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Nurses' Perspectives on Challenges to Parental Compliance in Childhood Tuberculosis Therapy: Qualitative Study

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ABSTRACT

Parental adherence is critical to the successful treatment of pediatric pulmonary tuberculosis (TB) and the prevention of drug resistance. This study explored nurses' perspectives on barriers to parental adherence in the management of childhood TB. A qualitative phenomenological approach was employed. Semi-structured, in-depth interviews were conducted with 10 nurses who had at least five years of experience in pediatric TB care at Prof. Dr. Chairuddin P. Lubis Hospital, Universitas Sumatera Utara. Participants were recruited through purposive and snowball sampling techniques. Data were analyzed using Colaizzi's thematic analysis framework. Three major themes emerged: challenges in the clinical management of pediatric TB, barriers to treatment adherence, and nursing interventions to address treatment obstacles. Nurses described emotional burden, fear of infection, complex treatment regimens, workload pressures, limited parental health literacy, socioeconomic difficulties, stigma, and premature discontinuation of treatment when children showed clinical improvement. Effective management of pediatric TB requires family-centered nursing approaches, clear communication, psychosocial support, and multidisciplinary collaboration. Improving nurse-to-patient ratios and strengthening nurses' communication competencies may enhance parental adherence and contribute to better long-term treatment outcomes.

Keyword: Parental Compliance, Pediatric Pulmonary Tuberculosis, Multi-Drug Resistance, Health Education, Tuberculosis

1. Introduction

Tuberculosis (TB) remains a major global public health challenge, with children, adolescents, and young mothers among the populations at greatest risk. In pediatric populations, TB is frequently underdiagnosed or diagnosed late, increasing the likelihood of severe complications, permanent sequelae, and mortality (Huynh et al., 2025). Indonesia currently bears the second-highest TB burden worldwide, with an estimated 821,200 cases. According to the United Nations Children's Fund (UNICEF, 2025), children account for approximately 17% of all reported TB cases in the country.

Pediatric tuberculosis transmission most commonly occurs within the household environment through exposure to infected adults, particularly parents or caregivers who remain undiagnosed or possess limited awareness of TB symptoms and transmission mechanisms. As a result, children are exposed to Mycobacterium tuberculosis through inhalation of aerosolized droplets generated by coughing or sneezing, as well as through prolonged close contact with infectious individuals. (Patel et al., 2024).

In the management of pediatric tuberculosis (TB), parents play a central role as the primary providers of Directly Observed Therapy (DOT). However, treatment adherence is often compromised by a combination of internal factors, including caregiver psychological distress and limited health literacy, as well as external barriers such as socioeconomic hardship, poor drug palatability, and prolonged treatment regimens (Anugrah et al., 2026). Non-adherence not only increases the risk of treatment failure but also contributes to the development of Drug-Resistant Tuberculosis (DR-TB), which is associated with substantially greater clinical complexity, longer treatment duration, and higher healthcare costs (Anugrah et al., 2026; Rhamelani et al., 2026).

Parental engagement is fundamental to both the prevention and successful treatment of pediatric tuberculosis (TB). Caregivers, particularly mothers, contribute significantly to reducing transmission risk by maintaining appropriate hygiene practices, ensuring adequate nutritional support, and improving household awareness of TB symptoms and preventive measures (Aja et al., 2024). Given that children are generally unable to independently manage complex treatment regimens, parental involvement remains a critical determinant of adherence to long-term TB therapy (Fernandes et al., 2024). In addition to supervising medication intake, parents are responsible for monitoring treatment-related side effects, supporting children's physical and emotional well-being, and encouraging continued adherence throughout the treatment period. Moreover, caregivers function as an essential intermediary between the child and healthcare providers, facilitating access to health services, reinforcing treatment instructions, and ensuring consistent compliance with prescribed medication regimens (Fernandes et al., 2024).

Pediatric tuberculosis (TB) treatment is often challenged by barriers to parental adherence, particularly limited caregiver knowledge regarding TB symptoms, transmission pathways, and the importance of maintaining treatment compliance. Caregivers frequently misinterpret the early manifestations of TB as common respiratory illnesses, such as influenza or other non-specific febrile conditions, which can delay diagnosis and treatment initiation (Shitol et al., 2023). According to Tola et al (2020), parental non-adherence may result in serious clinical consequences, including treatment failure, the development of drug-resistant tuberculosis, secondary complications, disease recurrence, and adverse effects on child growth and development.

