

Roadmap towards ending TB in children and adolescents

Third edition



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Roadmap towards ending TB in children and adolescents, third edition

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**Roadmap towards
ending TB in children
and adolescents**
Third edition
(2023)



2023

Preface

This third edition (referred to as the 2023 Roadmap) of the *Roadmap towards ending TB among children and adolescents* is an update to the 2013 and 2018 versions. The 2023 Roadmap recognizes the progress made over the past five years and outlines priorities and key actions designed to accelerate progress towards the targets elaborated during the 2023 United Nations General Assembly High-Level Meeting on the fight against TB. Implementation of these key actions at the global, regional, national and sub-national levels in the context of Universal Health Coverage (UHC) is expected to find and treat more children and adolescents with tuberculosis (TB) disease or TB infection, to prevent TB, to improve treatment outcomes and prevent TB-associated disability.

The 2023 Roadmap retains the strong focus on TB in children, while also emphasizing the importance of addressing TB among adolescents, and for the first time, among pregnant and post-partum women. Adolescents also have high rates of TB and have specific age-related needs that should be considered to improve outcomes. The inclusion of pregnant and post-partum women reflects the heightened risk of TB disease in this group and the ability to improve the lives of mothers, their infants and other family members, by preventing or addressing TB.¹ The 2023 Roadmap also recognizes the potential impact of climate change on poverty and diseases related to poverty – such as TB – and of possible future pandemics that may affect children and adolescents disproportionately, as was the case during the COVID-19 pandemic. Efforts to address pandemics and the health-related impacts of climate change need to consider these vulnerable populations.

The 2023 Roadmap is aligned with the 2022 World Health Organization (WHO) consolidated guidelines and operational handbook on the management of TB in children and adolescents. Its development has benefitted immensely from technical inputs by the core team of the Child and Adolescent TB Working Group throughout the process, and from additional inputs from the working group members and country representatives during a stakeholder consultation. To set the scene for the 2023 Roadmap, Ciara Goslett from South Africa shared her emotional story of surviving multidrug-resistant TB; we salute her bravery and ongoing advocacy efforts. We are also grateful to those who provided examples of the implementation of interventions to address TB in children, adolescents and pregnant and post-partum women that are included in text boxes.

WHO looks forward to continued collaboration with TB survivors, community, civil society, technical and financial partners to advocate and facilitate implementation of the key actions highlighted in the 2023 Roadmap. Every child and adolescent has the right to life and health, which are key principles highlighted in the *Convention of the Rights of the Child*. Children and adolescents are our future – together, we have an opportunity to improve their health, well-being and opportunities in life by preventing and managing TB.



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¹ The terms 'pregnant' or 'post-partum' women are used in the Roadmap. However, the term 'woman' is intended to be inclusive of all those who identify as women and/or who give birth. While the majority of people who are pregnant or can give birth are cisgender women (who were born and identify as female), WHO acknowledges the importance of the experiences of transgender men and other gender diverse people who have the reproductive capacity to give birth.

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Abbreviations

ART	antiretroviral therapy
CAD	computer-aided detection
CAWG	Child and Adolescent TB Working Group
CHW	community health worker
COVID-19	coronavirus disease
CSO	civil society organization
CXR	chest x-ray
DR	drug-resistant
DS	drug-susceptible
DSD	differentiated service delivery
EPTB	extrapulmonary TB
GDF	Global Drug Facility
HBC	high-burden country
HLM	High-Level Meeting
iCCM	integrated community case management
IMAI	integrated management of adolescent and adult illness
IMNCI	integrated management of newborn and childhood illness
IPD	individual patient data
MAF-TB	multisectoral accountability framework for TB
MDR	multidrug-resistant
NSP	national strategic plans
NTP	national tuberculosis programme
PADO-TB	Paediatric Drug Optimization for TB
PIP	paediatric investigational plans
PK	pharmacokinetic
R&D	research and development
SDGs	Sustainable Development Goals
STPI	Stop TB Partnership Indonesia
TB	tuberculosis
TDR	Special Programme for Research and Training in Tropical Diseases
TPT	TB preventive treatment
UHC	universal health coverage
UN	United Nations
UNICEF	United Nations Children’s Fund
WG	working group
WHO	World Health Organization
wMRD	molecular WHO-recommended rapid diagnostic test
XDR	extensively drug-resistant

1 Tuberculosis in children and adolescents: taking stock

The United Nations Sustainable Development Goals (SDGs) provide a global policy framework for the progress that is expected to be achieved by 2030 in terms of health, education, reduction of inequalities and economic growth (1). SDG3 calls for “ensuring healthy lives and well-being for all, at all ages”. Specific targets incorporated into this goal relate to maternal and child health, the burden of major communicable diseases, including tuberculosis (TB), universal health coverage (UHC) and access to safe, effective, high quality and affordable essential medicines and vaccines for all. Both the WHO *End TB Strategy* (2) and the *Global Strategy for Women’s, Children’s, and Adolescent’s Health (2016–2030)* (3) are fully aligned with the SDG policy framework, defining the key advances that would contribute to SDG3, and recognizing that progress under this goal cannot be achieved in isolation but is interlinked with comprehensive advances across the entire SDG framework.

The 2020 report by the World Health Organization (WHO), the United Nations Children’s Fund (UNICEF) Lancet Commission entitled “A future for the world’s children” (4) and the 2022 progress report on the *Global Strategy for Women’s, Children’s, and Adolescent’s Health (2016–2030)* (5) each assessed progress towards relevant SDGs. Despite the improvements in survival, nutrition and education made over the past two decades, both reports highlight that maternal, child and adolescent health and well-being are still challenged by both old and new threats, including climate change and emerging outbreaks of infectious diseases. Both reports emphasize the importance of a multisectoral approach to effectively tackle these threats, and discuss the data gaps that are hindering accurate monitoring of progress towards SDG targets in children, adolescents and pregnant women. In addition, The WHO–UNICEF–Lancet Commission report makes a call for placing child and adolescent health and well-being at the centre of the SDG agenda and provides recommendations on how this can be achieved.

Addressing TB in children and adolescents can indeed contribute to achieving SDG3 targets, but for relevant progress to be achieved the guiding principles outlined in the Lancet Commission report and in the WHO *End TB Strategy* (2,6) need to be effectively applied to TB policies, programming and implementation. The unique needs of children and adolescents should be placed centrally across the spectrum of interventions, specific multisectoral approaches benefitting these populations should be critical components of implementation, and data frameworks that can specifically monitor progress in these populations should be readily available.

Over the past few years, there have been several important achievements related to TB prevention and care among children (i.e. aged below 10 years) and adolescents (aged 10–19 years). The inclusion and visibility of children and adolescents in global TB policies and agendas has increased significantly; paediatric formulations of TB medicines to treat drug-susceptible (DS) and drug-resistant (DR) TB are commercially available; and research efforts have informed the design of effective models of care as well as the use of shorter treatment regimens and improved approaches to TB diagnosis, leading to the release of updated consolidated guidelines and

operational handbook on the management of TB in children and adolescents in 2022 (7,8). However, progress in addressing the gaps in TB case finding and in access to TB preventive treatment (TPT) in children and adolescents has been limited. Consequently, TB remains a top ten cause of under-5 mortality (9) and the major infectious disease causing morbidity and mortality in adolescents (along with HIV) (10).

To set the scene, Box 1 contains the story of a young TB survivor from South Africa.

Box 1



***I cried, I carried on,
I conquered: MDR-TB
can be cured!***



A young girl’s testimony on her battle against TB

My name is Ciara Goslett from Cape Town, South Africa. When I was 11 years old, I contracted multidrug-resistant (MDR) TB from my twin brothers, who were 19 years old then and both completed their treatment and recovered. However, my two uncles living in the same household did not fully adhere to their TB medication and both developed the more severe extensively drug-resistant (XDR) TB. Sadly, both passed away in 2016.

When I developed TB symptoms – including night sweats, coughing, chest pain and difficulty breathing – my mom took me to the local clinic where I was asked to provide a sputum sample for TB testing. However, I returned to school soon afterwards and only received my positive test result two weeks later. My mom fetched me from school immediately. I was shocked and confused and started to cry when she called my grandmother and mentioned that I had MDR-TB. Although I had no idea what TB was, I just sensed that it was something bad from my mom’s expression. She took me to the clinic the following day, where I started second-line TB treatment.

I took 17 tablets every day. This was very hard to swallow, literally and figuratively, at that young age. I initially took most of my medication at home, sometimes staying up until 02:00 in the morning, battling to finish taking the tablets in stages, as it made me nauseous. I also received amikacin injections at the clinic daily. Later I was admitted to the children’s ward at Brooklyn Chest Hospital (BCH) in Cape Town, where I was placed in the isolation section. Arriving at the hospital was a scary experience and I was shivering, shaking and vomiting in the taxi from fear of being separated from my family. However, after a few weeks I made new friends and settled into the routine and the new environment. It became a positive experience in the end because the hospital staff were caring and kind. I also attended school on the premises and the teachers took us to the nearby public library and the park every week. On a recent visit to BCH I was pleasantly surprised when many of the medical staff still remembered me and one of my teachers is now the BCH school principal.

However, it was a very difficult time. I suffered many side-effects from the medicines. The clofazimine tablets made my skin tone much darker and it made my complexion go extremely red in the sun. The moxifloxacin tablet had a very bad taste. I recall a small round yellow tablet which made me nauseous. With the amikacin, I experienced some irritation and tenderness at the injection site, followed by a strange sensation running down my leg. I still have flashbacks about taking the medicines, and so I have difficulty taking any form of medicine to this day.

Dealing with stigma is a big challenge. I was bullied and called names. At the public school, my peers called me “tomato” because of the clofazimine side-effects. Being isolated from my family members was also hard. People feared TB and before I went to the hospital, my family feared getting infected. I also lost friends. This fear continued after I completed treatment. Even today, eight years after being cured of MDR-TB, some people ask me if I am TB-free before engaging with me comfortably.

Research should seek to reduce the number of tablets children need to take and their side-effects. The treatment period should be reduced to the shortest possible, for both drug-susceptible and MDR-TB. Better flavours need to be explored for medicines such as moxifloxacin and the injections with severe side-effects should not be used any longer!

I would like to call on world leaders to act now and invest in implementing the most recent TB guidelines in their countries as fast as possible. Over 1 million children and young adolescents get sick with TB every year. I don’t want them to go through the painful experience that I went through. It is time for change. Together we can end TB!

In 2022, there were an estimated 1.25 million children and young adolescents (0–14 years old) who fell ill with TB, but 51% of those were not diagnosed or not reported to national TB programmes. The gap is even more substantial in children under five years of age, with 58% of estimated children affected by TB being missed, compared to 30% of people aged 15 years and above (11).

The number of children and young adolescents (0–14 years) notified with TB increased steadily between 2014 and 2019. However, the detrimental impact of the coronavirus disease (COVID-19) pandemic and related restrictions on availability and accessibility of health services reversed this progress, with 2020 notifications dropping back to 2014 levels, reflecting lower levels of TB detection and a potential increase in community transmission (12). The impact of the pandemic on TB notifications disproportionately affected children, especially the youngest ones, when compared to adults. Compared with the predicted number of notifications of people with TB in 2020, notifications dropped by 35.4% for children 0–4 years of age, by 27.7% for those aged 5–14, and 18.8% in people aged 15 years and above (13). Data from the *Global Tuberculosis Report 2023* show that notifications in children and young adolescents are back on track, with the highest number of notifications (613 000) since reporting started in 2012, although the detection gap remains wide at over 50% (11).

The detection gap is even more dramatic when we consider multidrug-resistant (MDR) TB. Modelling estimates suggest that 25 000–32 000 children and young adolescents fall ill with MDR-TB annually (14, 15) but that of these, more than 80% are either undiagnosed or unreported, and likely not receiving appropriate treatment (11).

Achieving optimal coverage of TPT is also critical to protect children and adolescents exposed to TB, including those living with HIV, from developing TB disease. But estimates show that the coverage of TPT initiation among eligible child contacts aged under 5 years has stagnated in recent years. In 2022, only 37% of 1.56 million eligible household contacts under 5 years accessed TPT and coverage was even lower for household contacts above 5 years, with only 11% out of 11.4 million started on TPT (11). While the coverage of TPT among people living with HIV (PLHIV) has improved substantially in recent years (11), coverage among children and adolescents with HIV cannot be accurately monitored as age-disaggregated data are not available at the global level.

The health of infants and young children strongly depends on the health of their mothers. Maternal TB² poses a substantial risk of morbidity to both the pregnant woman and the newborn. If not diagnosed and treated in a timely manner, TB can lead to increased neonatal morbidity, low birth weight, prematurity as well as obstetric complications (16). Congenital TB is rare but can be challenging to diagnose and represents a serious threat to the infant. After delivery, neonates born to mothers affected by TB are at high risk of developing TB disease (17). As a result, effectively addressing TB in infants and young children cannot be separated from effectively addressing maternal TB. However, the burden of TB in pregnant and post-partum women is poorly characterized (18), making it challenging to define the size of the problem and to respond accordingly.

