment adherence and disease outcomes (Salazar-Austin et al., 2025). Home visits conducted between July and August 2025 enabled direct assessment of treatment response and nutritional status, observation of the family's implementation of environmental modifications, identification of adherence barriers and collaborative problem-solving, delivery of ongoing education, and screening of other household members for TB symptoms (Amare et al., 2023).

Within the next month, we saw improvements in the patient's symptoms, a return to normal leukocyte levels, and an increase in appetite, height, and weight following the implementation of the all-encompassing and holistic therapy plan. This suggests that the family medicine-based intervention was effective and should be continued.

Systematic household contact investigation identified that while the paternal grandmother with unidentified chronic lung disease does not live in the home, she remains a potential TB contact requiring evaluation and TB screening to determine if she has TB disease requiring treatment or TB infection requiring preventive therapy (WHO, 2020; Kaswaswa et al., 2022). Additionally, investigation of household members residing with the patient (parents, older sibling, maternal and paternal grandparents in the home) was essential to identify any TB symptoms or TB infection, with provision of TB preventive therapy (typically 6 months of isoniazid) to asymptomatic TB-infected contacts to reduce their risk of progression to TB disease (WHO, 2020).

IV. CONCLUSION AND SUGGESTION

A. Conclusion

This case demonstrates that the family medicine approach utilizing genogram analysis, mandala of health assessment, APGAR and SCREEM evaluation, and holistic five-aspect diagnosis enables comprehensive understanding of how TB and stunting emerge from interconnected social determinants of poverty, inadequate nutrition, crowded housing, poor sanitation, and health system weakness. The systematic application of patient-focused, family-approach, and community-level interventions including anti-TB therapy, nutritional rehabilitation, family health education on the five family health tasks, home environmental modification, and home visits by community health workers provided this child with integrated, equitable care addressing not only her medical diagnoses but also related family and community factors.

B. Suggestion

The discussion in this study is still limited. A more comprehensive, in-depth study of the family medicine approach to children with TB and stunting is urgently needed as a suggestion for future authors.

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