As the primary link between the healthcare system and the family, nurses play a pivotal role in providing the education, guidance, and psychosocial support required to translate clinical recommendations into sustained home-based treatment adherence (Syahrir et al., 2025). Through their continuous interactions with caregivers, nurses directly observe the daily challenges faced by families, including financial hardship, social stigma, and other barriers that are often overlooked by standardized treatment protocols. Although the provision of high-quality clinical care is central to nursing practice, several barriers may limit nurses' ability to perform this role effectively. These include decisional uncertainty, insufficient knowledge of pediatric rights, and limited understanding of institutional policies (Bawah et al., 2024). Such challenges may reduce nurses' capacity to provide effective education, motivation, and ongoing support for caregivers. Consequently, when adequate nursing guidance is lacking, caregivers are more likely to deviate from prescribed medication schedules and clinical recommendations, thereby compromising treatment adherence and therapeutic outcomes (Fadare et al., 2020).

Barriers that hinder nurses in improving parental adherence to pediatric tuberculosis (TB) treatment often originate within the healthcare work environment. Heavy workloads frequently limit the time available for nurses to provide structured and comprehensive education to caregivers, thereby reducing the effectiveness of adherence support and pediatric TB management (Baluku et al., 2023). Furthermore, research conducted by An et al. (2023) in Cambodia reported that limited human resources, inadequate staff capacity in managing childhood tuberculosis, and insufficient collaboration between healthcare facilities remain significant barriers perceived by nursing professionals. Similarly, Rezaee et al. (2020) found that workforce shortages often require nurses to assume responsibilities beyond their professional scope of practice, while hierarchical and non-collaborative relationships between nurses and physicians further impede efforts to improve parental medication adherence. Psychological and occupational challenges also represent important barriers to effective nursing practice, including fear of occupational exposure to TB during patient care, concerns regarding

needlestick injuries, social stigma associated with caring for patients with TB, and inadequate workplace social support (Baluku et al., 2023).

The low levels of nursing competence also represent an internal barrier that negatively affects multiple aspects of healthcare delivery, including patient safety and the quality of nursing care (Adusumelli et al., 2024). Inadequate nursing skills may impair communication effectiveness and limit nurses' ability to establish trust and empathy with caregivers, thereby reducing their capacity to educate parents about the importance of adhering to prescribed treatment regimens (Comellas et al., 2018).

While quantitative research has established the prevalence of parental non-adherence, substantial gaps remain in understanding how nursing professionals experience and navigate these challenges in their daily clinical practice. A critical policy–practice gap persists, as existing clinical guidelines often fail to address the sociocultural complexities and systemic barriers encountered by nurses when supporting parental adherence to pediatric tuberculosis (TB) treatment. Consequently, this study adopts a phenomenological approach to explore nurses' perspectives on the challenges associated with parental adherence to childhood TB therapy. By examining nurses' lived professional experiences, this study seeks to identify the informal strategies they employ, the professional dilemmas they encounter, and the multidimensional barriers that influence parental adherence in the management of pediatric TB.

2. Methods

2.1. Research Design

This study employed a qualitative research design using a phenomenological approach to explore and understand the lived experiences of participants within their daily professional practice (Polit & Beck, 2018). Specifically, a descriptive phenomenological approach was adopted to provide an in-depth understanding of nurses' experiences and to capture the essence of the challenges they encounter in the provision of pediatric tuberculosis (TB) care.

2.2. Population and Sample

The participants in this study were nurses involved in the care of pediatric tuberculosis (TB) patients at Prof. Dr. Chairuddin P. Lubis Hospital, Universitas Sumatera Utara. A purposive sampling strategy was employed to recruit participants who met the following inclusion criteria: (1) actively employed in the pediatric inpatient ward; (2) possessing a minimum of five years of clinical experience in pediatric TB care; (3) willing to participate voluntarily; and (4) able to communicate effectively in the Indonesian language. Based on these criteria, a total of 10 nurses were recruited. To enhance the richness of the data and broaden participant recruitment, a snowball sampling technique was subsequently applied. Initial participants were invited to identify and refer other nurses who met the study's inclusion criteria and were willing to participate in the research.