As a result of the gaps in TB diagnosis and prevention described above, progress towards the targets set out in the 2018 United Nations General Assembly High-Level Meeting on the fight against TB (UN-HLM) (19) has not been sufficient (11) (see Fig. 1):

- 71% of the 2018 target for the number of children and young adolescents diagnosed and started on TB treatment have been achieved by 2022.
- For the target for children and young adolescents started on treatment for MDR/rifampicin-resistant (RR) TB by 2022 only 19% of the target has been achieved.
- Progress towards achieving the UN-HLM targets for TPT coverage among household contacts has also been slow, with only 55% and 10% of the targets for TPT provision in child contacts <5 years and >5 years being achieved by 2022, respectively.
- In contrast, important progress has been made on the coverage of TPT among PLHIV (including children), where the agreed targets were achieved by the end of 2021.

In September 2023, at the second UN-HLM on the fight against TB, renewed commitments to address TB in children and adolescents have been defined. New targets include reaching 90% of the estimated number of people who develop TB with quality assured diagnosis and treatment, and supporting them to complete treatment. This translates to providing life-saving treatment for up to 45 million people between 2023 and 2027, including up to 4.5 million children and up to 1.5 million people with drug-resistant tuberculosis. 90% of people at high-risk of developing TB will be provided with preventive treatment by 2027, which translates to providing TPT to 30 million household contacts of people with TB, including children, and approximately 15 million people living with HIV (total target 45 million). All people with TB should have access to a health and social benefits package so they do not have to endure financial hardship because of their illness. The political declaration also commits to urgently scaling up comprehensive efforts to close longstanding gaps in prevention, diagnosis, treatment and care of children with or at-risk of TB. It recognizes TB as an important preventable cause

² 'Maternal TB' refers both to TB during pregnancy and the post-partum period.

of childhood illness and death, including among children with HIV and as a co-morbidity of other common childhood illnesses, especially pneumonia, meningitis and malnutrition. This should be done by implementing relevant WHO guidance and policies to improve equitable access to screening, prevention, testing and treatment services, particularly to vaccines and formulations of TB medicines for children, as part of comprehensive integrated primary health care (20). This renewal is important as it provides the basis to build on the progress made so far and further advance the fight against TB among children, adolescents, as well as pregnant and post-partum women.

These targets present an opportunity to galvanize global efforts to end TB, including through investment in innovative interventions.

The approach to develop the third edition of the *Roadmap towards ending TB in children and adolescents* (hereafter referred to as the Roadmap) included consultation with the core team of the Child and Adolescent TB Working Group, taking into consideration recent updates to WHO guidance on the management of TB in children and adolescents (7,8). In addition, a virtual stakeholder consultation was conducted in April 2023, followed by internal and external peer review. Members of the working group were invited to develop illustrative text boxes based on lessons learned and best practices. These were reviewed and selected ensuring geographical balance and relevance.

The aim of the Roadmap is to define the coordinated actions that must be prioritized and implemented over the next five years to significantly reduce TB-related morbidity and mortality in children and adolescents, and to decrease the TB burden in pregnant/post-partum women.

The Roadmap first takes stock of progress made against the key actions in the second edition of the Roadmap (21). It then identifies the persistent and new challenges that prevented achievement of the 2018 UN-HLM targets.

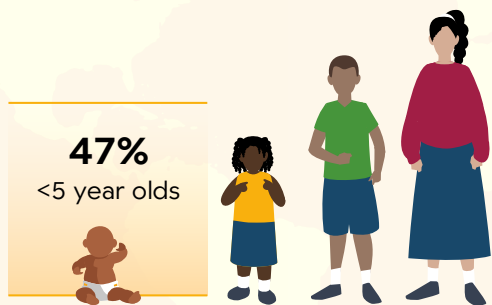
The Roadmap then proposes priority actions to address these challenges. It highlights key areas where the specific needs of children, adolescents, as well as those of pregnant and post-partum women, must be considered and prioritized in order to foster enabling policies, and implement health interventions, service delivery strategies and research and development (R&D) efforts that effectively address gaps. Key actions are presented under four headings: (i) political leadership, multisectoral engagement and accountability and sustained advocacy efforts; (ii) addressing persistent policy-practice gaps; (iii) implementation of people-, family- and community-centred strategies; and, (iv) addressing persistent gaps in data and shortfalls in research and development.

The ultimate measure of success will be whether all children, adolescents and pregnant/postpartum women – including the most vulnerable and neglected – are able to access high quality, comprehensive and people-centred health care services for TB prevention, diagnosis, treatment and care. Such services should be available under the umbrella of universal health coverage (UHC) and social protection, without people incurring catastrophic costs for themselves and/or their families, and without experiencing stigma or discrimination.

Progress and persistent gaps in addressing TB among children and adolescents

10.6 million TB among all ages in 2022 → 1.3 million TB deaths in 2022

1.25 million children (0–14 years) developed TB in 2022 (12% of all TB) → 214 000 TB deaths in 2022 (16% of all TB deaths)



727 000 adolescents

(10–19 year-olds) developed TB in 2012 (Snow et al, 2018) (22)



Among deaths in HIV-negative children and young adolescents 0–14 years,

76% were in children <5 years



96% of deaths occurred in children who did not access TB treatment

(Dodd et al, 2017) (23)



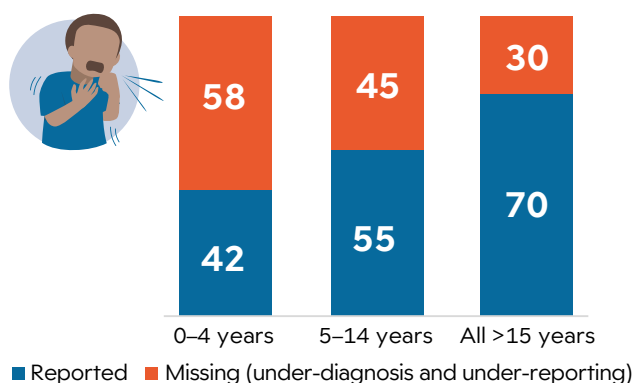
31 000

(14%) TB deaths in the 0–14 year age group were among children living with HIV

Treatment coverage gap

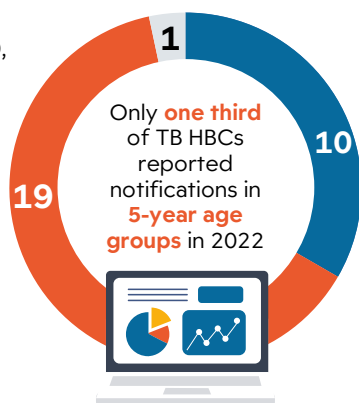
The treatment coverage gap remains **highest among the youngest children**

% of missing persons with TB in different age groups (2022)



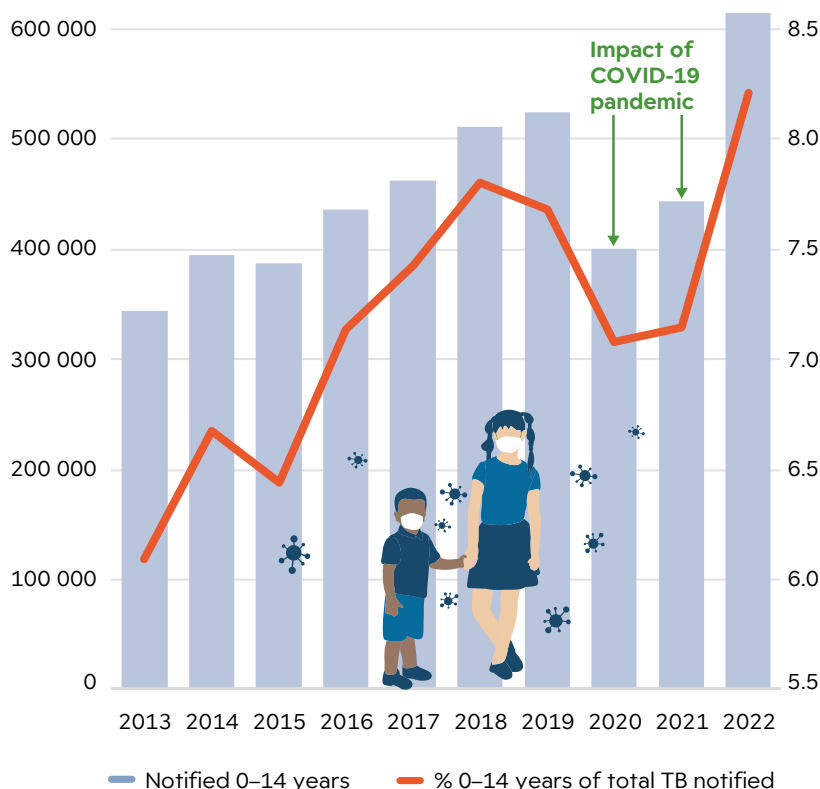
Age group reporting by 30 TB HBCs

- 0–4, 5–9, 10–14, 15–19, 20–24, 25–34, 35–44, 45–54, 55–64, 65+
- 0–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65+
- 0–4, 5–14, 15+

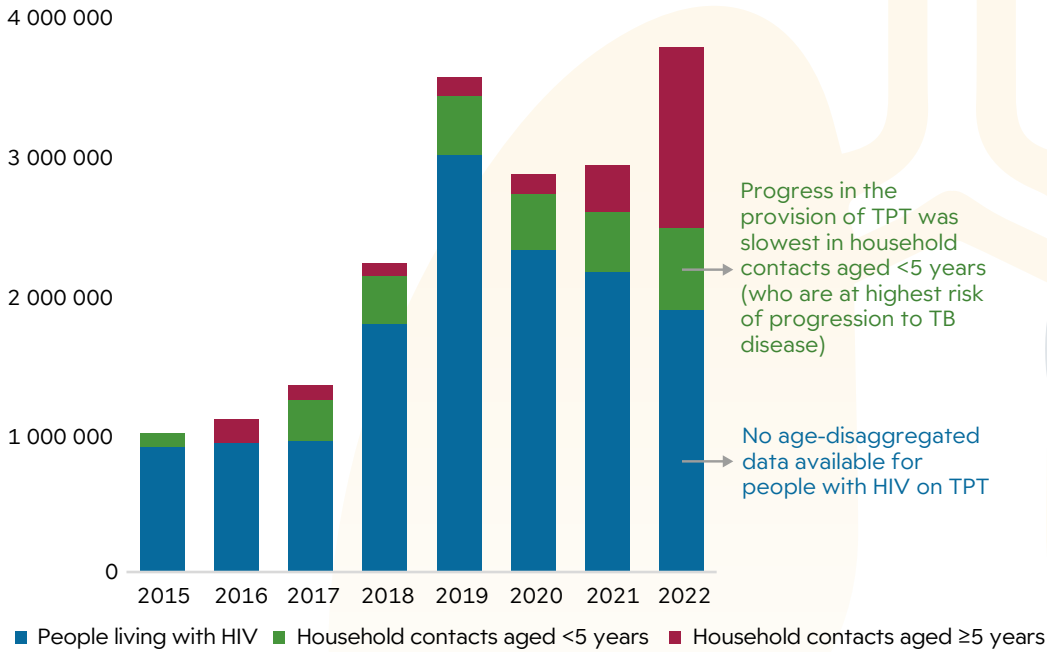


The COVID-19 pandemic had a **disproportionate impact** on notifications with **delayed recovery** in the youngest age groups, compared to adults (see arrows in graph below). Notifications were **back on track** in 2022 with the highest number of notifications and % of all TB notified to date.

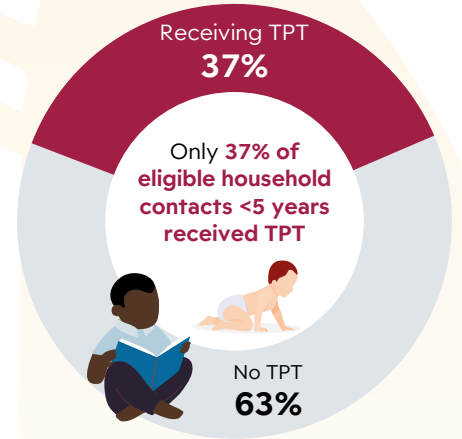
Trends in case detection in children and young adolescents (0–14 years), 2013–2022



TB prevention gap



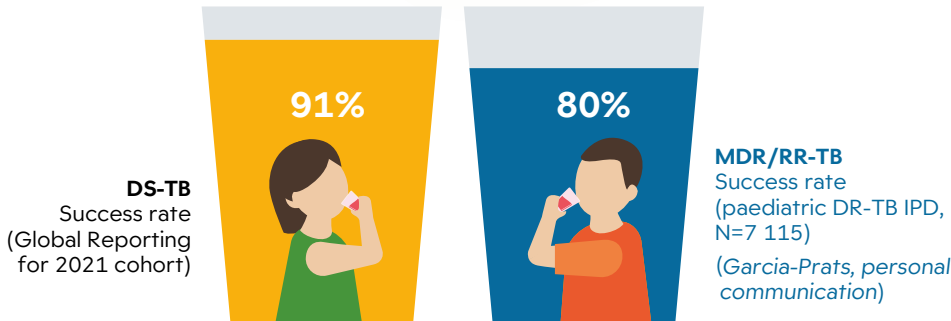
Access to TPT in child contacts <5 years



