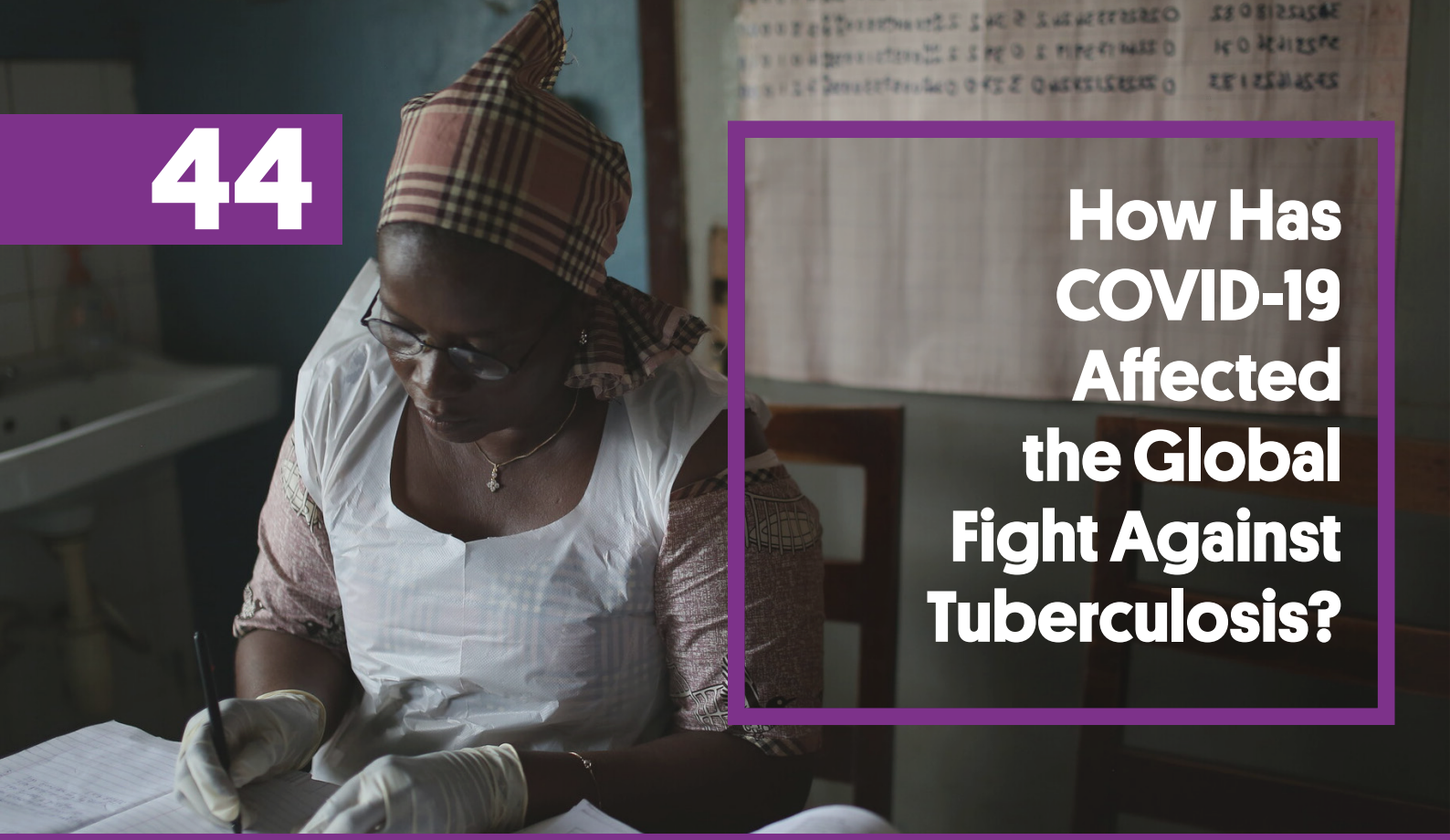

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How Has COVID-19 Affected the Global Fight Against Tuberculosis?

Series | COVID-19 and other pandemics

ISGlobal Barcelona Institute for Global Health

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[This document is a one of a series of discussion notes addressing fundamental questions about the global health. Its purpose is to transfer scientific knowledge to the public conversation and decision-making process. The papers are based on the best information available and may be updated as new information comes to light.]

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Photo: Ross Road Community Health Center in Freetown, Sierra Leone. Dominic Chavez / World Bank

Tuberculosis (TB) remains **one of the oldest and leading infectious causes of death** in the world; with modern strains of the causative agent, Mycobacterium tuberculosis, dating some 15,000 years back.[1] TB was the first infectious disease to be declared a public health emergency in 1993.[2] Since then, it has continued to be **a public health priority** particularly in low and middle income countries (LMIC) which endure the highest burden of disease.

TB is usually described as **a disease of poverty**, as poor income settings across the globe account for a disproportionately high disease burden. Poor populations are at higher risk of TB infection, progression to disease, and mortality due to poverty-related risk factors such as living conditions, undernutrition, and comorbidities, among others. The vicious cycle between poverty and TB is well reported in several studies, showing that TB incidence and mortality are closely linked to socioeconomic indicators. Families experience a marked loss of their income and fall further in the grip of poverty.[3]

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[1] Kefyalew Addis Alene, Kinley Wangdi, and Archie C A Clements, 'Impact of the COVID-19 Pandemic on Tuberculosis Control: An Overview', *Tropical Medicine and Infectious Disease* 5, no. 3 (24 July 2020): 123, https://www.mdpi.com/2414-6366/5/3/123; Thomas M. Daniel, 'The History of Tuberculosis', *Respiratory Medicine* 100, no. 11 (1 November 2006): 1862–70, https://doi.org/10.1016/j.rmed.2006.08.006.