2.3. Data Collection

The study was conducted between May and December 2025. Data were collected through semi-structured, in-depth interviews conducted by the principal researcher, with each interview lasting approximately 45–60 minutes. The study was undertaken at Prof. Dr. Chairuddin P. Lubis Hospital, Universitas Sumatera Utara. This setting was selected because it serves as a major referral center for tuberculosis (TB) management and houses a specialized pulmonology clinic. Preliminary observations revealed a high number of recurrent pediatric TB cases, with many children presenting with relapsed clinical conditions. This pattern suggested suboptimal treatment adherence and highlighted an important gap in compliance with recommended pediatric pulmonary TB treatment guidelines. All interviews were conducted in a private room within the pediatric inpatient unit to ensure participant privacy and confidentiality. An interview guide was developed to explore the following areas: (1) nurses' experiences in providing pediatric pulmonary TB care; (2) challenges encountered during clinical practice; (3) factors influencing parental treatment adherence; (4) barriers to the implementation of TB therapy; and (5) nursing strategies used to overcome these challenges. To ensure methodological rigor and trustworthiness, the study incorporated the following qualitative strategies: (1) prolonged engagement, involving a two-day period of rapport building to establish trust and gain contextual understanding of the clinical setting; (2) persistent observation, focusing on verbal and non-verbal expressions to enhance the depth and credibility of the findings; (3) field notes, documenting non-verbal behaviors and environmental contexts to complement the interview data; (4) audio recording and verbatim transcription, ensuring accurate capture and preservation of participants' narratives; (5) method triangulation, integrating

interview data, observations, and field notes to achieve a comprehensive understanding of the phenomenon; (6) data saturation, whereby participant recruitment ceased after 10 interviews when no new themes or insights emerged; and (7) member checking, in which preliminary interpretations were verified with participants to ensure that the findings accurately reflected their lived experiences.

2.4. Data Analysis

The qualitative data were analyzed using Colaizzi's descriptive phenomenological method. Following the completion of the interviews, all audio recordings were transcribed verbatim. The transcripts were then integrated with the researchers' field notes to ensure a comprehensive and contextualized dataset. The analysis began with repeated readings of the transcripts to achieve a deep understanding of the participants' lived experiences and to identify significant statements relevant to the research objectives. These statements were subsequently organized into formulated meanings and clustered into themes that reflected the essence of nurses' experiences. As described by (Polit & Beck, 2018)., Colaizzi's method emphasizes the phenomenological interpretation of participants' verbatim accounts, enabling researchers to identify, organize, and interpret interconnected themes that accurately represent the phenomenon under investigation.

2.5. Trustworthiness

To ensure the trustworthiness of the findings, this study adhered to the evaluative framework proposed by Lincoln and Guba (1985), which encompasses four key criteria: credibility, dependability, confirmability, and transferability. Credibility was established through prolonged engagement with participants and the conduct of in-depth interviews, supported by audio recordings and detailed field notes to capture the richness and contextual nuances of participants' experiences. Dependability was enhanced by maintaining a systematic audit trail and implementing a consistent research process, including the use of a standardized interview guide and the rigorous, sequential application of the Colaizzi method for data analysis. Confirmability was ensured by grounding all emergent themes in participants' verbatim accounts and preserving the raw data, including interview transcripts and audio recordings, thereby enabling transparency and auditability throughout the analytical process. Finally, transferability was strengthened by providing rich, contextualized descriptions of the clinical setting and participant characteristics, enabling readers to assess the applicability of the findings to comparable pediatric healthcare contexts.

2.6. Ethics Approval

This study was conducted in accordance with established ethical principles and received ethical approval from the Health Research Ethics Committee of Universitas Sumatera Utara (Approval No. 1007/KEPK/USU/2025).

3. Results

3.1. Characteristics of participants

As presented in Table 1, the study included 10 nurses currently working in the pediatric inpatient ward. All participants were female, ranging in age from 30 to 42 years, and had between 6 and 13 years of clinical experience in pediatric nursing. All held a Bachelor of Nursing degree and had obtained professional nursing licensure. With respect to ethnic background, the majority of participants identified as Javanese.

Table 1 Characteristics of participants

Participants	Gender	Age	Religion	Ethnic group	Education	Length of time working in the pediatric inpatient ward	Work unit
P1	Female	33 year	Islam	Batak	Bachelor of Nursing Profession	8 year	Children's inpatient room
P2	Female	30 year	Islam	Java	Bachelor of Nursing Profession	8 year	Children's inpatient room
P3	Female	38 year	Christian	Batak	Bachelor of Nursing Profession	6 year	Children's inpatient room
P4	Female	42 year	Christian	Batak	Bachelor of Nursing Profession	13 year	Children's inpatient room

Table 1 Continued

Participants	Gender	Age	Religion	Ethnic group	Education	Length of time working in the pediatric inpatient ward	Work unit
P5	Female	35 year	Islam	Java	Bachelor of Nursing Profession	7 year	Children's inpatient room
P6	Female	31 year	Christian	Batak	Bachelor of Nursing Profession	8 year	Children's inpatient room
P7	Female	34 year	Islam	Java	Bachelor of Nursing Profession	6 year	Children's inpatient room
P8	Female	36 year	Islam	Java	Bachelor of Nursing Profession	7 year	Children's inpatient room
P9	Female	39 year	Islam	Java	Bachelor of Nursing Profession	7 year	Children's inpatient room
P10	Female	36 year	Christian	Batak	Bachelor of Nursing Profession	9 year	Children's inpatient room

3.2. Themes and Sub-themes

Following a rigorous analysis using Colaizzi's descriptive phenomenological method, three overarching themes emerged that captured the barriers experienced by nurses in promoting parental adherence to pediatric tuberculosis (TB) management.