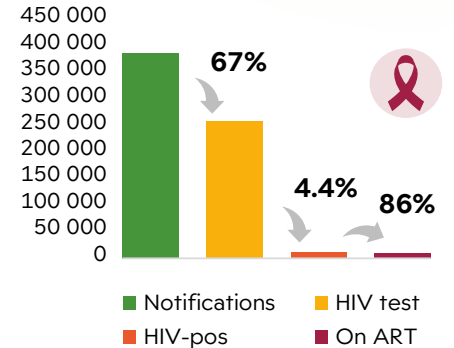
Treatment outcomes

TB/HIV care cascade

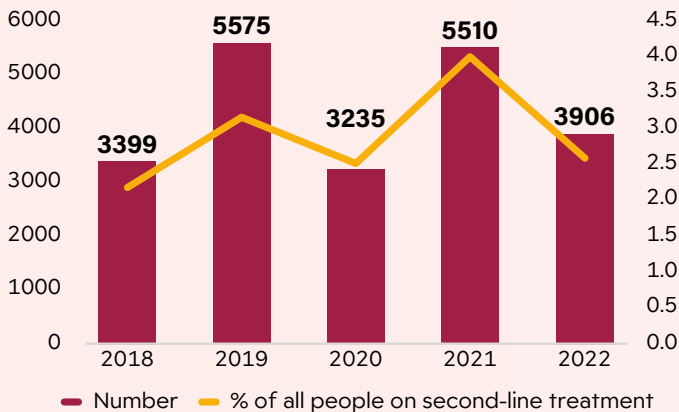
Treatment outcomes DS- and MDR/RR-TB in 0–14 years



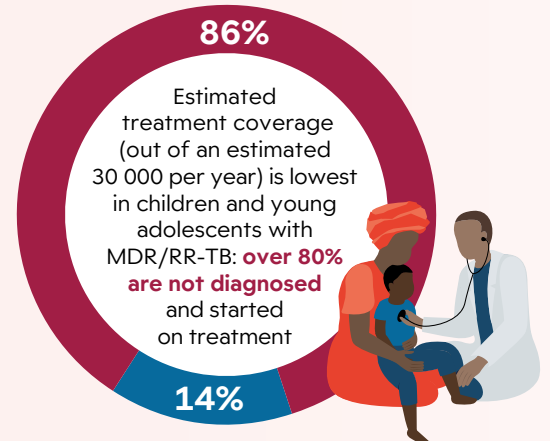
0–14 years in 20 TB/HIV HBCs



Second-line treatment initiation in 0–14 years, 2018–2022



MDR/RR-TB in children and young adolescents

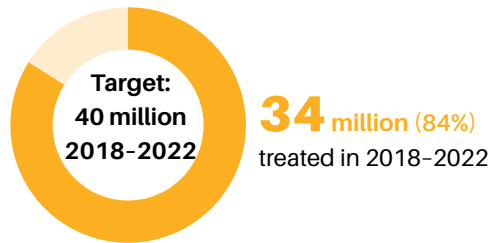


(Jenkins et al, 2014 (14); Dodd et al, 2016) (15)

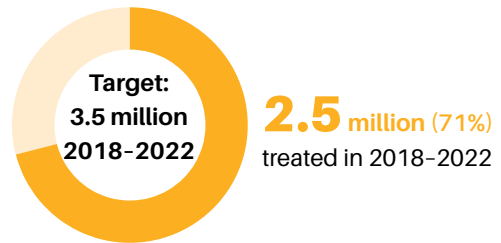
Fig.1. Progress against 2018 UN-HLM TB targets for children and related gaps (11)

Treatment for DS- and DR-TB

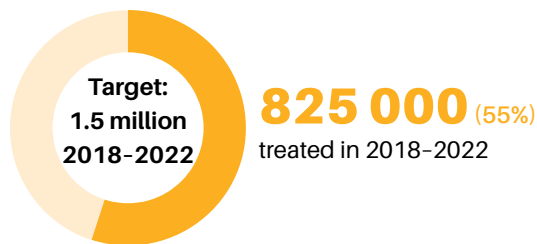
TB treatment (all ages)



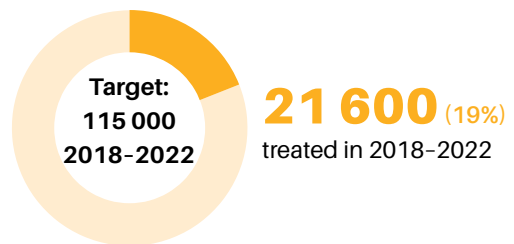
TB treatment (children)



MDR/RR-TB treatment (all ages)

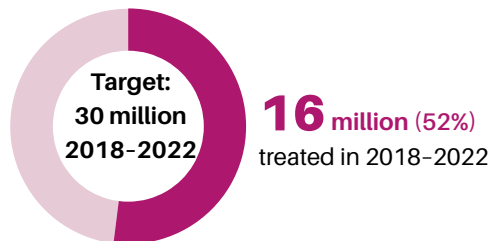


MDR/RR-TB treatment (children)

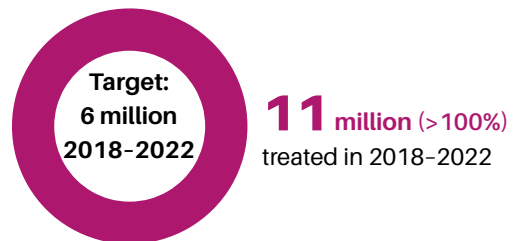


TB Preventive Treatment

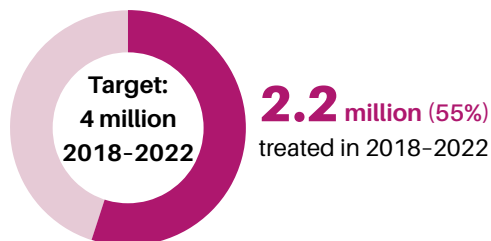
All ages



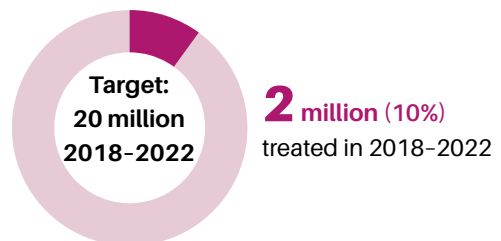
People living with HIV



Household contacts aged <5 years



Household contacts aged ≥5 years



2 The 2018 Roadmap: key achievements and remaining challenges

2.1 Key achievements

The 2018 Roadmap (second edition) (21) included 10 key actions that were considered critical to ensuring prioritization of children and adolescents in all TB prevention and care activities. This section summarizes the main achievements related to those key actions (Table 1).

Successful global advocacy efforts have increasingly highlighted the challenges faced by children and adolescents with TB, and their families, promoting the inclusion of these populations in international policies and calls to action on TB, as well as increased attention from donor organizations. There has also been more recognition of the specific needs of children and adolescents in global TB-focused R&D. The establishment of national (technical) working groups (WGs) and appointment of focal persons for TB in children and adolescents has improved, although with wide variability among countries (24,25). Reviews of national TB programmes often include experts in TB management among children and adolescents, and the specific aspects related to TB in these populations are now more systematically assessed. This has led to greater inclusion of specific interventions that address TB among children and adolescents in national planning documents.

Studies to optimize treatment regimens and diagnostic approaches for the detection and management of TB in children and adolescents have been completed and have informed relevant policy and implementation guidance. In addition, a growing number of operational research studies focusing on children and adolescents have been implemented in TB high-burden settings, generating new evidence and lessons learnt that could contribute to closing persistent TB case-finding and prevention gaps. Importantly, this also includes additional evidence on the association between malnutrition and TB among children, as well as approaches for TB detection in children affected by various comorbidities (such as HIV, malnutrition and pneumonia).



Paediatric formulations of medicines for treating DS- and DR-TB in children, as well as for TPT, have been made commercially available. Based on data received from the Stop TB Partnership/Global Drug Facility (GDF), by the end of 2022, paediatric dispersible fixed-dose combinations for treatment of DS-TB have been procured by more than 100 countries by the end of 2022 (GDF personal communication). For treatment of DR-TB, paediatric formulations of bedaquiline and delamanid have been procured by 53 and 41 countries, respectively. An increasing number of countries are procuring paediatric second-line medicines. In addition, 96 countries (including 23 of the 30 TB high-burden countries (HBCs)) have rolled out shorter TPT regimens: 3HR in 58 countries; 3HP in 56 countries (11).³

Evidence-based consolidated guidelines on the management of TB in children and adolescents were published by WHO in March 2022 (7). The new guidelines comprehensively summarize the available evidence on diagnostic approaches, treatment and models of care, while an

³ 3HR: isoniazid plus rifampicin daily for 3 months; 3HP: isoniazid plus rifapentine weekly for three months.

accompanying operational handbook (8) provides practical guidance and considerations to support implementation under programmatic conditions. An e-course on the management of TB in children and adolescents, aimed at health workers at the primary health care level, was released in 2023. A second e-course targeting a programmatic audience is in development (26).

Table 1. Achievements related to the ten key actions outlined in the 2018 Roadmap towards ending TB in children and adolescents

<p>1: Strengthen advocacy at all levels</p> 	<ul style="list-style-type: none"> → Specific targets on TB in children and young adolescents (0-14 years of age) were included in the 2018 and 2023 UN-HLMs on the fight against TB and a spotlight on children and adolescents was included in the UN Secretary General’s 2020 and 2023 progress reports on the implementation of the political declaration of the 2018 UN-HLM on TB → In 2021, WHO issued a ‘Call to Action 2.0: A global drive to scale up TB prevention’ that called for the scale up of household contact investigation interventions, including for children who are contacts of people with TB^a → The Vatican Initiative High-level Dialogue to Assess Progress on and Intensify Commitment to Scaling Up Diagnosis and Treatment of Paediatric HIV (Vatican Initiative) has included TB diagnostic and treatment commitments since 2020, and in 2022 a focus on TB during pregnancy and the post-partum period was added^b → In 2022, ministers of health in the WHO African region endorsed a ‘Call to action to accelerate progress in addressing TB and undernutrition in children’^c → In 2019, WHO launched the ‘1+1’ Initiative, a global youth movement to end TB^d
<p>2: Foster national leadership and accountability</p> 	<ul style="list-style-type: none"> → Tools to assess activities related to the management of TB in children and adolescents during national TB programme reviews were developed → Budgeting tools for key TB interventions targeting children and adolescents were developed and are now included in the <i>Integrated Health tool for planning and costing</i> (see resources in section 5) → The Union/CDC sub-Saharan Centre of Excellence was established to facilitate learning and exchange on the management of TB in children and adolescents in the African region^e → Project-based multi-country assessments of national policies and programme preparedness for the management of TB in children and adolescents were conducted, in close collaboration with national programmes, to identify areas that require strengthening → The UHC service coverage index improved globally with the infectious disease sub-index improving most rapidly, followed by the reproductive, maternal, newborn and child health (RMNCH) sub-index^f → Engagement with the education sector to build awareness and strengthen information sharing on TB among students has increased, in line with WHO’s Multisectoral Accountability Framework (MAF-TB). In 2022, education was the most engaged sector, with 59% of countries globally and 79% of TB HBCs reporting that this sector was strongly engaged in advocacy, information sharing, education and communication in the TB response.

3: Foster functional partnership for change



- The Child and Adolescent TB Working Group (CAWG)⁹ has grown considerably in membership and provides a strong collaborative framework for supporting advocacy work as well as for developing practical tools to support countries in the planning and implementation of TB programming for children and adolescents
- The WHO Civil Society Task Force on TB is actively engaged in WHO Global Tuberculosis Programme's guidelines development process, including guidelines for addressing TB in children and adolescents, as well as in the dissemination and advocacy efforts
- WHO regional consultations on ending TB in children and adolescents were conducted in 2019 and 2022, with broad representation from all key stakeholders
- National paediatric associations are engaged in technical working groups and in various activities in several countries, aiming to strengthen collaboration between national programmes, academia and clinicians
- Paediatric Drug Optimization for TB (PADO-TB) meetings are regularly organized to ensure stakeholder consensus on the paediatric formulations to be prioritized for developmentⁱ
- The updated Child Survival Action Initiative^j was launched, and there is ongoing work on updating the WHO *Pocket book of hospital care for children*^k
- The Sentinel Project^h has continued to provide field implementation guidance on the delivery of services for children and adolescents affected by DR-TB

4: Increase funding for children and adolescents TB programmes



- There are various initiatives to mobilize targeted funding for the management of TB in children and adolescents. Illustrative examples include:
 - Update of the Global Fund TB modular framework^l (allocation period 2023–2025) and creation of a new module for key and vulnerable populations that includes interventions for children and adolescents
 - Inclusion of paediatric interventions in the Global Fund *Toolkit for tuberculosis: Program essentials* (such as child-friendly formulations, all oral regimens for DR-TB, 4-month regimen for non-severe, DS-TB are used for TB treatment in children)^m
 - Unitaid funded grantsⁿ for TB prevention, diagnosis and treatment in children and adolescents, and supporting innovations in terms of tools and models of care
 - Additional funding support for rapid TPT scale up and coverage in PLHIV, including children and adolescents, as well as contact investigation and introduction of use of stool samples