[2] Thomas M. Daniel, 'The History of Tuberculosis', *Respiratory Medicine* 100, no. 11 (1 November 2006): 1862–70, https://doi.org/10.1016/j.rmed.2006.08.006; WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[3] Devra M. Barter et al., 'Tuberculosis and Poverty: The Contribution of Patient Costs in Sub-Saharan Africa – a Systematic Review', *BMC Public Health* 12, no. 1 (14 November 2012): 980, https://doi.org/10.1186/1471-2458-12-980; Olivia Oxlade and Megan Murray, 'Tuberculosis and Poverty: Why Are the Poor at Greater Risk in India?', *PLoS ONE* 7, no. 11 (19 November 2012): e47533, https://doi.org/10.1371/journal.pone.0047533; The Lancet, 'Tackling Poverty in Tuberculosis Control', *The Lancet* 366, no. 9503 (17 December 2005): 2063, https://doi.org/10.1016/S0140-6736(05)67862-2.

Over the past decades the TB pandemic has been affected by major historical events leading to **a variation in disease burden** across the globe. For instance, World War I and II had a negative impact on the TB epidemic in Europe leading to an increase in disease burden and mortality during that time.[4] **After World War II**, Europe experienced dramatic improvements in socioeconomic status. Along with this came medical discoveries for TB chemotherapy that further contributed to the reduction of disease burden.[5] In low- and middle-income countries, **the HIV epidemic** led to a re-emergence of TB, as the two diseases have a symbiotic relationship. TB quickly became the leading cause of death in people living with HIV, and people living with HIV became the group at highest risk of getting TB disease.[6] Antiretroviral therapy as well as integrated TB/HIV prevention and treatment strategies abated the TB pandemic in the most recent decades. However, **the COVID-19 pandemic** has put TB control programs at risk of losing years of significant gains in the fight against TB particularly in LMICs with high TB burden. Other factors, such as the emergence of other disease epidemics or political instability and wars in many regions of the world further hinder global TB control efforts.

Additionally, f**unding of TB programs** and particularly TB R&D has been long overlooked despite the high mortality. Consequently, there has been limited advance in novel vaccines, drugs and diagnostics. This is in contrast to the investment seen in COVID-19 research – 113 times more than the investment made in TB research in 2020 [7]

[4] Thomas M. Daniel, 'The History of Tuberculosis', *Respiratory Medicine* 100, no. 11 (1 November 2006): 1862–70, https://doi.org/10.1016/j.rmed.2006.08.006.

[5] Kefyalew Addis Alene, Kinley Wangdi, and Archie C A Clements, 'Impact of the COVID-19 Pandemic on Tuberculosis Control: An Overview', *Tropical Medicine and Infectious Disease* 5, no. 3 (24 July 2020): 123, https://www.mdpi.com/2414-6366/5/3/123; Thomas M. Daniel, 'The History of Tuberculosis', *Respiratory Medicine* 100, no. 11 (1 November 2006): 1862–70, https://doi.org/10.1016/j.rmed.2006.08.006.

[6] Muktar H. Aliyu and Hamisu M. Salihu, 'Tuberculosis and HIV Disease: Two Decades of a Dual Epidemic', *Wiener Klinische Wochenschrift* 115, no. 19–20 (October 2003): 685–97, https://doi.org/10.1007/BF03040884; Anthony D Harries et al., 'The HIV-Associated Tuberculosis Epidemic—When Will We Act?', *The Lancet* 375, no. 9729 (May 2010): 1906–19, https://doi.org/10.1016/S0140-6736(10)60409-6; Joanne R. Winter et al., 'The Impact of HIV Infection on Tuberculosis Transmission in a Country with Low Tuberculosis Incidence: A National Retrospective Study Using Molecular Epidemiology', *BMC Medicine* 18, no. 1 (14 December 2020): 385, https://doi.org/10.1186/s12916-020-01849-7.

[7] Priya Venkatesan, 'Worrying Lack of Funding for Tuberculosis', *The Lancet Infectious Diseases* 22, no. 3 (March 2022): 318, https://doi.org/10.1016/S1473-3099(22)00073-1.

1. TB Pandemics Pre COVID-19

"In 1998, the WHO started to use a global list of high burden countries (HBC) for TB – at the time these were 22 countries (most of which LMICs) which comprise 80% of the global TB cases."

In 1998, the World Health Organization (WHO) started to use **a global list of high burden countries** (HBC) for TB – at the time these were 22 countries (most of which LMICs) which comprise 80% of the global TB cases. This list provided a focus for global action on TB; it has been used to promote, establish high-level political engagement with the countries in the list and allowed WHO and others to target limited resources to the countries with the largest number of TB cases. Two more lists were added to this one in later years to include HBC for **TB/HIV co-infection and multidrug resistant TB** (MDR TB). These lists have been expanded and reviewed twice thus far, in 2016 and in 2020 *(See Figure 1)*.[8]

Figure 1. The three global HBC lists for TB, TB/HIV and MDR/RR-TB to be used by WHO during the period 2021-2025, and their areas of overlap.