Table 2 Themes and sub-themes nurses' perspectives on challenges to parental compliance in childhood tuberculosis therapy

Themes	Sub-themes
Challenges in clinical management of pediatric tuberculosis	Psychosocial and emotional burden Fear of the risk of infection Complexity of care
Impediments to enhancing pediatric tuberculosis treatment adherence	Intrinsic nursing barriers External and systemic barriers
Nursing interventions and strategies to mitigate barriers in pediatric tuberculosis treatment	Cultivating effective communication and rapport with caregivers Clinical interventions in pediatric tuberculosis management Adaptive nursing approaches and family-centered education

Theme 1: Challenges in clinical management of pediatric tuberculosis

The challenges experienced by nurses in providing care for children with tuberculosis (TB) vary considerably and are often influenced by their years of professional practice and clinical experience. These challenges encompass emotional strain, concerns regarding occupational exposure to infection, and the inherent complexities of delivering pediatric TB care. The present study identified three overarching themes that characterize these barriers: emotional burden, fear of infection, and the clinical complexity of pediatric TB management.

Sub-themes 1: Psychosocial and emotional burden

Nurses providing care for children with tuberculosis (TB) experience considerable psychosocial and emotional challenges arising from the prolonged and complex nature of TB treatment, compounded by the unique developmental needs of pediatric patients. These circumstances require comprehensive, patient-centered care and sustained clinical vigilance. Observing the physical deterioration of young children, particularly manifestations such as profound weakness and substantial weight loss, often evokes strong feelings of empathy and compassion among nurses. These emotional responses are reflected in the following participant account:

"*I feel sorry for a small child who has to drink so much medicine, especially if a child patient comes back because of a relapse, what will happen? Our work is in vain" (P3)*

Nurses described experiencing sadness and emotional distress when witnessing the physical deterioration of children with chronic pulmonary symptoms. The coexistence of a persistent cough and marked physical frailty created a psychologically demanding care environment, requiring nurses to balance the delivery of

therapeutic interventions with sensitivity to the child's visible suffering. This emotional complexity is reflected in the following participant account:

"The condition of the child who has been coughing for a long time has become so skinny that it makes us sad when we give him medicine" (P1)

Sub-themes 2: Fear of the risk of infection

Providing care for children with tuberculosis (TB) inevitably raises concerns regarding the risk of occupational exposure and nosocomial transmission. These concerns arise from the recognition that TB is a highly communicable infectious disease that poses a potential risk to both patients and healthcare professionals. Frequent and prolonged contact with children undergoing TB treatment may increase the likelihood of exposure to *Mycobacterium tuberculosis*, often resulting in heightened anxiety and reinforcing the need for strict adherence to infection prevention and control measures. This concern is reflected in the following participant account:

"*It's a mix of caring for a child with TB, it's a shame, it's also a worry, it's all there for the TB child" (P1)*

Nurses reported that their fear of infection extended beyond concerns for their own health to include the potential risk of transmitting tuberculosis (TB) to their family members. They recognized that inadequate adherence to infection prevention and control measures during clinical practice could increase the likelihood of household transmission following occupational exposure. This concern regarding the potential transmission of TB within the home is reflected in the following participant account:

"So I'm just afraid that if I don't protect myself, I'm afraid I could bring germs home... and infect everyone in my house later..." (P5)

Sub-themes 3: Complexity of care

These challenges are particularly evident in ensuring the timely administration of anti-tuberculosis medications. Nurses bear the professional responsibility of administering medications according to strict therapeutic schedules, such as in the early morning before meals, leaving little flexibility for delaying or rescheduling doses, as may be feasible in the management of other conditions. Consequently, effective treatment requires not only the child's readiness but also close collaboration with family members to ensure strict adherence to the prescribed medication regimen.