5: Bridge the policy-practice gap



- The 2022 WHO consolidated guidelines and operational handbook (module 5) on the management of TB in children and adolescents were published, providing consolidated policy recommendations and concrete practical implementation guidance for interventions along the full cascade of care and new recommendations including:
 - Diagnostic approaches (use of Xpert Ultra in all paediatric specimens, the use of integrated TB treatment decision algorithms to support diagnosis of pulmonary TB in children (<10 years of age)) with evidence-based examples in the handbook
 - Treatment shortening for children and adolescents (aged 3 months to 16 years) with non-severe TB (2HRZ(E)/2HR)^o and for adolescents ≥ 12 years (2HPMZ/2HPM)^o
 - An alternative short intensive regimen for treatment of TB meningitis (6HRZEt)^o
 - The use of bedaquiline and delamanid as part of all-oral regimens for the treatment of DR-TB in children of all ages
 - Decentralized, integrated and family-centred models of care to improve access to and provision of TB prevention and care to children and adolescents
- Guidance to support implementation of global accelerated action for the health of adolescents (AA-HA!)^p was published
- There is increasing evidence-generation and sharing of lessons learned to help address the policy-practice gap. This includes evidence on the implementation of community-based models of care for contact investigation and TPT, and their impact on improving coverage and completion; evidence and lessons learned on the implementation of TB case-finding activities targeting children and young adolescents; and evidence and lessons learned on decentralized approaches to TB case finding, management and prevention in children and adolescents (see also Box 2)
- Training materials, job aids and other tools for the management of TB in children and adolescents by WHO and other stakeholders were published, including dedicated materials for sample collection procedures and chest x-ray (CXR) reading and interpretation (see selected resources section)

6: Implement and expand interventions for prevention



- There is increased attention from national TB programmes, donors and implementing partners on the scale up of TPT and on increasing coverage of TPT among high-risk populations, including TB contacts <5 years of age, and children and adolescents living with HIV
- Delivery of TPT as part of HIV services, including for children and adolescents has strengthened
- 23 of the 30 TB HBCs have introduced shorter TPT regimen as of the end of 2022 (15 are using 3HR, and 21 3HP)

7: Scale up child and adolescent TB case finding and treatment



- Use of stool and nasopharyngeal aspirate for Xpert testing has been recommended for diagnosis of TB in children (in addition to several other sample types previously recommended) for diagnosis of pulmonary and extrapulmonary TB) and this is progressively being implemented
- LF-LAM is recommended for use as part of the diagnostic evaluation of children and adolescents with HIV
- There is increased awareness of the utility of CXR for clinical diagnosis in children and incorporation into national diagnostic algorithms for TB in children and adolescents
- As of end-2022, the paediatric dispersible fixed-dose combinations RHZ (75/50/150 mg) and RH (75/50 mg) have been procured by 102 and 104 countries, respectively (data from GDF)
- Paediatric formulations for all medicines used in the treatment of DR-TB have become commercially available
- Shorter TB treatment regimens have been recommended for the treatment of DS-TB and TB meningitis

8: Implemented integrated family- and community-centred strategies



- New evidence has been generated and shared on family-centred approaches to provide TB services to households affected by TB, such as integrating treatment adherence support for people affected by TB disease with contact investigation and TPT adherence support for family members and household contacts
- New WHO recommendations were issued on decentralized and family-centred, integrated care to improve TB prevention and detection among children and adolescents
- Examples and country experiences on the inclusion of TB in the integrated management of newborn and childhood illness (IMNCI) package of care have been generated and shared (see Box 3)

9: Improve data collection, reporting and use



- Reporting of age-disaggregated data has improved:
 - TB notifications for age groups 0-4; 5-9; 10-14; 15-19 reported by 10 TB HBCs in 2022
 - Treatment initiation in children and young adolescents with MDR/RR-TB (0-14 years) reported by 29 MDR-TB HBCs in 2022
 - TB treatment outcomes (treatment success rate) in children and young adolescents (0-14 years), reported by 20 TB HBCs for the 2021 cohort in 2022
 - HIV testing, TB/HIV co-infection and antiretroviral therapy (ART) coverage for children and young adolescents (0-14 years) reported by 20 TB/HIV HBCs in 2022
- Consolidated treatment outcome definitions are available, applicable to people of all ages with any form of TB disease^a

10: Encourage research focused on TB in children and adolescents



- Final data from the SHINE trial on treatment shortening for non-severe TB in children and adolescents have been reviewed by a WHO Guideline Development Group leading to a strong recommendation on a 4-month regimen for the treatment of DS non-severe pulmonary TB in children between 3 months and 16 years of age
- The Unitaid-funded projects focused on the paediatric population (i.e. TB Speed, Benefit Kids and CaP-TB) generated important evidence to inform the management of TB in children and adolescents (ranging from TB preventive treatment, diagnosis, models of care, treatment and prevention of DR-TB). The IMPAACT4TB project (on TPT) is ongoing^f
- Several other multi-country collaborative research initiatives on TB in children and adolescents have been established and are generating high quality evidence^r
- The *Chasing Expedited and Equitable Treatment Access for children* task force has been established to accelerate paediatric investigations of the next generation of TB drugs^s
- Data are being generated to evaluate computer-aided detection using chest radiography in children and young adolescents
- A generic research protocol has been developed by the Special Programme for Research and Training in Tropical Diseases (TDR) and WHO to support the evaluation of the integrated TB treatment decision algorithms for diagnosis of pulmonary TB in children^t
- Evaluations of novel TB vaccines targeting adolescents and young adults are progressing to phase II and phase III trials
- A DR-TB individual patient data (IPD) platform including data on children and adolescents as well as pregnant and post-partum women linked to infant outcomes has been established

All data in this table are sourced from the WHO Global Tuberculosis Report 2023 (11).

- a. Call to Action 2.0: A global drive to scale up TB prevention. Geneva: World Health Organization; 2021 (<https://www.who.int/publications/m/item/call-to-action-2.0-a-global-drive-to-scale-up-tb-prevention>, accessed 29 September 2023).
- b. Paediatric HIV & TB: Rome Action Plan. Rome: The Vatican Platform for High-Level Dialogues; 2022 (<https://www.paediatricrivactionplan.org/high-level-dialogues>, accessed 29 September 2023).
- c. Call to action by the WHO African Region Ministers of Health during the side event on Paediatric TB and Nutrition on the margins of the 72nd WHO AFRO Regional Committee. Lomé: African Union/Elizabeth Glaser Pediatric AIDS Foundation/Stop TB Partnership/World Health Organization; 2022 (<https://aidswatchafrica.net/wp-content/uploads/2022/09/AFRO-RC72-Call-to-Action-17.08.2022-.pdf>, accessed 29 September 2023).
- d. WHO 1+1 Initiative. Global youth movement to end TB [website]. Geneva: World Health Organization; 2022 (<https://www.who.int/initiatives/who-1-1-initiative>, accessed 29 September 2023).
- e. Child and Adolescent TB Centre of Excellence. Paris: The Union Against Tuberculosis and Lung Disease; 2022 (<https://theunion.org/our-work/tuberculosis/child-adolescent-tuberculosis/child-and-adolescent-tb-centre-of-excellence>, accessed 29 September 2023).
- f. Tracking Universal Health Coverage: 2021 Global monitoring report. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/357608>, accessed 29 September 2023).
- g. Child and Adolescent TB Working Group [website]. Geneva: Stop TB Partnership; 2019 (<https://www.stoptb.org/stop-tb-working-groups/child-and-adolescent-tb-working-group>, accessed 29 September 2023).
- h. The Sentinel Project on pediatric drug-resistant tuberculosis [website]. Boston: The Sentinel Project; 2023 (<https://sentinel-project.org/>, accessed 29 September 2023).
- i. Report of the meeting to review the paediatric antituberculosis drug optimization priority list. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/340316>, accessed 29 September 2023).

- j. 2nd Global Forum on Childhood Pneumonia [website]. Madrid: Child Health Task Force; 2023 (<https://www.childhealthtaskforce.org/events/2023/04/2nd-global-forum-childhood-pneumonia>, accessed 29 September 2023).
- k. Pocket book of hospital care for children: Second edition. Geneva: World Health Organization; 2013 (<https://iris.who.int/handle/10665/81170>, accessed 29 September 2023).
- l. See section 7 of: Modular Framework Handbook. Geneva: Global Fund; 2023 (https://www.theglobalfund.org/media/4309/fundingmodel_modularframework_handbook_en.pdf, accessed 29 September 2023).
- m. Information Note. Tuberculosis. Allocation Period 2023–2025. Geneva: The Global Fund; 2023 (https://www.theglobalfund.org/media/4762/core_tuberculosis_infonote_en.pdf, accessed 29 September 2023).
- n. See: TB Speed project: <https://www.tb-speed.com/>; Benefit Kids: <https://blogs.sun.ac.za/dttc/benefit-kids/>; CaP-TB: <https://pedaids.org/our-expertise/tuberculosis/catalyzing-pediatric-tb-innovations/>; IMPAACT4TB: <https://impaact4tb.org/>.
- o. 2HRZ(E)/2HR: two months of isoniazid, rifampicin and pyrazinamide, with or without ethambutol, followed by two months of isoniazid and rifampicin; 2HPMZ/2HPM: two months of isoniazid, rifapentine, moxifloxacin and pyrazinamide, followed by two months of isoniazid, rifapentine and moxifloxacin; 6HRZEto: six months of daily isoniazid, rifampicin, pyrazinamide and ethionamide.
- p. Global Accelerated Action for the Health of Adolescents (AA-HAI): guidance to support country implementation. Geneva: World Health Organization; 2017 (<https://iris.who.int/handle/10665/255415>, accessed 29 September 2023).
- q. WHO consolidated guidelines on tuberculosis data generation and use. Module 1: Tuberculosis surveillance. Geneva: World Health Organization; 2023 (In press).
- r. Examples include: the IMPAACT Network: <https://www.impaactnetwork.org/>; SMART4TB: <https://www.usaid.gov/global-health/health-areas/tuberculosis/partnerships-and-projects/smart4tb>; CDC TBTC: <https://www.cdc.gov/tb/topic/research/tbtc/default.htm>; RaPaed: <https://publications.edctp.org/international-partnerships-against-infectious-diseases/rapaed-tb>; DECIDE-TB: <https://www.tb-speed.com/actualite/the-decide-tb-project/>.
- s. Tony Garcia-Prats awarded grant to assess new pediatric antituberculosis developments. University of Wisconsin School of Medicine and Public Health; 2023 (<https://www.pediatrics.wisc.edu/tony-garcia-prats-awarded-grant-to-assess-new-pediatric-antituberculosis-developments/>, accessed 29 September 2023).
- t. TDA4Child initiative [website]. Geneva: Special Programme for Research and Training in Tropical Diseases; 2023 (<https://tdr.who.int/activities/TDA4Child-initiative>, accessed 29 September 2023).

Boxes 2 and 3 provide examples of community engagement in ending TB in children and adolescents and integration of TB care into child health from Indonesia and Zambia, respectively.

Box 2

The instrumental role of communities in ending TB in children and adolescents: experiences from Indonesia



Engaged and empowered communities play a crucial role in the success of national tuberculosis programmes (NTPs). In Indonesia, the NTP has actively involved affected families and health cadres in TB care for many years. Recognizing the significance of community participation, the Stop TB Partnership Indonesia (STPI) and Penabulu Foundation have joined forces to establish a community consortium dedicated to advancing TB elimination efforts in the country.

Between 2021 and 2022, 9037 community health workers (CHWs) from 190 districts across 30 provinces in Indonesia were recruited to carry out TB contact investigation, TB education and treatment monitoring. Coordination efforts spanned across the national, provincial and district levels. At the national level, policies and operational guidelines were developed, ensuring alignment with national priorities. Provincial managers fostered collaboration between the STPI-Penabulu consortium, provincial and district health offices, health facilities, district-level coordinators, community organizations, and community leaders. At the district level, managers coordinated field activities, involving CHWs, CHW coordinators, TB staff at health facilities, and TB programme managers at the district health office.

The district-level CHW coordinators received a list of people newly diagnosed with TB and allocated tasks to CHWs according to their neighbourhoods. Assigned CHWs visited households of people affected by TB, providing education to family members, conducting TB screening by inquiring about TB symptoms, and identifying children under five years of age in the household. Contacts showing TB symptoms and children under five years were referred to the nearest primary health care centre for sputum examination and to receive TB preventive treatment. Contact investigation was also conducted among people who live or work near those affected by TB.

As a result of the consortium's efforts, contact investigation was carried out among 202 641 people with TB and 4 136 122 contacts were identified and screened for TB (392 352 children under 10 years and 653 526 10–19 years old). Among the child contacts screened, 4234 were diagnosed with TB in 2022.

These findings show that the concerted efforts of the community consortium have proven instrumental in finding and managing people with TB or at risk of TB, highlighting the pivotal role of engaged communities in the fight against TB in Indonesia.

Box 3

Integrating TB care into child health care packages: experiences from Zambia

Effectively addressing TB in children requires that it is fully integrated into the packages of care designed to provide health care to this population. The NTP in Zambia has implemented the following interventions to ensure availability of TB services for children seeking care at health care facilities, including at the primary health care level:

- The integrated management of newborn and childhood illness (IMNCI) chart booklet has been revised to include TB as a possible differential diagnosis for all children presenting with fever, respiratory symptoms, malnutrition (moderate and severe acute), and developmental delays.
- Nurses, clinicians and nutritionists in the outpatient department, in-patient department, maternal and child health and nutrition clinics have been trained to perform TB screening. TB screening algorithms and job aids have been placed across all entry points attended by children.
- Attention has been dedicated to the delivery of a comprehensive and integrated package of TB and nutrition services. Growth monitoring and nutritional assessment are part of the routine care provided to all children under five years of age. Children identified with moderate or severe acute malnutrition are systematically referred for TB investigations. As part of in-patient services, TB screening and nutritional assessment are done concurrently.