Source: The WHO global HBC lists for TB, TB/HIV and MDR/RR-TB 2021 -2025

[8] World Health Organization, *WHO Global Lists of High Burden Countries for Tuberculosis (TB), TB/HIV and Multidrug/Rifampicin-Resistant TB (MDR/RR-TB), 2021–2025: Background Document* (Geneva: World Health Organization, 2021), https://apps.who.int/iris/handle/10665/341980.

At the World Assembly of 2014, the **WHO End TB Strategy 2016 -2035** (with a vision for a world free of TB with zero deaths, disease and suffering due to tuberculosis) was endorsed and adopted by member states; and at the UN General Assembly in the following year (2015) ending TB epidemic by 2030 was included as one of the health targets in **goal 3 of the Sustainable Development Goals (SDGs)**, which is to ensure health and well-being for all.[9]

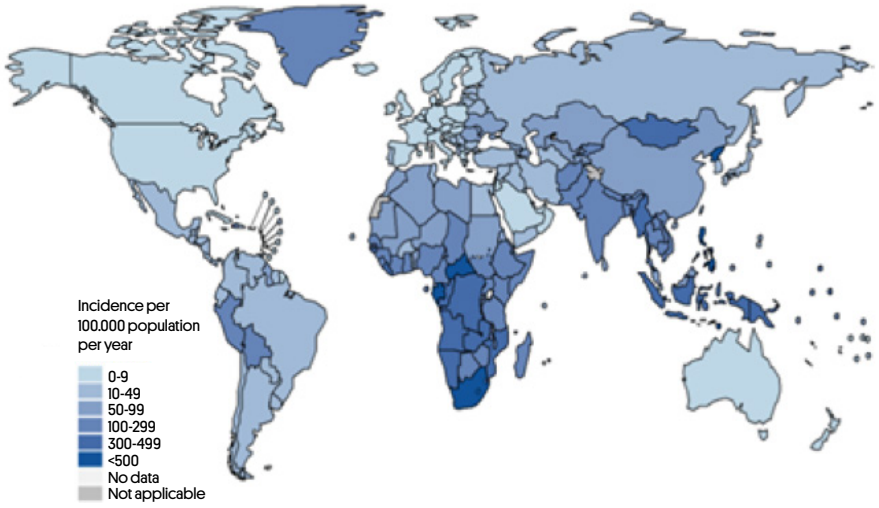
Table 1. The END TB Strategy of the World Health Organization.

Vision: A world free of tuberculosis [zero deaths, disease and suffering due to tuberculosis] **Goal:** End the global tuberculosis epidemic		Milestones		Targets		Global achievements
		2020	2025	SDG* 2030	EndTB 2035	2015-2020
1	**Reduction in number of TB deaths compared with 2015 (%)**	35%	75%	90%	95%	9%
2	**Reduction in TB incidence rate compared with 2015 (%)**	20%	50%	80%	90%	11%
3	**TB-affected families facing catastrophic costs due to TB (%)**	0%	0%	0%	0%	47%

*TB was added in the agenda and goals of the UN Sustainable Development Goals (SDGs)

Source: WHO, 'The End TB Strategy' (World Health Organization, 2015).

Figure 2. Estimated TB incidence rates, 2020.



Source: Global situation of TB epidemic in 2020 and progress made towards targets. https://www.who.int/teams/global-tuberculosis-programme/data.

[9] WHO, 'The End TB Strategy' (World Health Organization, 2015), https://www.who.int/teams/global-tuberculosis-programme/the-end-tb-strategy.

By 2020, the set targets were far from being reached globally and also in LMIC, where more than 80% of the world disease burden is found in South East Asia (43%), Africa (25%) and Western Pacific (18%). Globally, the cumulative decline in TB incidence rate from 2015 to 2020 was 11% (far short of the 20% milestone) and the cumulative reduction in mortality was 9.2% (a far cry from the 35% milestone).[10]

Only a few of the HBCs had reached the 2020 milestones (six reached the TB incidence reduction milestone and 6 reached the 35% mortality reduction.[11]

In recent years, **TB diagnosis** has experienced a remarkable change with the introduction of rapid molecular tests that provide results of TB and rifampicin resistance in less than 2 hours. In 2020, of the 4.8 million TB cases with pulmonary TB, 59% were bacteriologically confirmed (a 2% increase from 2019). However, low and middle-income countries reported the lowest bacteriological confirmation levels (around 50%) compared to the high-income countries (81%) due to accessibility, variation in diagnostic and reporting practices, among others.

Globally, 50% of the targeted 40 million **TB treatments** and 32% of the targeted 1.5 million drug resistant TB treatments (adult and children) had been reached in 2020. There was a marked increase in the number of people receiving TB preventive therapy (people living with HIV, household contact of bacteriologically confirmed pulmonary TB, and clinical risk groups) from 1.0 million people in 2015 to 3.6 million in 2019. Most of those receiving TB preventive therapy were people living with HIV.

There were **gains observed for drug resistant TB** diagnosis and treatment as well, with the advances in drug resistance detection by rapid molecular tests, culture methods and/or sequencing technologies. On the other hand, new and safer treatment regimens were implemented (including child friendly and injection free regimens) and the conventional duration of drug resistant TB treatment were shortened.