"In terms of taking medication, for children with TB, it has to be at the right time, at 6 in the morning, they have to take it before eating, so it's different from other children, who can wait after eating." (P8)

Nurses perceived the management of childhood tuberculosis (TB) as a multifaceted process that extends beyond pharmacological treatment to encompass comprehensive caregiver education. This educational component was considered integral to successful treatment, as the effectiveness of the therapeutic regimen depends largely on the family's understanding of and adherence to recommended care practices. The significance of this responsibility is reflected in the following participant account:

"It's a bit difficult to care for children with TB because we have to educate their families to take TB medication... because TB medication... you can't... you can't just give it to anyone" (P4)

Theme 2: Impediments to enhancing pediatric tuberculosis treatment adherence

The provision of care for children with tuberculosis (TB) involves numerous challenges that hinder nurses' efforts to promote parental adherence to treatment regimens. These challenges extend beyond the clinical aspects of care and encompass both internal professional and external factors. The internal challenges include workload-related fatigue, psychological distress, and limitations in specialized knowledge and clinical competencies related to pediatric TB care. The external challenges comprise parental non-adherence, the child's fluctuating physical condition throughout the course of treatment, persistent sociocultural stigma surrounding TB, and institutional constraints, including limitations in hospital resources and facilities.

Sub-themes 1: Intrinsic nursing barriers

The internal barriers refer to the challenges experienced personally by nurses in the course of providing care. Nurses frequently encounter workload-related fatigue resulting from high clinical demands. This condition typically arises when patient volume increases while the number of nursing personnel remains limited, leaving nurses physically and emotionally exhausted and compromising their ability to deliver optimal care. These challenges were described by several participants as follows:

"There is an excess workload, so we are also a bit overwhelmed when there are a lot of patients... and

the number of nurses is small... it's like one nurse can divide up the tasks..." (P3)

The shortage of nursing personnel was also identified as a key factor contributing to increased clinical workloads. Participants reported that inadequate staffing intensified their caregiving responsibilities, requiring additional physical and emotional effort to maintain the quality and standards of nursing care. This concern was expressed by the following participant:

"We are short of nurses, so it feels like the workload is a bit excessive" (P1)

The findings revealed that a perceived lack of specialized knowledge and clinical competencies in pediatric tuberculosis (TB) management constituted a significant barrier to promoting parental adherence to treatment. Participants emphasized that continuous professional development is essential for integrating current evidence-based practices into clinical care. Although the hospital provides support through regular training programs and workshops, nurses underscored the importance of these initiatives in strengthening their competencies and enhancing their capacity to support parental adherence to the prescribed treatment regimen. This perspective was reflected in the following participant accounts:

"The training support earlier, hospitals should routinely provide training or workshops related to pediatric TB for health workers, especially nurses..." (P5)

Sub-theme 2: External and systemic barriers

The external barriers encountered in the provision of care for children with tuberculosis (TB) pose significant challenges to nurses' efforts to promote parental adherence to treatment. These barriers arise from factors beyond the nurses' direct control, particularly those related to family dynamics, patient-specific factors, persistent sociocultural stigma surrounding TB, and institutional constraints within the healthcare system.

The primary external barrier identified by nurses was related to parental factors, including non-adherence to treatment recommendations, limited health literacy, and ineffective communication. Participants observed that although parents often appeared to understand the education and guidance provided, they frequently encountered difficulties in consistently implementing the recommended treatment regimen. This concern was expressed by the following participant:

"We educate him about medication compliance, but he just says yes or nods but doesn't do it" (P4)

Parental non-adherence was particularly evident when children began to show signs of clinical improvement. Nurses reported that some caregivers prematurely discontinued treatment after perceiving their child to have fully recovered following the resolution of symptoms. This observation was reflected in the following participant account:

"After taking the medicine, when he saw that his child was healthy... he could play around, he wanted to stop the treatment even though it wasn't the right treatment" (P3)

The findings further revealed that limited parental health literacy regarding childhood tuberculosis (TB) constitutes a significant external barrier to treatment adherence. Participants indicated that this limited health literacy was often associated with parents' educational backgrounds, which were generally perceived to be inadequate for understanding the complexities of TB management. These educational limitations reduced caregivers' ability to comprehend the health information and treatment instructions provided by nurses. This challenge was reflected in the following participant account:

"They think TB is an adult disease or is only contagious if there is a family member with a history of severe coughing in the house" (P10)

Theme 3: Nursing interventions and strategies to mitigate barriers in pediatric tuberculosis treatment

To address the barriers encountered in the management of childhood tuberculosis (TB), nurses implemented a range of adaptive strategies to support parental adherence to treatment. These strategies emerged in response to the multifaceted challenges encountered throughout the course of care, including those related to the child's clinical condition, parental factors, persistent sociocultural stigma, and institutional constraints within the healthcare system. The findings were organized into three overarching themes: effective communication with caregivers, clinical management strategies for childhood TB, and nurses' professional attitudes in responding to challenges encountered in clinical practice.