The following elements have been identified as critical to ensure successful implementation of this integrated package:

1. Training of nutritionists and community health workers on TB screening.
2. Placement of a presumptive TB register in nutrition clinics or units to facilitate the recording of TB screening.
3. Regular inclusion of nutritionists in TB data review meetings.

Based on this experience, the Zambia National TB Programme will continue to invest in the integration of TB care at all health service points attended by children, and will further strengthen the provision of a comprehensive TB, IMNCI and nutrition package of services. Further work is needed to ensure TB training for nutritionists is available nationally.



2.2 Remaining challenges that require urgent action

While significant progress has been made in addressing TB among children and adolescents over the past five years, some remaining challenges require urgent attention to reduce unnecessary suffering and TB-related morbidity and mortality.

These gaps have been organized into the following main categories:

- Insufficient prioritization, funding and accountability with regard to TB in children, adolescents and pregnant/ post-partum women.
- Persistent policy–practice gaps in developing, implementing and scaling up evidence-based programmatic approaches.
- Weak implementation of people-, family- and community-centred strategies, limiting access to TB prevention and care for those who need it most.
- Persistent gaps in data and shortfalls in research and development targeting TB in children, adolescents and pregnant/post-partum women.

The progress noted in the previous sections mainly concerns children and young adolescents. Recognizing that the specific needs of older adolescents and pregnant/post-partum women should also be prioritized by NTPs, the 2023 Roadmap includes specific considerations for these populations (see boxes 4 and 6).



Box 4

Care for adolescents with TB: experiences from India

Adolescents have unique health care needs. Health care services should be designed to minimize disruptions to school and work, as this period of life is critical for acquiring the competencies needed for future success. Additionally, mental health, sexual/reproductive health and substance use are also important considerations for this age group. As adolescents gain autonomy, they want to make their own health care decisions and maintain privacy, yet they have not yet achieved adult-level health literacy, impulse control, or appreciation of risk and consequences. Thus, the continued involvement of caregivers is needed to optimize outcomes but must be balanced with the need for privacy and autonomy.

Differentiated health services^a can improve care for adolescents with TB given that they: are more likely to be lost to follow up than other age groups; can fall behind or drop out of education; frequently suffer from social isolation and/or depression; and suffer from TB-related stigma and discrimination.

The DR-TB Project of Médecins Sans Frontières (MSF) – Mumbai (India) has implemented adolescent-friendly services including: individual counselling and peer support groups for adolescents and their caregivers; training to empower caregivers to effectively support and communicate with adolescents; linking adolescents to vocational skills training to restore or enhance their chances of employment after TB; and separate clinic spaces with adolescent-friendly spaces.

Planned initiatives include: community- and school-based campaigns to increase TB awareness, reduce TB-related stigma and support adolescents' re-integration into school and social activities; integration of family planning services into TB services; integration of activities to address TB-related disability during and after TB treatment and provision of palliative care services (when needed); involvement of experienced adolescent clients to provide peer-to-peer support to new TB clients; and research to evaluate the effectiveness of these adolescent-friendly services.



To date, MSF has enrolled 143 adolescent patients with DR-TB into care. Although other factors may be involved, the loss to follow up rate with the package of care provided has reduced from 8–10% to less than 5%. Adolescents report that the counselling helped them to tackle the stigma associated with TB and better enabled them to return to school/college.

These initiatives are critical to improve clinical, socioeconomic and psychological outcomes for adolescents with TB.

^a Person-centred approaches to simplify provision of HIV or TB services across the cascade of care in ways that better serve the needs of people with HIV and TB, and reduce unnecessary burdens on the health system

2.2.1 Insufficient prioritization, funding and accountability

Strong political commitment from national and local governments in the fight against TB, including specific attention to the unique needs of children, adolescents and pregnant/post-partum women, is essential to reduce TB-related suffering and deaths.

During the past few years, the need to strengthen TB programming for children and adolescents has been increasingly recognized and reflected in national strategic plans (NSPs) for TB and other national documents. However, despite these promising advances, there are still several areas that are not sufficiently prioritized, and implementation often remains sub-optimal.

Funding for interventions to tackle TB in children and adolescents

Specific interventions addressing TB in children and adolescents are not routinely costed and included in budgets of NSPs or health plans, and even when they are included, they are rarely fully funded. This chronic lack of dedicated resources represents a key bottleneck for implementation. Separate funding for activities to prevent and address TB in children and adolescents should be prioritized in both domestic and external funding (27).

National leadership and accountability

While TB in children is generally included, specific interventions to address TB in adolescents, especially for older adolescents (15–19 years of age), are generally missing in NSPs. This limits national oversight and accountability, and hinders regular monitoring of progress made (28).

National level grants represent an important opportunity to support the implementation of TB NSPs, with workplans driven by NTPs in collaboration with relevant stakeholders. Sub-optimal country-level prioritization represents a critical missed opportunity to strengthen TB programming for children and adolescents.

TB imposes a direct and indirect financial burden on affected families. Financial barriers hinder access to TB care for children, adolescents and their families, particularly in relation to clinical investigations (such as chest x-rays) prior to TB diagnosis. Because of inadequate social protection measures, many children and adolescents affected by or exposed to TB are missed because their families cannot afford access to care (8,29). It is important for NTPs to ensure families affected by TB can benefit from social protection.

Functional partnerships for change

While collaboration and integration of TB and HIV services has progressively improved thanks to several years of strong policies, funding and deployment of 'one-stop shop' models, these efforts have been focused on the adult population and the availability of high quality, integrated care for the paediatric and adolescent population varies substantially among countries.

Collaboration and integration of efforts across relevant disease programmes (such as TB, maternal, neonatal and child health services, nutrition etc.) and sectors (such as public and private health sectors, education, welfare and social affairs) remain limited, leading to lost opportunities to find the missing children exposed to and with TB, and retaining those with TB in care (28). Engagement of community leaders and community-based organizations focused on TB in children and adolescents remains sub-optimal, leading to reduced community awareness. This is often due to limited capacity and lack of funding for community-based TB care.

Advocacy

Sustained advocacy is required at global, regional, national and sub-national levels to maintain and grow the visibility of TB in children and adolescents achieved so far. Further work is needed to strengthen the capacity of local civil society organizations to become strong advocates for the needs of children, adolescents and pregnant/post-partum women affected by TB, and to provide resources and empower them to promote and keep the spotlight on ending TB with national authorities. In turn, regular monitoring and evaluation of community-based services provided by civil society and TB-affected communities should be conducted as part of the overall national TB response to assess those services (28).

2.2.2 Persistent policy–practice gaps in implementing and scaling up evidence-based programmatic approaches

Persistent policy–practice gaps continue to stall progress in addressing TB in children and adolescents. Interventions for the management of TB in children and adolescents are often developed and piloted, but even if they show good results, national programmatic scale up can be challenging. This can occur for a range of reasons, including limited resources and a lack of trained health care personnel (24,25). Adoption and full implementation of the latest WHO guidelines for TB prevention, diagnosis and treatment is often delayed, resulting in people affected by TB not benefiting from the latest approaches and tools.

Capacity building for health care personnel and awareness generation

Building the capacity and confidence of all health workers to manage TB in children and adolescents is a fundamental step to close the policy–practice gap. Related challenges include high staff turnover, limited opportunities for dedicated technical assistance that focuses on service delivery for TB in children and adolescents, and limited engagement of national paediatric associations in capacity building. In addition, there remain gaps in training curricula and programmes, and routine mentorship and supportive supervision (remotely or on-site) for front-line health workers at all health system levels in the public and private sectors (30).

Community health workers (CHWs) are an important cadre for the delivery of people-centred TB services and are increasingly recognized as a key player to support the provision of TB prevention and care. Yet there has been little investment in recruiting and retaining them and building their capacity. The availability of context-specific training materials and programmes targeting CHWs also remains limited (30).

Furthermore, awareness-raising efforts targeting children and adolescents, as well as their parents and caregivers, can empower them to take an active role in their care. However, age-specific information and education materials targeting these groups (especially adolescents) is generally poor and education is seldom implemented (24,25) (see Box 5).

Box 5

The critical role of training and capacity building in finding missing children and adolescents exposed or affected by TB



Closing the gap in TB detection and prevention in children and adolescents requires building capacity among front-line health workers to prevent, diagnose and manage TB in this population. Such training is particularly critical for health workers providing care for children <10 years of age, as diagnosing TB in this population often relies on clinical and radiological findings,

which requires clinician confidence and expertise. Projects such as DETECT-TB^a and CaP-TB^b have shown that building capacity and confidence to consider, diagnose and manage TB in children and adolescents among front-line health workers is feasible, and can also increase coverage of TPT when combined with contact investigation interventions.

Building such capacity requires a comprehensive training and mentorship programme that involves district and facility-level staff to ensure all relevant health worker cadres are reached. Such training programmes ideally deliver on-site training, experiential learning and regular, on-site and/or remote mentorship to consolidate skills and build expertise. The Union/CDC Child and Adolescent TB Centre of Excellence^c is currently working with several countries in the African region to support the development of nationwide training and capacity building programmes for managing TB in children and adolescents.

One barrier to implementing comprehensive training is the availability of financial and human resources to move beyond training workshops to deliver hands-on, experiential learning and ongoing mentorship. This highlights the importance of earmarking financial resources for activities dedicated to training and capacity building regarding TB in children and adolescents, both in national budgets as well as in external grants.

^a DETECT-TB Project (<https://theunion.org/news/detect-child-tb-project-launched-in-uganda/>, accessed 29 September 2023).

^b CaP-TB (<https://pedaids.org/our-expertise/tuberculosis/catalyzing-pediatric-tb-innovations/>, accessed 29 September 2023).

^c Child and Adolescent TB Centre of Excellence. Paris: The Union Against Tuberculosis and Lung Disease; 2022 (<https://theunion.org/our-work/tuberculosis/child-adolescent-tuberculosis/child-and-adolescent-tb-centre-of-excellence>, accessed 29 September 2023).

Interventions for TB prevention

Scaling up contact investigation remains challenging as demonstrated by latest data on TPT coverage. Children under five years of age are the most vulnerable and can benefit most from TPT, yet despite recent improvement in contact investigation and linkage to prevention, TPT roll out remains limited in many TB HBCs. The number of countries that are expanding TPT to

children and adolescents aged five years and above is slowly increasing but remains limited overall. A growing body of evidence is showing that community-based models of care can improve TPT coverage as well as TPT completion, especially if combined with use of shorter TPT regimens (8). Yet implementation and scale up continues to stagnate, often due to lack of financial and human resources to support comprehensive interventions that include resource-intensive activities such as counselling and education, introduction of new regimens, expansion of target populations for TPT and roll out of community-based models of care. By the end of 2022, only 23 of the 30 TB HBCs had started implementing shorter rifamycin-based TPT regimens, including 15 using child-friendly 3HR, indicating sub-optimal uptake of these new regimens (11).

In addition, implementation of infection control measures and coverage of BCG vaccination remain sub-optimal in some countries; both are also key interventions to prevent TB disease or TB transmission (24).

TB case finding and treatment

In several countries, the capacity and confidence to screen, diagnose or make decisions about starting treatment and management of TB in children and adolescents remains primarily available at the higher levels of the health care system, and is less frequently available at the primary health care level. In addition, TB case-finding activities are not routinely integrated into the packages of care for children with comorbidities (e.g. malnutrition, pneumonia) and in the health services where children, adolescents and their families usually seek care (e.g. outpatient departments, in-patient departments, nutrition clinics). As a result of limited decentralization and integration, many children and adolescents still do not have access to adequate TB care at the first point of contact with health services. In addition, due to the challenges in scaling up contact investigation interventions, child contacts exposed to TB are not identified and investigated for TB in a timely way. This delays TB diagnosis, which can lead to disease progression, TB-associated disability and death, as well as further TB transmission, especially among adolescents.

Access to laboratory-based TB diagnosis and CXR are challenges in many TB HBCs, especially for young children, due to limited capacity for sample collection, limited access to CXR and limited capacity for CXR interpretation, including assessing disease severity. While implementation of more child-friendly approaches to laboratory-based diagnosis of TB, such as stool-based testing with molecular WHO-recommended rapid diagnostic tests (mWRDs) is progressing in many TB high-burden settings, there is much work to be done to ensure further roll out and scale up.

The optimal treatment of TB in children requires the use of formulations that are acceptable to them. Palatable formulations also improve adherence. While dispersible fixed-dose combinations for the treatment of DS-TB have been adopted by many countries (around 100 countries have procured them by end of 2022 as per data received from the GDF), the uptake of paediatric formulations of drugs used to treat DR-TB remains limited and the number of countries procuring them varies. Case finding for DR-TB in children remains insufficient, with only a limited number of children benefiting from the child-friendly medicines and regimens. In addition, some countries experience regulatory or financial barriers that hinder access to second-line medicines and formulations (8).

2.2.3 Inadequate implementation of integrated, people-, family- and community-centred strategies

The WHO End TB Strategy promotes people-centred care, and in 2019 WHO released a user guide to promote such care models (31). People-centred care is broadly defined as approaches that foster partnership and trust between people with TB and providers, and that is holistic, individualized, empowering, and respectful of the person's contexts, needs and autonomy. Although limited, existing evidence shows that these models result in positive health outcomes for people with TB, including children and adolescents (7,32). However, implementation of people-centred models of care for TB has been limited and has mostly focused on treatment initiation and adherence (33).