Although **funding in TB research** was slowly increasing from US$ 772 million in 2017 to US$ 901 million in 2019; it was still very well below the US$ 2 billion per year target set at the UN high-level meeting on TB. However, the diagnostic, treatment and vaccine pipelines are comprehensive with new testing platforms, new chemical entities and more than ten vaccine candidates in clinical trials ●

[10] Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[11] World Health Organization, *WHO Global Lists of High Burden Countries for Tuberculosis (TB), TB/HIV and Multidrug/Rifampicin-Resistant TB (MDR/RR-TB), 2021–2025.* https://cdn.who.int/media/docs/default-source/hq-tuberculosis/who_globalhbcliststb_2021-2025_backgrounddocument.pdf?sfvrsn=f6b854c2_9

2. Impact of COVID-19 on TB

"Due to delayed or missed diagnosis, delayed initiation of treatment and reduced quality of TB treatment follow-up, the number of TB deaths have started increasing in 2020 for the first time since 2017."

The COVID-19 pandemic has been a **significant setback** for TB programmes around the world, particularly in LMICs where the disease burden is the highest. It has also been a remarkable **reminder** of the remaining challenges in achieving TB control. The impact has been on multiple dimensions, including TB service demand, access, supply chain, number of TB cases identified and notified, TB incidence, mortality and financing.[12]

Impact on TB burden:

In the initial months of the SARS-CoV-2 pandemic, the WHO used the national number of monthly or quarterly notifications of TB cases to monitor the impact of the pandemic. They noted that, at global scale, the **TB case notifications** per year decreased by 18% in 2020, compared to 2019. The monthly and quarterly TB case notifications were markedly reduced in the majority of the high TB burden countries with the largest decrease in Gabon (80%), Philippines (37%), Lesotho (35%), Indonesia (31%) and India (25%). There were **variations between countries** due to the differences in time of COVID-19 waves, types of restriction measures adopted and their duration, as well as the capacity of the health system to manage both pandemics. Africa WHO region had a modest initial decrease of notified cases (2.5%) compared to the South-East Asia and Western Pacific regions which accounted for 84% of the global TB case notification reduction.[13]

TB diagnostic services suffered a setback during COVID-19 in **two ways**:

1. **Timely access** to services and community active case finding activities.
2. **Diversion of services resources** a towards the COVID-19 leading to missed opportunities for diagnosis.

Access to TB services were restricted by several measures adopted by LMICs such as **movement restrictions** (lack of transport for both patients and healthcare workers) and **decongestion of health facilities** to avoid COVID-19 transmission (patients were told to stay home, only come to health facilities if urgent). TB diagnostics are health facility-based, and with patients unable to reach them, the TB case diagnosis is reduced. **Fears of getting infected** with COVID-19 and **fears of stigmatization** (in parts of Africa) also kept patients away from the health facilities.[14]

TB community activities such as **active case finding** were initially suspended in many of the LMICs due to COVID-19 pandemic and the lack of clear guidelines on how to carry out these activities. In some countries, the health workers carrying out TB community services were also reassigned to COVID-19 community screening activities.[15]

The TB diagnostic molecular platforms were diverted for use in COVID-19 testing when a way to use the TB rapid diagnostic molecular test for SARS-CoV-2 testing was developed. In LMICs this meant that **TB diagnostic services were deprioritized** to give place to COVID-19 testing.[16] For example in South Africa, it was reported that during the first lockdown there was an estimated

[12] WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[13] WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[14] Mishal S. Khan et al., 'Mitigating the Impact of COVID-19 on Tuberculosis and HIV Services: A Cross-Sectional Survey of 669 Health Professionals in 64 Low and Middle-Income Countries', *PLOS ONE* 16, no. 2 (2 February 2021): e0244936, https://doi.org/10.1371/journal.pone.0244936; Jean B. Nachega et al., 'Minimizing the Impact of the Triple Burden of COVID-19, Tuberculosis and HIV on Health Services in Sub-Saharan Africa', *International Journal of Infectious Diseases*, Commemorating World Tuberculosis Day March 24th, 2021: "The Clock is Ticking", 113 (1 December 2021): S16–21, https://doi.org/10.1016/j.ijid.2021.03.038; Alaine U. Nyaruhirira et al., 'COVID-19 Diagnosis in Low- and Middle-Income Countries', *The Journal of Molecular Diagnostics : JMD*, 3 February 2022, https://doi.org/10.1016/j.jmoldx.2021.12.008; WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[15] Gabriella J. Caren et al., 'COVID-19 Pandemic Disruption on the Management of Tuberculosis Treatment in Indonesia</P>', *Journal of Multidisciplinary Healthcare* 15 (26 January 2022): 175–83, https://doi.org/10.2147/JMDH.S341130; A C Meneguim et al., 'Adapting TB Services during the COVID-19 Pandemic in Mumbai, India', *Int J Tuberc Lung Dis*. 24, no. 10 (2020): 1119–21, https://doi.org/10.5588/ijtld.20.0537.

[16] Quarraisha Abdool Karim and Cheryl Baxter, 'COVID-19: Impact on the HIV and Tuberculosis Response, Service Delivery, and Research in South Africa', *Current HIV/AIDS Reports 19*, no. 1 (1 February 2022): 46–53, https://doi.org/10.1007/s11904-021-00588-5; Nyaruhirira et al., 'COVID-19 Diagnosis in Low- and Middle-Income Countries'.