Sub-themes 1: Cultivating effective communication and rapport with caregivers

Effective communication between nurses and parents emerged as a key strategy for overcoming barriers to the management of childhood tuberculosis (TB) and promoting parental adherence to treatment. Adopting an open, empathetic, and approachable communication style fostered a supportive therapeutic relationship,

enabling parents to participate more actively and confidently in the child's care. This approach is reflected in the following participant account:

"Building trust from parents because parents must be sure first that what we are doing is for the good of their children" (P9)

The strategic use of language and tailored communication approaches emerged as essential components of effective caregiver education in childhood tuberculosis (TB) management. Nurses reported that using clear, non-technical language facilitated caregivers' understanding of the differences between childhood TB and TB in adults. By employing simple, accessible terminology, avoiding complex medical jargon, and delivering health education at an appropriate pace, nurses enabled caregivers to process and comprehend the information more effectively. This communication strategy was reflected in the following participant account:

"Use language that is easy to understand, so first explain that TB in children is different from TB in adults" (P8)

Sub-themes 2: Clinical interventions in pediatric tuberculosis management

The clinical strategies implemented by nurses to optimize outcomes for children with tuberculosis (TB) extended beyond the administration of pharmacological treatment to encompass interdisciplinary collaboration and the active involvement of families in the care process. The findings identified three key components of these strategies: the provision of supportive care while awaiting diagnostic test results, collaboration with the interprofessional healthcare team, and parental involvement throughout the child's care. Initially, these strategies focused on meeting the child's fundamental physiological needs, particularly through monitoring fluid balance and providing nutritional support to maintain hemodynamic stability and overall clinical condition during treatment. This approach was reflected in the following participant account:

"If the results of the examination take a long time, I will help with other treatments, for example, focusing on fluids... or also the child's nutrition" (P4)

Nurses also collaborated closely with the interprofessional healthcare team, particularly pediatricians, to manage specific clinical conditions and treatment-related concerns. For example, when children experienced persistent vomiting or when caregivers expressed concerns regarding diagnostic test results, nurses communicated these findings to the attending physician and collaborated in determining appropriate subsequent interventions. This collaborative practice was reflected in the following participant account:

"Most often it's with a doctor, a pediatrician, for example if the child vomits excessively, if the parents don't believe me, I'll report it to the doctor" (P9)

Sub-themes 3: Adaptive nursing approaches and family-centered education

Nurses demonstrated considerable adaptability in responding to challenges encountered in clinical practice, frequently using routine interactions to establish rapport with parents. By fostering a supportive, empathetic, and approachable environment, nurses encouraged caregivers to communicate more openly and become more receptive to health education and clinical guidance. This adaptive approach involved continuously assessing each family's unique circumstances, enabling nurses to tailor their interpersonal communication and educational strategies accordingly. This professional adaptability was reflected in the following participant account:

"Because every family's circumstances are different, so it usually has to be adjusted to the family's character." (P4)

Nurses also used routine clinical encounters, such as meal delivery, as opportunities to strengthen rapport with parents. By initiating informal conversations about the well-being of both the child and the caregiver, nurses sought to create a supportive and approachable environment that encouraged parents to communicate more openly and become more receptive to the health education provided. This relationship-building strategy was reflected in the following participant account:

"For example, like I said earlier, when delivering food, we don't just talk about the child's development... we also ask the mother, 'Have you eaten, ma'am? How was your sleep? Is your child fussy?' So the atmosphere is more relaxed, and they can feel comfortable and slowly become willing to listen." (P1)

4. Discussion

4.1. Challenges in clinical management of pediatric tuberculosis

Managing childhood tuberculosis (TB) is inherently complex because of the unique physiological and developmental needs of children, who often present with substantial physical impairment and require

comprehensive, family-centered care. Beyond clinical competence, nurses require considerable emotional resilience to manage the psychological demands of caring for children with TB, including concerns regarding occupational exposure to infection, which may affect their confidence in delivering comprehensive parental education. TB care has been described as a highly demanding area of clinical practice because of the emotional burden associated with witnessing patient suffering, concerns regarding occupational exposure to infection, and the complexities of TB management (Matakanye et al., 2019). Less experienced nurses frequently experience emotional distress and profound empathy when caring for children with TB, particularly when confronted with treatment-related complications such as vomiting and visual disturbances (Amuge et al., 2024).