Children, adolescents, pregnant and post-partum women are often defined as special populations as they are characterized by specific needs that differ from the general adult population and require tailored approaches in terms of health service design and delivery to improve access to, and retention in care. As part of the shift towards differentiated service delivery (DSD) models for HIV care, services adapted to the specific needs of children and adolescents living with HIV have been designed and implemented. Useful insights and lessons learned can be drawn from those experiences and could be adapted and applied to other disease programmes (34,35). True integration of services across disease programmes remains limited in many settings (24,25).

2.2.4 Persistent gaps in data and shortfalls in research and development targeting TB in children and adolescents

Data collection, reporting and use

A comprehensive understanding of the TB epidemic in children, adolescents, pregnant and post-partum women is essential to inform programming and resource allocation. While knowledge of the TB epidemic in children and young adolescents has improved over the past 10 years (because of the increasing number of countries reporting age-disaggregated notifications), some critical information is still missing. The knowledge gaps related to the TB epidemic in adolescents and pregnant and post-partum women are even larger.

Two-thirds of the TB HBCs are still reporting TB notification data using the age groups of 0–4 years and 5–14 years; the latter group including both older children (5–9 years of age) and young adolescents (10–14 years). Data on older adolescents aged 15–19 years are included with older age groups. Mainly countries with digital surveillance systems are able report and analyse data disaggregated by five-year age groups and WHO is encouraging all countries to move to such digital surveillance systems. Granular information on the true burden of TB disease in children and adolescents is currently patchy (11).

Treatment outcomes are available for the age-group under 15 years but are typically not disaggregated by HIV status. Overall, knowledge and understanding of the TB cascades of care (both for TB disease and the prevention of TB) in children and adolescents with HIV remains limited due to the lack of age-disaggregated data for the main TB/HIV indicators (11).

Contact investigation and evaluation is not only poorly conducted but also poorly documented. Assessments by partners suggest that NTPs have only recently started to introduce registers that allow line-listing of all contacts identified for each person with TB and to monitor the proportion who are screened for TB. Even when data on contact evaluation are collected, they are seldom

reported to the national level in a standardised manner, making monitoring and evaluation of contact investigation challenging (24,25).

Data on pregnant and post-partum women affected by TB are recorded as part of individual care, but usually not collected and reported as part of routine TB surveillance by National TB programmes. Therefore, the burden and characteristics of TB in this vulnerable population and their infants are largely unknown (see Box 6).

Box 6

TB in pregnant and post-partum women and their infants

Pregnant and post-partum women are at increased risk of developing TB, with associated risks of maternal hospitalization, death and adverse pregnancy outcomes including eclampsia and miscarriage. Maternal TB increases the risk of premature birth, vertical transmission of HIV, and morbidity and mortality of both the infant and others in the household. Effective TB prevention and timely TB diagnosis and treatment in pregnant and post-partum women are essential to improving outcomes. Given that pregnant women are seldom eligible for inclusion in clinical trials, delays in safety evaluation and dose optimization of TB drugs in this population has resulted in longer, less efficacious, and more toxic regimens particularly for the treatment of DR-TB.



To improve the care of pregnant and post-partum women with TB, and decrease TB-related maternal and infant morbidity and mortality, several actions are needed:

- A better understanding of the burden of TB in pregnant and post-partum women. This could be done through periodic assessments of the proportion of people diagnosed with TB who are pregnant or post-partum women, based on review of a representative sample of people notified with TB. This may also help estimate the burden of maternal TB and facilitate the development and evaluation of targeted interventions.
- Pregnant and post-partum women and their infants should be protected through, and not excluded from, research. The inclusion of maternal, pregnancy, birth and infant outcomes in dedicated safety studies for all new TB drugs (for both DS- and DR-TB) and vaccines, prior to the completion of phase III trials, will facilitate their inclusion in regulatory submissions.
- Rigorous operational research and collection of data in global registries will enable the systematic and rapid detection of uncommon adverse maternal, pregnancy and birth outcomes, including birth defects.

Research focused on TB in children, adolescents, pregnant and post-partum women

Children, adolescents, pregnant and post-partum women tend to be excluded from clinical studies evaluating new TB diagnostics, drugs and vaccines. As a result, they benefit from these medical advances at a much later stage.

The diagnosis of TB in children still relies primarily on clinical-radiological findings, since children are often unable to produce sputum and their TB disease is generally characterized by a low bacterial load (paucibacillary TB). Therefore, available pathogen-based TB diagnostic assays have shown sub-optimal sensitivity in children. Alternative sample types such as induced sputum, gastric aspirate and nasopharyngeal aspirate are recommended, but collection of those specimens requires skilled personnel, dedicated equipment and consumables, and can lead to discomfort (8). Recently, stool has been added to the sample types that can be used for the diagnosis of TB in children. While the diagnostic accuracy of stool samples may be lower compared to other sample types (36), their collection does not require specialized skills, invasive procedures nor costly consumables, and can be easily implemented in all settings. Additional evidence is also needed to inform the use of integrated TB treatment decision algorithms for the diagnosis of pulmonary TB and related decisions to start TB treatment in children (<10 years of age) (7).

The lack of a highly sensitive, point of care diagnostic assay based on readily available sample types for the diagnosis of TB in children remains a critical gap. Given that molecular tests to detect TB in a range of specimens have largely been optimized, there is a need for dedicated efforts to identify host biomarker profiles that provide an accurate diagnosis. Despite some encouraging preliminary findings, large scale research studies in this area have been limited (7).

Improving access to CXR is also important for TB diagnosis in children. Recent technological advances such as the availability of portable CXR devices and the development of artificial intelligence software that can interpret CXR images (computer-aided detection (CAD) software), are promising. There are currently no data on the performance of CAD technologies for those aged under 15 years, which is preventing their use to support the diagnosis of TB in this age group (8).

Pharmacokinetic (PK) and safety data that can inform the use of shorter regimens for the treatment of DS-TB (e.g. 4-month isoniazid/rifapentine/moxifloxacin/pyrazinamide (HPMZ) regimen for those under 12 years of age and in pregnant and post-partum women) and DR-TB (e.g. 6-month regimen consisting of bedaquiline, pretomanid, linezolid with or without moxifloxacin (BPaLM/BPaL) in those under 14 years and in pregnant and post-partum women) are currently lacking (8).

Remaining gaps in evidence on TB prevention include PK and safety data to inform use of shorter regimens for TPT (e.g. 3HP and 1HP) in children across all ages, especially among children living with HIV. Data from studies comparing head-to-head safety, efficacy and acceptability of 3HP and 1HP in children and adolescents are also largely missing. These data are critical to inform countries' decisions to adopt and roll out shorter TPT regimens (8).

The current vaccine development pipeline is focussed on adolescents and adults who can transmit TB. There is, however, also a need for better vaccines for young children who are at risk of more severe forms of TB (37).

Finally, age cut-offs used for children and adolescents in clinical trials are often not aligned to the WHO clinical definitions, which makes it challenging to ensure consistency of age groups for WHO recommendations.

3 Key actions to accelerate progress

The progress made in the last few years is encouraging but falls far short of what is required and had only a marginal impact on improving access to TB care for children and adolescents. To further accelerate progress and to effectively address the persistent policy–practice gaps, a comprehensive and multisectoral approach is needed. This requires stronger prioritization of children and adolescents and a focus on pregnant and post-partum women. To achieve this, it will be important to have strong leadership from ministries of health, working closely with WHO and other partners and stakeholders. The following section highlights the key actions that should be prioritized (see Fig. 2 for a visual summary of the ten key actions).

Increase political leadership, multisectoral engagement and accountability and sustain advocacy efforts

In TB HBC, ensuring the availability and accessibility of high-quality TB services for children, adolescents as well as for pregnant and post-partum women should become a central component of the health agenda and a priority for policy-makers in the context of UHC. The actions necessary to achieve this goal are outlined below.



KEY ACTION 1: Increase funding for TB prevention and care, including for children and adolescents

- In line with the political declaration of the 2023 UN-HLM on TB, increase annual global investments for the TB response, and funding for national programmes, with commensurate increases to fund specific interventions for priority groups who have a heightened risk of TB, such as children and adolescents.
- Make adequate and earmarked budgetary provisions from domestic and other funding sources for activities to prevent and manage TB in children and adolescents.⁴



KEY ACTION 2: Foster (sub-)national leadership, multisectoral accountability and collaborative activities

- Ensure the functionality of national and sub-national platforms (such as technical working groups or sub-groups for TB in children and adolescents) as well as the availability of (a) focal person(s) responsible to support and oversee TB programming for children and adolescents. Clearly define the roles and responsibilities of the national and sub-national working groups and focal persons.
- Ensure that interventions related to TB in children, adolescents and pregnant women are included in NSPs and other health plans, bilateral and multilateral grant applications, including specific national and sub-national targets for children and adolescents, as well as for pregnant and post-partum women, as relevant.

⁴ Tools that can support budgeting for TB interventions in children and adolescents have been developed (see section 5 for selected resources).

- Ensure that TB prevention, management and care among children, adolescents, as well as for pregnant and post-partum women, is considered during the development and implementation of the national multisectoral accountability framework for TB (MAF-TB).
- Strengthen collaboration with the reproductive, maternal, neonatal, child and adolescent health programmes and national paediatric associations, and ensure that diagnosis and management of TB disease is adequately included in the relevant platforms for the delivery of health care to children, adolescents and pregnant and post-partum women, such as integrated management of childhood illness (IMCI), integrated management of adolescent and adult illness (IMAI), integrated community case management (iCCM) and antenatal care services packages.
- Strengthen collaboration with the private health sector through private-public mix models that ensure implementation of national guidelines, use of quality-assured drugs, linkages and referral systems between private and public sectors, harmonized processes for data collection as well as reporting to national surveillance systems.
- Building on best practices of engagement of the education sector as part of MAF-TB implementation, establish and further strengthen collaboration with ministries of education to integrate TB information and educational sessions (with the aim of improving dissemination of correct information and reducing stigma and discrimination) and TB prevention activities as part of school-related activities; identify solutions that can minimize impact on schooling and educational curricula for children and adolescents affected by TB.
- Invest in the engagement of community leaders and community-based organizations as key partners to increase the demand for high quality TB services for children, adolescents, pregnant and post-partum women.
- Ensure that preparedness and response plans for health emergencies - including those related to the health-related consequences of climate change and any future pandemics - take into consideration the specific needs of the paediatric and adolescent populations.



KEY ACTION 3: Implement social protection programmes for children, adolescents and families affected by TB

- In line with the target set at the 2023 UN-HLM on TB, develop and fund social protection programmes to ensure that all people with TB have access to a health and social benefits package to alleviate the health and non-health related financial burden of TB experienced by affected people and their families, including addressing those costs that hinder access to TB care (e.g. clinical consultation fees, CXR fees and other costs related to TB investigations).
- Develop and fund programmes to support children and adolescents affected by TB directly or indirectly, and minimize the long-lasting impacts that TB can have on their ability to thrive and reach their full potential.



KEY ACTION 4: Sustain advocacy on TB in children and adolescents at all levels

- Ensure that local civil society organizations (CSOs) and affected communities are engaged and adequately resourced to advocate for prioritization of TB in children, adolescents and pregnant and post-partum women by political leaders and decision-makers.
- Ensure the availability of funding to: support monitoring activities with active engagement of communities and civil society and advocacy work to ensure the availability and accessibility of TB services for children, adolescents, pregnant and post-partum women, and to ensure

TB is high on the political agenda of national authorities; and support national programmes to monitor and evaluate community-based services provided by civil society.

- Sustain advocacy work to maintain the visibility of TB in children, adolescents, pregnant and post-partum women in global regional and national agendas.

Address persistent policy–practice gaps

Addressing the persistent policy–practice gaps requires that all stakeholders work together to implement and bring to scale interventions that have proven to be effective as well as maximizing the roll out of existing tools and approaches. This requires that NTPs, donors and implementing partners prioritize the following activities.



KEY ACTION 5: Build and sustain local capacity to prevent and manage TB

- Facilitate faster uptake and implementation of the latest WHO guidelines for TB prevention, diagnosis and treatment.
- Ensure the development of nationwide training programmes dedicated to the full cascade of TB care in children and adolescents, targeting both health workers and CHWs across all levels of the health system, and include activities for refresher trainings as well as regular facility-level mentorship and supervision. Ensure these plans and related budgets are included in NSPs and relevant funding applications.
- Strengthen technical assistance on the management of TB in children, adolescents, pregnant and post-partum women.
- Include modules on screening, prevention, diagnosis and management of TB in training curricula on children and adolescents for nurses, general practitioners and other relevant health cadres involved in family-centred care, and promote people-centred models of care.



KEY ACTION 6: Plan, implement and scale up interventions for TB prevention

- In line with the target set at the 2023 UN-HLM on TB to provide preventive treatment for at least 90% of people at high risk of developing TB, scale up contact investigation and TPT, including for households affected by DR-TB, and prioritize the implementation of community-based, family-centred models of care.
- Ensure high coverage of TPT among people living with HIV, including children and adolescents.
- In collaboration with the Expanded Programme on Immunization (EPI) programme, optimize BCG coverage.
- Strengthen implementation of infection control measures both at the facility and community levels and ensure the specific aspects related to TB care for children are addressed (e.g. separate waiting rooms for children if feasible, adequate spaces for sample collection procedures).
- Improve uptake of shorter TPT regimens for all age groups.
- Strengthen interventions to improve adherence to TPT, including use of digital technologies.
- Ensure availability of paediatric dispersible formulations of all relevant medicines for TPT, including rifapentine.