50% decrease in the daily rapid diagnostic molecular tests translating to a 33% decrease in detected TB cases.[17]

All the above reasons help explain the **decrease in case notifications between 2019 and 2002**. With continued disruptions well into 2021 it is now apparent that the world will not reach the UNHLM target of reaching 40 million newly diagnosed TB cases between 2018 and 2022. An impact on TB incidence was not immediately observed in 2020, but modelling studies in 16 high priority countries project an increase in global TB incidence in 2022 and 2023.[18]

Impact on TB treatment and prevention services:

Most LMICs, especially those with high TB burden reported the **reassignment of TB health workers** to COVID-19 activities as well as the **repurposing of TB treatment centres** for COVID-19.[19] Additionally TB programme **supply chains for medications, laboratory consumables and personal protective equipment** were disturbed by the COVID-19 pandemic worldwide, but this was more acute in LMICs as most rely on external suppliers and donors for this. The WHO reported declines in TB treatment enrolment of 15% for drug resistant TB, as well as about 1 million less TB preventive treatment offered just between 2019 and 2020.[20] There has also been a **reduction in coverage of the bacille Calmette-Guérin** (BCG) **vaccine** (5% or more in 31 countries). Due to delayed or missed diagnosis, delayed initiation of treatment and reduced quality of TB treatment follow-up, the number of **TB deaths** have started increasing in 2020 for the first time since 2017, and more than 1.5 million people died of tuberculosis in 2020 (compared to 1.4 million in 2019). Modelling projections in 16 high priority countries show that TB mortality is expected to increase in 2022 and 2023.[21]

Additionally, the combination of COVID-19 and TB is considered a sort of **"cursed duet". TB should be considered** a risk factor for severe COVID disease and patients with TB should be prioritised for COVID-19 preventative efforts, including vaccination. The impact of COVID-19 on long-term pulmonary sequelae in patients with TB and the need for pulmonary rehabilitation is yet to be determined.[22]

Impact on TB finance:

Most of the LMICs, which also make up most of the high TB burden countries, rely on **external donor funds** to run the national TB programmes. With COVID-19 pandemic funds at international level and domestic level were redirected to manage and mitigate the health and socioeconomic effects of COVID-19. There was subsequently a decline in **funding for TB programmes** (prevention, diagnostics, treatment).[23] SAccording to the Global TB report, in 2020 TB spending on outpatients and inpatients declined by 8.7% from 2019 level as a result of a reduction in TB case notifications, changes in treatment modalities (remote/multi month dispensing) and reallocation of funds to COVID-19 activities.[24]

A study in South Africa equally reported on the **diversion of research funding** towards COVID-19 – using existing TB research capacity (funds, infrastructure and human resources).[25] Given the global economic situation and the accumulation of demanding crises – those derived from Ukraine's conflict, in the first place – it is unlikely that this trend will be reversed in the near future ●

[17] Quarraisha Abdool Karim and Salim S. Abdool Karim, 'COVID-19 Affects HIV and Tuberculosis Care', *Science* 369, no. 6502 (24 July 2020): 366–68, https://doi.org/10.1126/science.abd1072; Abdool Karim and Baxter, 'COVID-19'.

[18] WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[19] Nachega et al., 'Minimizing the Impact of the Triple Burden of COVID-19, Tuberculosis and HIV on Health Services in Sub-Saharan Africa'; WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[20] Alene, Wangdi, and Clements, 'Impact of the COVID-19 Pandemic on Tuberculosis Control'; Caren et al., 'COVID-19 Pandemic Disruption on the Management of Tuberculosis Treatment in Indonesia</P>'; WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[21] Global Tuberculosis Report, 2021 and Stop TB Partnership, 'The Devastating Effect of the COVID-19 Pandemic on the TB Response-A Minimum of 5 Years of Progress Lost and 6 Million Additional People Ill with TB, 2020', https://stoptb.org/assets/documents/COVID/COVID%20impact%20on%20TB%20Modeling_Key%20Messages_FINAL.pdf

[22] TB/COVID-19 Global Study Group. Tuberculosis and COVID-19 co-infection: description of the global cohort. Eur Respir J. 2022 Mar 24;59(3):2102538. doi: 10.1183/13993003.02538-2021. PMID: 34764184; PMCID: PMC8588566. https://erj.ersjournals.com/content/early/2021/11/04/13993003.02538-2021.

[23] Caren et al., 'COVID-19 Pandemic Disruption on the Management of Tuberculosis Treatment in Indonesia</P>'; Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[24] WHO, 'Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

[25] Quarraisha Abdool Karim and Salim S. Abdool Karim, 'COVID-19 Affects HIV and Tuberculosis Care', Science 369, no. 6502 (24 July 2020): 366–68, https://doi.org/10.1126/science.abd1072; Abdool Karim and Baxter, 'COVID-19'.

Box 1. A Forecasted Impact for TB on International Targets.

The Stop TB Partnership published a report where early projections showed that the End-TB strategy targets would not be reached as a result of the COVID-19 pandemic. They projected that, with continued COVID-19 restrictions in 2021, about 5 to 8 years of progress would be lost, and TB incidence and mortality would increase to levels last seen in 2013 (incidence) and 2016 (mortality).[26]

Other modelling studies projected that due to delays in diagnosis and treatment caused by the COVID-19 pandemic, over the next five year period TB incidence could increase up to 9% and TB mortality would increase by 20%.[27, 28]

These projections did not take into account the **socioeconomic consequences of COVID-19** in LMICs such as loss of income, loss of food security and housing. These in turn lead to overcrowding and malnutrition, which are well known risk factors for TB. It is reported that during 2020, an estimated 100 million people were pushed into poverty by COVID-19 pandemic, especially in LMICs. Undernutrition accounts for 20% of global TB incidence.[29]

Additionally, the modelling studies were based on two scenarios (with different expected periods of lockdown and recovery) – and in reality these varied widely from country to country; so it is difficult to gauge the true impact given this **heterogeneity in COVID-19 restriction measures**.