The physical deterioration and social consequences experienced by children with tuberculosis (TB) impose a substantial emotional burden on nurses. Caring for these patients requires nurses to balance professional responsibilities with the emotional distress associated with witnessing the adverse effects of the disease on children's physical well-being, daily functioning, and social interactions. Nursing professionals have been reported to experience profound sadness and feelings of helplessness when performing pediatric TB diagnostic procedures, particularly when children must be physically restrained to obtain diagnostic specimens and subsequently undergo prolonged, multi-stage treatment (Joshi et al., 2023). Similarly, nurses have been shown to experience a strong sense of professional responsibility for the outcomes of children with TB, recognizing them as a highly vulnerable population. This heightened sense of responsibility contributes to concerns regarding parental adherence to preventive therapy and follow-up care, particularly because opportunities for direct clinical monitoring become substantially limited after hospital discharge (Moverman et al., 2020).

4.2. Impediments to enhancing pediatric tuberculosis treatment adherence

Adherence to treatment for childhood pulmonary tuberculosis (TB) is a critical determinant of therapeutic success, particularly because of the prolonged duration of treatment. Although nurses serve as key intermediaries between clinical requirements and the psychosocial needs of families, their ability to fulfill this role is often constrained by both systemic and individual barriers. Factors such as excessive workload, emotional exhaustion, and limited professional support can substantially compromise the effectiveness of nursing interventions aimed at promoting parental adherence to treatment. These barriers may also impair nurses' clinical reasoning and decision-making abilities, thereby limiting their capacity to provide comprehensive, family-centered care. The competencies most adversely affected include communication skills and critical thinking, both of which are essential for delivering effective TB care (Zeleke et al., 2021). In addition, the global shortage of healthcare personnel within TB services further intensifies these challenges. Workforce shortages have been identified as a major contributor to excessive workloads, occupational stress, burnout, and psychological distress among healthcare professionals (Wang et al., 2024). Similarly, high patient volumes have been associated with increased workplace stress, particularly in specialized TB care settings that require intensive monitoring and continuous clinical supervision (Abdulla et al., 2022). Furthermore, inadequate specialized training may result in deficiencies in the knowledge and clinical competencies required for pediatric TB care, thereby reducing nurses' ability to establish therapeutic relationships, demonstrate empathy, and provide effective health education to children and their families (Comellas et al., 2018).

Adherence to treatment for childhood tuberculosis (TB) is strongly influenced by the socioeconomic and educational characteristics of caregivers. Caregivers with lower educational attainment, financial constraints, and limited TB-related health literacy are more likely to experience difficulties in adhering to the prescribed treatment regimen (Laghari et al., 2021). Non-adherence commonly manifests as the premature discontinuation of medication following perceived clinical improvement, missed doses due to forgetfulness, or inconsistent adherence to the prescribed dosing schedule (An et al., 2023). In addition, caregivers may discontinue treatment because of concerns about adverse drug reactions experienced by the child. Limited formal education, particularly at the primary or junior secondary school level, has also been associated with reduced capacity to understand complex medical information and treatment instructions (Gao & Luo, 2024). Furthermore, medication refusal among children due to poor palatability, adverse effects, and treatment-related discomfort poses substantial challenges for both caregivers and healthcare providers in maintaining treatment adherence (Mcinziba et al., 2025). Collectively, these findings suggest that limited caregiver health literacy, together with the practical challenges associated with medication administration and children's limited understanding of treatment, constitutes a major barrier to successful childhood TB management.

Treatment adherence among children with tuberculosis (TB) is strongly influenced by the characteristics and circumstances of their caregivers. Caregivers with lower educational attainment, financial constraints, and limited TB-related health literacy are more likely to experience difficulties in adhering to their children's treatment regimens (Laghari et al., 2021). Non-adherence commonly manifests as the premature discontinuation of medication when the child appears to show clinical improvement, missed doses due to forgetfulness, or inconsistent adherence to the prescribed treatment schedule (An et al., 2023). In addition, concerns regarding adverse drug reactions experienced by the child may prompt caregivers to discontinue treatment prematurely. Limited formal education, particularly at the primary or junior secondary school level, has also been associated with reduced capacity to understand medical information and treatment instructions (Gao & Luo, 2024). Furthermore, medication refusal among children due to poor palatability, adverse effects, and treatment-related discomfort presents considerable challenges for both caregivers and healthcare professionals in maintaining treatment adherence (Mcinziba et al., 2025). Consistent with these findings, the present study also identified children's limited understanding of the disease and its treatment as an important factor complicating the management of childhood TB. Beyond educational and treatment-related challenges, sociocultural factors also influence caregivers' adherence to TB treatment. Parents may delay seeking a diagnosis or avoid explicitly referring to the disease as TB because of concerns about the social stigma and negative consequences associated with the diagnosis for the family (Leddy et al., 2022). This reluctance reflects the persistent influence of TB-related stigma on health-seeking behavior and acceptance of the diagnosis. In addition, treatment-related decisions are often influenced by the opinions and approval of senior or influential family members, underscoring the collective nature of healthcare decision-making in many cultural settings (Leddy et al., 2022).