KEY ACTION 7: Increase access to optimal TB care for children and adolescents

- Scale up services for diagnosis and treatment of TB, in line with the target set at the 2023 UN-HLM on TB to provide quality-assured diagnosis and treatment to at least 90% of the estimated number of people who develop TB, to reach up 45 million people between 2023 and 2027, including 4.5 million children.
- Integrate TB diagnostic approaches and case finding across health services attended by children, adolescents as well as pregnant and post-partum women.
- Improve the capacity to diagnose and manage TB in children and adolescents across all levels of the health system:
 - Strengthen implementation of sample collection procedures to improve bacteriological confirmation, including stool testing for children under 10 years of age.
 - Support the use of integrated treatment decision algorithms for TB diagnosis in children under 10 years of age with presumptive pulmonary TB, including adaptation to the local context.
 - Strengthen capacity for CXR reading and interpretation and access to CXR, and ensure access to computer-aided detection once validated for all ages.
- Strengthen integration of services along the TB care cascade in the packages of care for: children and adolescents affected by comorbidities (e.g. severe pneumonia, severe acute malnutrition, HIV); pregnant and post-partum women, including those with HIV.
- Implement packages of care for TB-associated disabilities during and after TB treatment.
- Improve the uptake of paediatric formulations of second-line anti-TB medicines.
- Learning lessons from the COVID-19 pandemic, ensure maintenance of TB services during disease outbreaks, as part of the pandemic preparedness and response agenda.

Strengthen the implementation of integrated people-, family- and community-centred strategies as part of primary health care

While there is growing recognition of the importance of people-centred care for TB, translating people-centred care into practice within TB programmes is complex, partly because TB control strategies have historically prioritized top-down approaches to disease management, combined with weak community engagement. This has contributed to very low involvement of people with TB in decisions around TB care, including children, adolescents and their caregivers. A paradigm shift is needed as integrated people-, family- and community-centred approaches are instrumental in reaching children and adolescents with TB or at risk of TB, many of whom are currently missed. The following actions, coordinated across national programmes, donors, implementing partners and CSOs, are critical to achieving this.



KEY ACTION 8: Strengthen implementation of integrated, people-, family- and community-centred strategies as part of primary health care

- Implement integrated, family-centred and community-based models of care for the implementation of contact investigation and TPT.
- Design and evaluate differentiated service delivery (DSD) models to improve access to and retention in TB care for children and adolescents.
- Implement outreach programmes focusing on special populations such as children and adolescents who are victims of abuse and neglect.
- Invest in education and sensitization of communities, with a focus on young generations, to create awareness, generate knowledge and understanding around TB, and to destigmatize the disease.
- Promote decentralized models of TB care with diagnostic capacity available and accessible at the primary health care level as part of comprehensive integrated primary health care.

Address persistent gaps in data and shortfalls in research and development

Effective tools and approaches to address the TB epidemic in children, adolescents, pregnant and post-partum women cannot be optimized unless gaps in routine data, and related shortfalls in R&D are addressed. National programmes, funding agencies and researchers must commit to pursue the following key actions.



KEY ACTION 9: Improve data collection, reporting and use

- Prioritize implementation of digital case-based systems for recording and reporting of TB data.
- Transition to digital case-based surveillance systems and expand reporting of age-disaggregated TB notification data using five-year age groups (0–4; 5–9; 10–14; 15–19) to improve understanding of the TB epidemic in children and adolescents.
- For countries reporting notifications in 5-year age groups, produce aligned age-disaggregated estimates.
- Report data on treatment outcomes in five-year age groups (0–4; 5–9; 10–14; 15–19) and by HIV status for countries with digital case-based surveillance systems.
- Compile, analyse and use information on TB-associated disability in children and adolescents at the country level.
- At country level, report on the TB cascade of care for children and adolescents with HIV.
- Report and monitor coverage of contact investigation activities at (sub-)national levels.
- When recording data on extrapulmonary TB (EPTB) at facility level, record the type of EPTB, including TB meningitis in children.
- Conduct periodic assessments of the proportion of people diagnosed with TB who are pregnant or post-partum women, based on review of a representative sample of people notified with TB to characterize the TB epidemic in this population and to be able to address it through evidence-based interventions. Recording of pregnancy status should be included in medical records.



KEY ACTION 10: Support TB R&D and innovation focused on children, adolescents, pregnant and post-partum women

- Ensure investments in TB R&D for children, adolescents as well as for pregnant and post-partum women are commensurate with their disease risk and burden.
- Generate additional evidence on the performance of WHO-recommended, as well as next generation, rapid molecular based assays when using minimally invasive sample types needed for diagnosis of TB in children.
- Generate evidence on the performance of software for computer-aided reading and interpretation of CXR for TB diagnosis in children and young adolescents.
- Evaluate the performance of integrated TB treatment decision algorithms for the diagnosis of pulmonary TB in children <10 years of age.
- Invest in studies for the identification, validation and evaluation of host and pathogen biomarkers for TB disease and for response to treatment in children and young adolescents, prioritizing non-sputum approaches.
- Align age cut-offs in clinical trials with WHO-recommended age groups (i.e children <10 years, adolescents 10–19 years).
- Close gaps in pharmacokinetic (PK) and safety data so that children and pregnant women can benefit from shorter regimens for TPT and TB treatment, including drug-resistant TB, in a timely way.
- Initiate paediatric investigational plans (PIPs) for new TB drugs as soon as enough evidence on efficacy is available in adults, and expand the number of sites in TB HBCs capacitated to conduct clinical trials for investigational new drugs, according to standards of national regulatory authorities.
- Facilitate the collection of data on TB in pregnant and post-partum women, linked to infant outcomes as part of the WHO individual patient data platform.
- Ensure a sound pipeline of clinical studies for the evaluation of vaccine candidates in children, adolescents, pregnant and post-partum women.

4 Key milestones in the implementation of the 2023 Roadmap

Area	2025 milestones	2028 milestones
<p>Increase political leadership, multisectoral engagement and accountability and sustain advocacy efforts</p>	<p>Countries have developed and endorsed country specific targets in line with the End TB Strategy and the political declaration of the 2023 UN-HLM on TB</p>	<p>Domestic and international funding dedicated to implementation of TB services for children and adolescents as well as for pregnant and post-partum women is available</p>
	<p>Functional national platforms such as technical working groups for TB in children and adolescents are in place</p>	<p>Local CSOs are advocating to end TB in children, adolescents, pregnant and post-partum women</p>
	<p>National TB programmes have (a) focal person(s) for addressing TB in children and adolescents</p>	<p>Monitoring activities, with engagement of communities and civil society, focused on TB care for children and adolescents as well as pregnant and post-partum women are implemented</p>
	<p>Interventions targeting TB in children, adolescents as well as pregnant and post-partum women are included, detailed and budgeted for in the NSP and in funding requests</p>	<p>Technical assistance programmes on prevention and management of TB in children and adolescents as well as in pregnant and post-partum women are fully funded and implemented</p>
	<p>Sustained investments in the capacity building of local stakeholders, including civil society organizations (CSOs) and in advocacy activities for addressing TB in children, adolescents as well as pregnant and post-partum women</p>	<p>Public-private mix models for the delivery of TB care to children and adolescents as well as pregnant and post-partum women have been scaled up</p>
<p>Address persistent policy-practice gaps</p>	<p>TB HBCs have budgeted nationwide periodic trainings and routine supportive supervision programmes on TB in children and adolescents, as well as in pregnant and post-partum women, targeting front-line health workers and community health workers</p>	<p>TB care is part of comprehensive integrated primary health care packages for:</p> <ul style="list-style-type: none"> → pregnant women and newborns → children and adolescents affected by comorbidities (e.g. malnutrition, severe pneumonia, HIV)
	<p>Community-based models of care are being used for contact investigation, and adequate financial and human resources are available to support implementation</p>	<p>Community-based models of care are being implemented for providing TPT and adequate financial and human resources are available to support their implementation</p>
	<p>Shorter TPT regimens are implemented, preferably using paediatric water-dispersible formulations</p>	<p>The 2023 UN-HLM targets for TPT coverage among the age groups under 5 years and 5 years and above have been achieved</p>
	<p>Capacity to diagnose and manage TB in children and adolescents is available across the different levels of the health system</p>	

Area	2025 milestones	2028 milestones
	Use of stool samples for TB diagnosis in children has been implemented and scaled up at the national level	The 2023 UN-HLM target for treatment of DS-TB in children and young adolescents has been achieved
	Paediatric formulations for TPT, DS- and DR-TB treatment are procured and available in countries	The 2023 UN-HLM target for treatment of DR-TB, including in children and adolescents has been achieved
Strengthen the implementation of people-, family- and community-centred strategies as part of primary health care	Family-centred approaches for delivery of TB care to households affected by TB (i.e. TB index patients and household contacts) are implemented	Differentiated service delivery models to improve access to TB care for adolescents and school-age children living with HIV are implemented in all TB/HIV HBCs
	Families affected by TB, including children and adolescents, benefit from social protection	
Address persistent gaps in data and shortfalls in research and development	Periodic assessments to determine the proportion of people diagnosed with TB who are pregnant or post-partum women are planned in TB HBCs	Periodic assessments to determine the proportion of people diagnosed with TB who are pregnant or post-partum women are conducted in TB HBCs
	Age-disaggregated data on TB notifications are reported by five-year age groups (0-4, 5-9, 10-14, 15-19) by all TB HBCs, and data are used at country level	TB treatment outcomes data are reported by five-year age groups (0-4, 5-9, 10-14, 15-19) and by HIV status by countries with digital case-based surveillance systems
	New evidence on integrated treatment decision algorithms, and on the use of computer-aided reading and interpretation of CXR in children and young adolescents has been generated	New evidence on all available molecular WHO-recommended rapid diagnostic test on sample types used for diagnosis of TB in children has been generated
	New PK and safety data of shorter regimens for TPT (e.g. 1 HP; 3 HP) in children and pregnant and post-partum women are available	New PK and safety data on treatment of DS-TB and DR-TB in children and pregnant and post-partum women are available
		Age groups in line with WHO-recommended clinical definitions are considered for clinical trials
		Paediatric investigational plans (PIPs) are developed at the start of clinical research for earlier evaluation of new TB drugs in children and adolescents
		A solid pipeline of clinical evaluation studies of vaccine candidate(s) in children is available

Fig. 2. Key actions in the Roadmap towards ending TB in children and adolescents

Third edition, 2023



References

1. The sustainable development agenda [website]. New York: United Nations, Department of Economic and Social Affairs (<https://sdgs.un.org/goals>, accessed 29 September 2023).
2. The end TB Strategy. Geneva: World Health Organization; 2014 (<https://iris.who.int/handle/10665/331326>, accessed 29 September 2023).
3. The global strategy for women's, children's, and adolescent's health 2016–2030. New York: Every Woman Every Child; 2015 (<https://platform.who.int/docs/default-source/mca-documents/rmncah/global-strategy/ewec-globalstrategyreport-200915.pdf>, accessed 29 September 2023).
4. Clark H, Coll-Seck AM, Banerjee A, Peterson S, Dalglish SL, Ameratunga S et al. A future for the world's children? A WHO-UNICEF-Lancet Commission. *Lancet*. 2020;395(10224):605–658. doi:10.1016/S0140-6736(19)32540-1.
5. Protect the promise: 2022 progress report on the every woman every child global strategy for women's, children's and adolescents' health (2016–2030). World Health Organization; 2022 (<https://iris.who.int/handle/10665/363919>, accessed 29 September 2023).
6. Implementing the end TB strategy: the essentials, 2022 update. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/365364>, accessed 29 September 2023).
7. WHO consolidated guidelines on tuberculosis. Module 5: management of tuberculosis in children and adolescents. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/352522>, accessed 29 September 2023).
8. WHO operational handbook on tuberculosis. Module 5: management of tuberculosis in children and adolescents. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/352523>, accessed 29 September 2023).
9. Perin J, Mulick A, Yeung D, Villavicencio F, Lopez G, Strong KL et al. Global, regional, and national causes of under-5 mortality in 2000–19: an updated systematic analysis with implications for the Sustainable Development Goals. *Lancet Child Adolesc Health*. 2022;6(2):106–115. doi:10.1016/S2352-4642(21)00311-4.
10. GBD 2019 Child and Adolescent Communicable Disease Collaborators. The unfinished agenda of communicable diseases among children and adolescents before the COVID-19 pandemic, 1990–2019: a systematic analysis of the Global Burden of Disease Study 2019. *Lancet*. 2023;402(10398):313–335. doi:10.1016/S0140-6736(23)00860-7.
11. Global tuberculosis report 2023. Geneva: World Health Organization; 2023 (<https://www.who.int/teams/global-tuberculosis-programme/data>, accessed 27 October 2023).
12. Global tuberculosis report 2021. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/346387>, accessed 29 September 2023).
13. Ranasinghe L, Achar J, Gröschel MI, Whittaker E, Dodd PJ, Seddon JA. Global impact of COVID-19 on childhood tuberculosis: an analysis of notification data. *Lancet Glob Health*. 2022;10(12):e1774–e1781. doi:10.1016/S2214-109X(22)00414-4.
14. Jenkins HE, Tolman AW, Yuen CM, Parr JB, Keshavjee S, Pérez-Vélez C et al. Incidence of multidrug-resistant tuberculosis disease in children: systematic review and global estimates. *Lancet*. 2014;383(9928):1572–9. doi:10.1016/S0140-6736(14)60195-1.
15. Dodd PJ, Sismanidis C, Seddon JA. Global burden of drug-resistant tuberculosis in children: a mathematical modelling study. *Lancet Infect Dis*. 2016;16(10):1193–1201. doi:10.1016/S1473-3099(16)30132-3.
16. Snow KJ, Bekker A, Huang GK, Graham SM. Tuberculosis in pregnant women and neonates: A meta-review of current evidence. *Paediatr Respir Rev*. 2020;36:27–32. doi:10.1016/j.prrv.2020.02.001.