[26] Stop TB Partnership, 'The Devastating Effect of the COVID-19 Pandemic on the TB Response-A Minimum of 5 Years of Progress Lost and 6 Million Additional People Ill with TB, 2020', 2020, https://stoptb.org/assets/documents/COVID/COVID%20impact%20on%20TB%20Modeling_Key%20Messages_FINAL.pdf.

[27] Alexandra B Hogan et al., 'Potential Impact of the COVID-19 Pandemic on HIV, Tuberculosis, and Malaria in Low-Income and Middle-Income Countries: A Modelling Study', *The Lancet Global Health* 8, no. 9 (September 2020): e1132–41, https://doi.org/10.1016/S2214-109X(20)30288-6.

[28] Lucia Cilloni et al., 'The Potential Impact of the COVID-19 Pandemic on the Tuberculosis Epidemic a Modelling Analysis', *EClinicalMedicine* 28 (1 November 2020), https://doi.org/10.1016/j.eclinm.2020.100603.

[29] Madhukar Pai, Tereza Kasaeva, and Soumya Swaminathan, 'COVID-19's Devastating Effect on Tuberculosis Care — A Path to Recovery', *New England Journal of Medicine* 0, no. 0 (5 January 2022): null, https://doi.org/10.1056/NEJMp2118145; Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021.

3. Conclusions and Recommendations

"In the same way COVID-19 response leverages existing TB infrastructure and resources, as we progress toward COVID-19 control TB programs in LMICs can move to integrate strategies and services of both diseases in a synergistic manner."

In the same way COVID-19 response leverages existing TB infrastructure and resources, as we progress toward COVID-19 control TB programs in LMICs can move to **integrate strategies and services of both diseases in a synergistic manner**. Both infections are respiratory in nature and have similar health prevention and control strategies. A commentary by Ntoumi et al. in the Lancet gives a good overview of COVID-19 innovations that could enhance TB control activities such as common diagnostic platforms, virtual healthcare, joint services, community-based service delivery models, rapid mobilization of funds, public-private partnerships and development of new diagnostics, vaccines and treatments.[30]

Additionally, WHO has been compiling case studies of **innovative responses** that have succeeded in mitigating or reversing negative impacts of the pandemic to provide examples for affected countries. For example, the use of COVID-19 vaccination programmes to screen for TB, sustaining real-time surveillance to improve TB detection and digital interventions to support treatment adherence and reduce health facility visits.[31]

COVID-19 shows the **verticalization of health programs** and the **weakness of the current health system models**. It alerted to the urgent need of a one health patient-centred approach as well as called for significantly more investment in health systems. With the dramatic reduction in case notifications observed in 2020, Ruhwald et al. (2022) proposed a **simultaneous and integrated testing for COVID-19 and tuberculosis** to increase case detection. They argue that innovations in mass testing observed during COVID-19 pandemic must be leveraged for TB to close the testing gaps.[32]

The funding seen in COVID-19 and the goals achieved with enhanced scientific research especially in vaccine research should be similar for TB. COVID-19 **research and development** in the first 11 months is reported to have benefited from USD $104 billion, which is 113 times more than the total amount spent on TB in 2020.[33] Significant increase in research and development of new diagnostic tools, vaccines and treatment modalities will surely take us closer to the EndTB targets.

The Global Fund's investment case is a recent and powerful analysis of the impact that adequate funds can have on TB incidence and mortality *(See Figure 3 and Figure 4)*. COVID-19 vaccine and therapeutics distribution were unfortunately inequitable and slow, especially in LMICs. The highest income countries in October 2021 had 30 times higher vaccination rate (125.3 vaccinations per 100 people) than lower income countries (4.2 per 100 people). Rydland et al (2022) suggest that for equitable distribution to occur prices, access and acceptability of vaccines should not be dependent on the resources of a particular nation and traditional power structures.[34] TB needs to see a similar or higher **political commitment** that was experienced with COVID-19 in order to quickly recover the losses and be in a position to reach the EndTB targets in 2035.[35]

[30] Francine Ntoumi et al., 'World Tuberculosis Day 2022: Aligning COVID-19 and Tuberculosis Innovations to Save Lives and to End Tuberculosis', *The Lancet* Infectious *Diseases* 22, no. 4 (1 April 2022): 442–44, https://doi.org/10.1016/S1473-3099(22)00142-6.

[31] Consolidated report of country success stories in mitigating the impact of the COVID-19 pandemic on TB services. ISBN 978-92-4-004823-2 (electronic version) ISBN 978-92-4-004824-9 (print version) https://apps.who.int/iris/rest/bitstreams/1418690/retrieve.

[32] Morten Ruhwald et al., 'Considerations for Simultaneous Testing of COVID-19 and Tuberculosis in High-Burden Countries', *The Lancet Global Health* 10, no. 4 (1 April 2022): e465–66, https://doi.org/10.1016/S2214-109X(22)00002-X.