4.3. Nursing interventions and strategies to mitigate barriers in pediatric tuberculosis treatment

Establishing therapeutic trust between nurses and parents is essential for addressing barriers in childhood tuberculosis (TB) management and enhancing the effectiveness of health education. When trust is established, caregivers are more likely to adhere to prescribed treatment regimens and communicate openly about challenges encountered during care. By fostering a supportive environment, nurses extend their role beyond clinical providers to become collaborative partners who are responsive to the psychosocial dynamics of families. Consistent with Meira et al. (2025), these findings indicate that bidirectional communication among healthcare providers, children, and caregivers is more effective than unidirectional instruction. Such communication approaches improve adherence to community-based TB therapy by enhancing caregivers' understanding of treatment duration, the risk of disease recurrence, and the importance of completing the full course of therapy. Similarly, Rangkuti et al. (2025) demonstrate that empathetic and adaptive communication fosters a supportive environment in which families feel acknowledged and validated. This sense of being understood significantly strengthens caregiver motivation and commitment to adhering to pediatric TB treatment protocols.

To enhance parental receptivity, nurses deliberately adjusted their tone of voice to ensure it remained calm, respectful, and non-patronizing, thereby facilitating open communication. In the context of Batak Toba culture, where everyday speech may be perceived as relatively firm, nurses engaged in cultural adaptation to ensure that their intonation was not misinterpreted as assertiveness or hostility. These adjustments were essential for establishing professional rapport grounded in mutual respect and sensitivity to family dynamics. Consistent with Solanas et al. (2022), these findings indicate that cultural values and social experiences shape nursing communication, meaning that communication cannot be entirely neutral, as tone and assertiveness are inevitably influenced by sociocultural context. Similarly, Taylan and Weber (2023) emphasize that adapting communication to the cultural and emotional context of families constitutes an essential professional competency. Such cultural attunement is crucial for building therapeutic trust and ensuring that health education is effectively received and applied by caregivers.

Consistent with Bedoya et al. (2023), these findings underscore the importance of multidisciplinary collaboration and caregiver education in the management of childhood tuberculosis (TB). Nurses play a central role in demonstrating medication administration techniques and managing clinical complications such as vomiting. Furthermore, Rangkuti et al. (2025) report that active family involvement and emotional support are key determinants positively associated with treatment adherence and improved quality of life for children. In situations of treatment refusal, nurses act as mediators by engaging extended family members to facilitate consensus while respecting family autonomy in accordance with ethical and legal principles. Similarly, Márquez et al. (2025) emphasize that adherence to pediatric TB treatment is strongly influenced by caregiver

engagement and family dynamics. Given the influence of socioeconomic and educational factors on treatment outcomes, a uniform approach is insufficient; instead, a tailored strategy that integrates educational and psychosocial interventions based on each family's context is necessary to optimize therapeutic success.

5. Conclusion

The clinical management of childhood tuberculosis (TB) is a multifaceted challenge that extends beyond medical treatment to encompass complex psychosocial and systemic barriers. The findings of this study indicate that nursing effectiveness in promoting treatment adherence is constrained by a combination of external and internal factors. Externally, limited caregiver health literacy and persistent sociocultural stigma contribute to delayed help-seeking behaviors, non-adherence, and concealment of the diagnosis. Internally, nurses experience high workloads and psychological distress, which may increase the risk of burnout and compromise the continuity and quality of care. Nevertheless, the findings also highlight the pivotal role of nurses in the therapeutic process. Through therapeutic communication, cultural adaptation, and multidisciplinary collaboration, nurses can help mitigate these barriers and support improved adherence to treatment. To optimize outcomes in childhood TB, healthcare systems should move beyond standardized protocols toward flexible, family-centered approaches that prioritize caregiver education and provide adequate emotional and professional support for nurses. Future research should further develop the evidence base for nursing interventions aimed at improving parental adherence to pediatric TB regimens. In particular, subsequent studies should evaluate the effectiveness of family-centered care models, nursing-led psychosocial support, and tailored communication strategies in strengthening adherence and informing evidence-based practice.

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