17. Maugans C, Loveday M, Hlangu S, Waitt C, Van Schalkwyk M, van de Water B et al. Best practices for the care of pregnant people living with TB. *Int J Tuberc Lung Dis.* 2023 May 1;27(5):357–366. doi:10.5588/ijtld.23.0031.
18. Sugarman J, Colvin C, Moran AC, Oxlade O. Tuberculosis in pregnancy: an estimate of the global burden of disease. *Lancet Glob Health.* 2014;2(12):e710–e716. doi:10.1016/S2214-109X(14)70330-4.
19. Political declaration of the 2018 UN General-Assembly High-Level Meeting on the Fight Against Tuberculosis (Resolution A/RES/73/3). New York: United Nations; 2018 (<https://www.who.int/publications/m/item/political-declaration-of-the-un-high-level-meeting-of-the-general-assembly-on-the-fight-against-tb>, accessed 29 September 2023).
20. Political Declaration on the High-Level Meeting on the fight against tuberculosis: “Advancing science, finance and innovation, and their benefits, to urgently end the global tuberculosis epidemic, in particular by ensuring equitable access to prevention, testing, treatment and care. New York: United Nations; 2023 (<https://www.un.org/pga/77/wp-content/uploads/sites/105/2023/09/TB-Final-Text.pdf>, accessed 2 October 2023).
21. Roadmap towards ending TB in children and adolescents, second edition. Geneva: World Health Organization; 2018 (<https://apps.who.int/iris/handle/10665/275422>, accessed 31 October 2023).
22. Snow KJ, Sismanidis C, Denholm J, Sawyer Susan M, Graham SM. The incidence of tuberculosis among adolescents and young adults: a global estimate. *Eur Respir J.* 2018;51(2). doi:10.1183/13993003.02352-2017.
23. Dodd PJ, Yuen CM, Sismanidis C, Seddon JA, Jenkins HE. The global burden of tuberculosis mortality in children: a mathematical modelling study. *Lancet Glob Health.* 2017;5(9):e898–e906. doi:10.1016/S2214-109X(17)30289-9.
24. Defeat childhood TB: A multicountry assessment of national policies and preparedness for childhood TB programming. Washington DC: Elizabeth Glaser Pediatric AIDS Foundation; 2021 (<https://pedaids.org/resource/defeat-childhood-tb/>, accessed 29 September 2023).
25. Assessment of child and adolescent TB policy and governance in countries participating in The Union’s Sub-Saharan Africa Child and adolescent TB centre of excellence. Paris: International Union Against Tuberculosis and Lung Diseases/United States Centers for Disease Control and Prevention; 2023 (https://theunion.org/sites/default/files/2023-03/Landscape%20assessment%20report_final%20%2301_25_2023_0.pdf, accessed 29 September 2023).
26. E-learning course on the management of tuberculosis in children and adolescents for health care workers. Geneva; World Health Organization: 2023 (<https://openwho.org/channels/end-tb>, accessed 27 October 2023)
27. 2020–2022 Technical Review Panel Observations Report. Geneva: The Global Fund; 2023 (https://www.theglobalfund.org/media/12137/trp_2020-2022observations_report_en.pdf, accessed 29 September 2023).
28. Adaptation and implementation of WHO’s multisectoral accountability framework to end TB (MAF-TB): operational guidance. Geneva: World Health Organization; 2023 (<https://iris.who.int/handle/10665/365806>, accessed 29 September 2023).
29. Atkins S, Heimo L, Carter D, Ribas Closa M, Vanleeuw L, Chenciner L et al. The socioeconomic impact of tuberculosis on children and adolescents: a scoping review and conceptual framework. *BMC Public Health.* 2022;22:2153. doi:10.1186/s12889-022-14579-7.
30. Moore BK, Dlodlo RA, Dongo JP, Verkuijl S, Sekadde MP, Sandy C et al. Evidence to action: Translating innovations in management of child and adolescent TB into routine practice in high-burden countries. *Pathogens.* 2022; 11:383. doi:10.3390/pathogens11040383.

31. People-centred framework for tuberculosis programme planning and prioritization: user guide. Geneva: World Health Organization; 2019 (<https://iris.who.int/handle/10665/329472>, accessed 29 September 2023).
32. Yuen CM, Szkwarko D, Dubois MM, Shahbaz S, Yuengling KA, Urbanowski ME et al. Tuberculosis care models for children and adolescents: a scoping review. *Bull World Health Organ.* 2022;100(12):777–788L. doi:10.2471/BLT.22.288447.
33. Myburgh H, Baloyi D, Loveday M, Meehan S-A, Osman M, Wademan D et al. A scoping review of patient-centred tuberculosis care interventions: Gaps and opportunities. *PLOS Glob Public Health.* 2023;3(2):e0001357. doi:10.1371/journal.pgph.0001357.
34. Cluver LD, Sherr L, Toska E, Zhou S, Mellins C-A, Omigbodun O et al. From surviving to thriving: integrating mental health care into HIV, community, and family services for adolescents living with HIV. *Lancet Child Adolesc Health.* 2022;6(8):582–592. doi:10.1016/S2352-4642(22)00101-8.
35. Abelman R, Alons C, Stockman J, Teri I, Grimsrud A, Ombija M et al. Implementation of differentiated service delivery for paediatric HIV care and treatment: opportunities, challenges and experience from seven sub-Saharan African countries. *Fam Med Community Health.* 2020;8(3):e000393. doi:10.1136/fmch-2020-000393.
36. Kay AW, Ness T, Verkuijl SE, Viney K, Brands A, Masini T et al. Xpert MTB/RIF Ultra assay for tuberculosis disease and rifampicin resistance in children. *Cochrane Database Syst Rev.* 2022;9(9):CD013359. doi:10.1002/14651858.CD013359.pub3.
37. An investment case for new tuberculosis vaccines. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/365230>, accessed 29 September 2023).

Selected resources

Resource title	Link
Policies and practical guidance	
WHO TB knowledge sharing Platform: all WHO consolidated guidelines on TB, operational handbooks and training materials	https://tbksp.org/en
WHO consolidated guidelines on tuberculosis Module 5: management of tuberculosis in children and adolescents	https://www.who.int/publications/i/item/9789240046764
WHO operational handbook on tuberculosis: module 5: management of tuberculosis in children and adolescents	https://www.who.int/publications/i/item/9789240046832
Diagnosis and Management of Tuberculosis in Children and Adolescents: A Desk Guide for Primary Health Care Workers. Fourth Edition. The International Union Against Tuberculosis and Lung Diseases	https://theunion.org/technical-publications/diagnosis-and-management-of-tuberculosis-in-children-and-adolescents-a-desk-guide-for-primary-health-care-workers
WHO Model List of Essential Medicines for Children – 9th list, 2023	https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2021.03 https://apps.who.int/iris/rest/bitstreams/1518734/retrieve
Training materials	
WHO e-course for health care workers on the management of tuberculosis in children and adolescents	Forthcoming on the TB channel at OpenWHO: https://openwho.org/channels/end-tb
WHO e-course on the management of tuberculosis in children and adolescents for “strategic resource persons” (programmatic)	Forthcoming on the TB channel at OpenWHO: https://openwho.org/channels/end-tb
The Union online course on CXR interpretation in children with presumptive TB	https://coursesonline.theunion.org/theunion/2023/interpretation-of-chest-x-rays-in-children-with-tb/393947/
TB Speed training course: Chest X-ray (CXR) training to diagnose childhood TB	https://www.tb-speed.com/wp-content/uploads/2021/09/Chest_X-Ray_Training_Children_Tuberculosis_TB-Speed.pdf
USAID TB DIAH TB Contact Investigations for Frontline Workers	https://training.tbdiah.org/index.php
Planning and programme management	
KNCV benchmarking tool for Childhood TB policies, practice and planning	Forthcoming at https://www.kncvtbc.org/
WHO guidance on conducting reviews of tuberculosis programmes	Forthcoming at: https://www.who.int/health-topics/tuberculosis#tab=tab_1
WHO Guidance for national strategic planning for tuberculosis	https://apps.who.int/iris/rest/bitstreams/1458000/retrieve
WHO social protection guidance	Forthcoming at: https://www.who.int/health-topics/tuberculosis#tab=tab_1
WHO policy brief on TB-associated disability	Forthcoming at: https://www.who.int/health-topics/tuberculosis#tab=tab_1
WHO guidance on community and civil society engagement to end TB	Forthcoming at: https://www.who.int/health-topics/tuberculosis#tab=tab_1
Budgeting tools for key interventions for the management of TB in children and adolescents	https://stoptb.org/wg/dots_expansion/childhoodtb/posee.asp
Integrated Health Tool for planning and costing TB (IHT:TB)	http://tb.integratedhealthtool.org/
Checklist for activities and interventions to be included in Global Fund proposals for strengthening the management of TB in children and adolescents (EGPAF/CAWG)	https://www.stoptb.org/checklist-tb-interventions-gf-proposals

Resource title	Link
Diagnosis of TB in children and adolescents	
WHO and Global Laboratory Initiative (GLI). Practical manual of processing stool samples for diagnosis of childhood TB	https://www.who.int/publications/i/item/9789240042650
The SOS Stoolbox: an implementation package for the SOS stool method to detect TB and rifampicin resistance. KNCV Tuberculosis Foundation.	https://www.kncvtbc.org/en/sos-stoolbox/
Diagnostic CXR Atlas for Tuberculosis in Children: A Guide to Chest X-ray Interpretation (the Atlas). The International Union against Tuberculosis and Lung Diseases	https://theunion.org/technical-publications/diagnostic-cxr-atlas-for-tuberculosis-in-children
Diagnostic CXR Atlas for Tuberculosis in Children Image Library. The International Union against Tuberculosis and Lung Diseases	https://atlaschild.theunion.org/
Drug-resistant TB	
WHO bedaquiline information note	https://iris.who.int/bitstream/handle/10665/370100/9789240074286-eng.pdf?sequence=1
WHO delamanid information note	https://iris.who.int/bitstream/handle/10665/370099/9789240074309-eng.pdf?sequence=1
Sentinel Project. Management of Multidrug-Resistant Tuberculosis in Children: A Field Guide (Fifth Edition)	http://sentinel-project.org/wp-content/uploads/2022/03/DRTB-Field-Guide-2021_v5.pdf
Sentinel Project. A Family-Centered Approach to the Treatment and Prevention of Drug-Resistant Tuberculosis in Children and Adolescents: Counseling Tools and Approach	http://sentinel-project.org/wp-content/uploads/2021/12/Peds_Counseling_Outline_V3.pdf
Sentinel Project. Management of Drug-Resistant Tuberculosis in Pregnant and Peripartum People: A Field Guide	http://sentinel-project.org/wp-content/uploads/2022/09/DRTB-Field-Guide-Pregnancy_Sept_2022.pdf
Research and development	
Treatment Action Group. 2022 Report on TB Research Funding Trends	https://www.treatmentactiongroup.org/resources/tbrd-report/tbrd-report-2022/
Treatment Action Group. 2022 Pipeline Report	https://www.treatmentactiongroup.org/resources/pipeline-report/2022-pipeline-report/
Paediatric HIV & TB: Rome Action Plan	https://www.paediatricrivactionplan.org/
Advocacy	
African Union and WHO Call to Action to end TB among children in Africa (2022)	https://www.afro.who.int/news/african-union-and-who-urge-swift-action-against-childhood-tuberculosis
Treatment Action Group 1/4/6x24 Campaign	https://www.treatmentactiongroup.org/1-4-6-x-24/
Global Fund Advocates Network Advocacy Guides to 1/4/6x24 - Shorter Regimens for TB	https://www.globalfundadvocatesnetwork.org/resource/advocacy-guides-to-1-4-6x24-shorter-regimens-for-tb/
Stop TB Partnership Hello Kitty Campaign	https://www.stoptb.org/advocate-to-entdtb/hello-kitty
Defeat Childhood TB. A Multicountry Assessment of National Policies and Preparedness for Childhood TB Programming	https://pedaids.org/resource/defeat-childhood-tb/
Union/CDC Center of Excellence. Landscape assessment of child and adolescent TB policy and governance in the centre of excellence countries	https://theunion.org/sites/default/files/2023-03/Landscape%20assessment%20report_final%20%2301_25_2023_0.pdf
Mobilizing youth to end TB	https://www.who.int/activities/mobilizing-youth-to-end-tb https://extranet.who.int/dataformv3/index.php/486379?lang=en

Additional resources can be found in Annex 1 of the WHO operational handbook on the management of tuberculosis in children and adolescents.

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