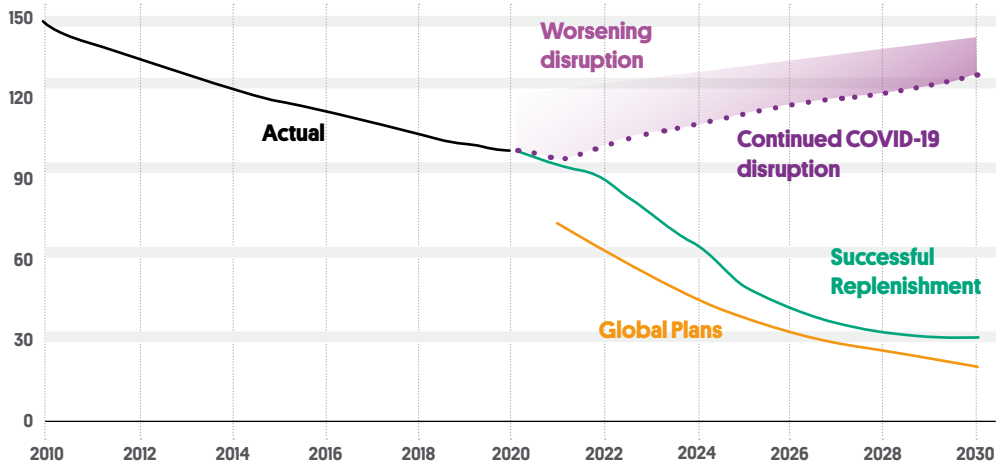
[33] Priya Venkatesan, 'Worrying Lack of Funding for Tuberculosis', *The Lancet Infectious Diseases* 22, no. 3 (March 2022): 318, https://doi.org/10.1016/S1473-3099(22)00073-1.

[34] Håvard Thorsen Rydland et al., 'The Radically Unequal Distribution of COVID-19 Vaccinations: A Predictable yet Avoidable Symptom of the Fundamental Causes of Inequality', *Humanities and Social Sciences Communications* 9, no. 1 (23 February 2022): 1–6, https://doi.org/10.1057/s41599-022-01073-z.

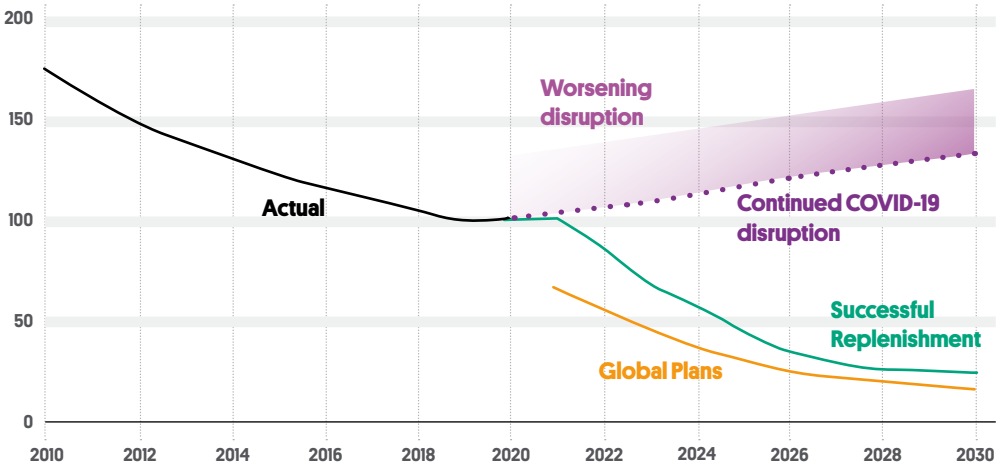
[35] Pai, Kasaeva, and Swaminathan, 'COVID-19's Devastating Effect on Tuberculosis Care — A Path to Recovery'; Global Tuberculosis Report 2021', 2021, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021; Alexandra Jaye Zimmer et al., 'Tuberculosis in Times of COVID-19', *J Epidemiol Community Health* 76, no. 3 (1 March 2022): 310–16, https://doi.org/10.1136/jech-2021-217529.

Figure 3. Global Fund investment case results for HIV, TB and malaria.

Combined Incidence Rate.



Combined Mortality Rate.

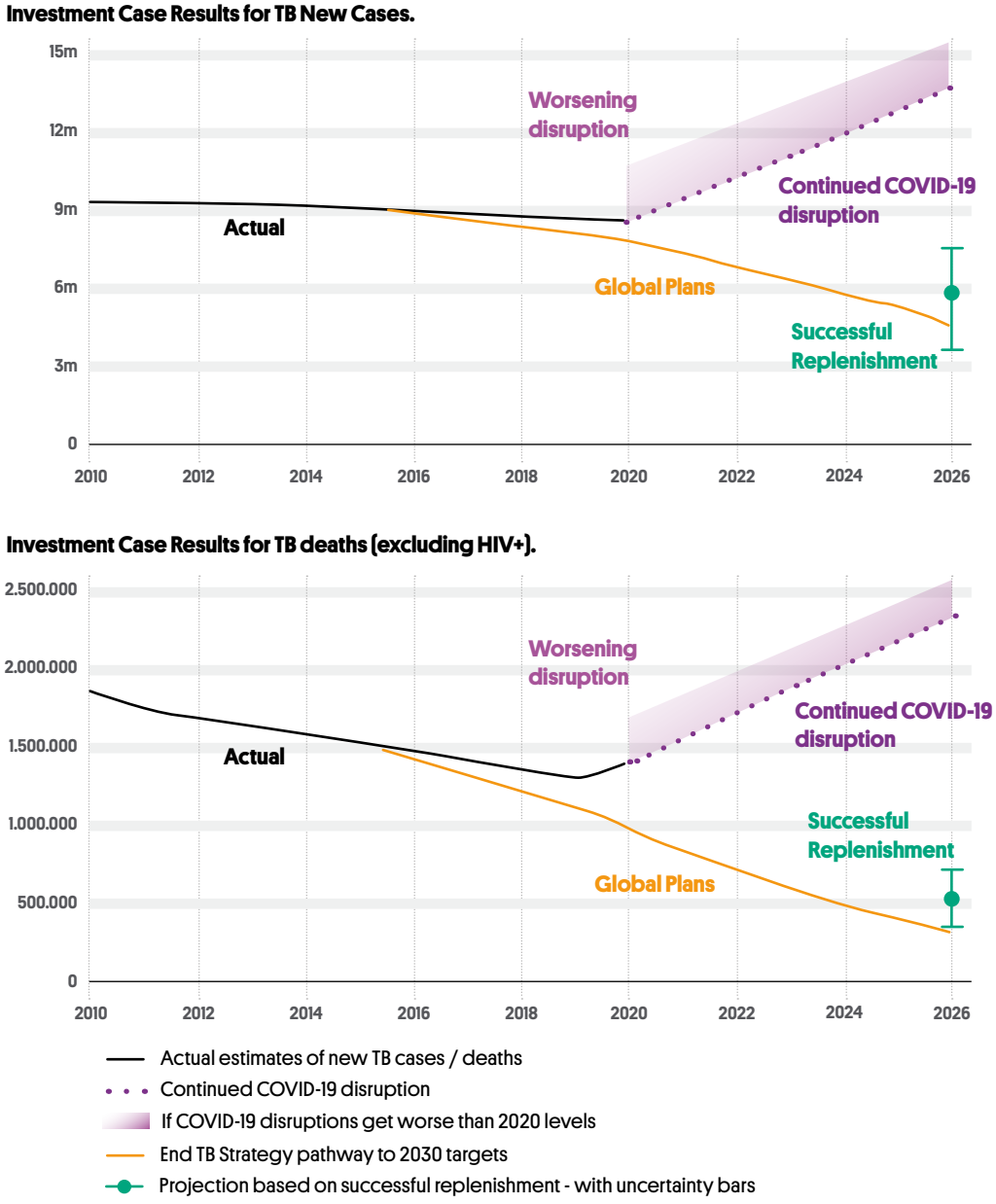


- Actual estimates of incidence / mortality
- Continued COVID-19 disruption
- If COVID-19 disruptions get worse than 2020 levels
- Global Plans pathway to 2030 incidence / mortality targets for HIV, TB and malaria
- Modelled results for this Investment Case – with uncertainty range

Lines are first normalized to 100 in 2020 for each disease, and then combined with equal weighting across the three diseases, separately for incidence and mortality rates.

Source: Global Fund. *Investment Case. Seventh Replenishment 2022*. https://www.theglobalfund.org/media/11798/publication_seventh-replenishment-investment-case_report_en.pdf

Figure 4. Global Fund investment case results for TB new cases and deaths.



Source: Global Fund.

However, every cloud has a silver lining such as **the case of Zambia** (a country in southern Africa). In a recently published article, Lungu et al. shared how after an initial decline in notifications they were able to recover, mitigate the effects of the pandemic and increase TB case notifications through careful, coordinated public health response and surveillance.[36] They describe the implementation of the following "tuberculosis response", with a multidisciplinary and multi partner approach:

1) TB situation room led by National TB Program staff and supported by the Ministry of Health leadership to review and analyse weekly notification data, share best practices, support low performers;

2) Facility based active case finding which consisted of systematic symptom-based screening to all patients present at the health facility, use and scale up of digital Chest X-ray as a triage test, use and scale up of TB Lam testing, at facilities

[36] Patrick S Lungu et al., 'Interrupted Time-Series Analysis of Active Case-Finding for Tuberculosis during the COVID-19 Pandemic, Zambia', *Bulletin of the World Health Organization* 100, no. 3 (1 March 2022): 205–15, https://doi.org/10.2471/BLT.21.286109.

with no diagnostic capacity there was sputum sample collection for those with positive screen, and for all facilities there was intensive technical support and mentoring;

3) **Demand generation consists of community activities** to raise TB awareness, educate and empower communities to request TB screening at health facilities, and inform them on where they can access TB screening and testing.

Notifications decreased by 22% in April 2020 as an immediate effect of the pandemic. After the implementation of the coordinated enhanced TB response activities, **notifications increased** by 45% and remained stable despite subsequent COVID-19 surges.

The Zambia case highlights **the way forward for future pandemic responses** – coordinated multidisciplinary public health response and continued public health surveillance •

To Know More

- WHO Tuberculosis Factsheet
- The impact of COVID-19 on the TB epidemic: A community perspective
- Global Tuberculosis Report 2021
- Interrupted time-series analysis of active case-finding for tuberculosis during the COVID-19 pandemic, Zambia

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https://www.isglobal.org/en/-/-como-ha-afectado-la-covid-19-a-la-lucha-global-contra-la-tuberculosis-

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