Stop TB Partnership

This document was developed by Avenir Health with inputs from Stop TB Partnership, Imperial College and USAID

The potential impact of Covid-19 on global resource needs for TB and its impact on the TB Global Plan 2018-2022

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Background

The global response to Covid-19 is expected to significantly affect TB programs in the short and medium term. Modelling studies have shown that an expected significant curtailing of TB program activities, reduction in TB care seeking and general supply chain interruptions, could lead to TB burden increasing to levels not seen in many years.

A study conducted by a Stop TB partnership suggests that globally, a 3-month lockdown and a protracted 10-month restoration (of TB services back to pre-Covid-19 levels) could lead to an additional 6.3 million cases of TB between 2020 and 2025, and an additional 1.4 million TB deaths during this time[1]. This study looked only at the impact of Covid-19 relative to continuation of current TB service levels.

The Stop TB continued the modelling investigation into the potential impact of Covid-19 on the implementation of the TB Global Plan 2018-2022 target levels, which where defined in terms of treating 40 million patients by 2022.

Approach

Impact of Covid-19 on TB burden

The impact of TB Global Plan 2018-2022 (GP) was estimated using the TIME model[2], calibrated to the latest WHO TB burden and notification databases. To estimate the impact of Covid-19 lockdown on baseline (i.e. a scenario of continuation of current service levels) and on the projected impact of the full implementation GP, downward adjustments, stated in Table 1, were made to the service levels. These adjustments were applied to all country models, assuming 5 months lockdown and 10 months needed to restore services back to pre-Covid levels.

Findings

The impact on new TB cases, TB deaths and TB notifications are shown in Figure 1-3. During the period 2020 to the end of 2022, when the GP ends, an estimated 2.4 million excess new cases and 400 thousand excess TB deaths would result. Notifications would drop by an estimated 3 million cases.

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[1] http://www.stoptb.org/assets/documents/news/Modeling%20Report_1%20May%202020_FINAL.pdf

[2] Houben, R.M.G.J., Lalli, M., Sumner, T. et al. TIME Impact – a new user-friendly tuberculosis (TB) model to inform TB policy decisions. BMC Med 14, 56 (2016). https://doi.org/10.1186/s12916-016-0608-4

In terms of impact on the full implantation of the GP, an estimated 3.3 million excess new cases and 501 thousand excess TB deaths would result. Notifications would drop by an estimated 1.9 million cases.

If the GP target service levels for 2022 are maintained to 2025, then new TB cases, TB deaths and TB notifications would reach similar levels by 2025 to the pre-Covid GP scenario. There would however still be significant excess burden created in the period 2020-2025 due the direct and indirect effects of the Covid lockdown.

Note it is assumed that after the restoration is complete, i.e. 15 months from the start of lockdown, that the GP target service levels are reached via linear scale-up by 2022 as planned. This would require more resources, as discussed in the next section.

Impact of Covid-19 on TB burden

Table 1: Summary of assumptions for the impact of Covid-19 lockdown on TB model parameters

Indicator	Reason for effect	Effect per month lockdown
From initiation of lockdown		
Reduction in transmission (DS- and DR-TB)	Physical distancing	Drops by 10%
Probability of diagnosis per attempted clinic visit, HIV-neg	Restriction on movements	Drops by 70%
Probability of diagnosis per attempted clinic visit, HIV-pos	Reduced lab capacity and availability of healthcare staff	Drops by 70%
First-line treatment completion, public sector and any engaged private sector	Healthcare staff unable to monitor and support treatment as usual	Drops by 50%
Second-line treatment completion, public sector and any engaged private sector		Drops by 50%
Starting one month into lockdown		
Proportion of TB diagnoses having DST result, New	Xpert machines and other lab facilities used for COVID-19 response	Drops by 75%
Proportion of TB diagnoses having DST result, Ret		Drops by 75%
TB treatment initiation	Stockouts and supply interruptions	Drops by 50%
Proportion of PLHIV receiving IPT, U5s	Stockouts and supply interruptions	Drops by 50%
Proportion of PLHIV receiving IPT, ART new	Disruptions in HIV care	Drops by 50%
Proportion of PLHIV receiving IPT, ART existing	Disruptions in HIV care	Drops by 90%

Figure 1: Impact on new TB cases following TB lockdown of 5 months, followed by 10 months to restore TB services to current levels
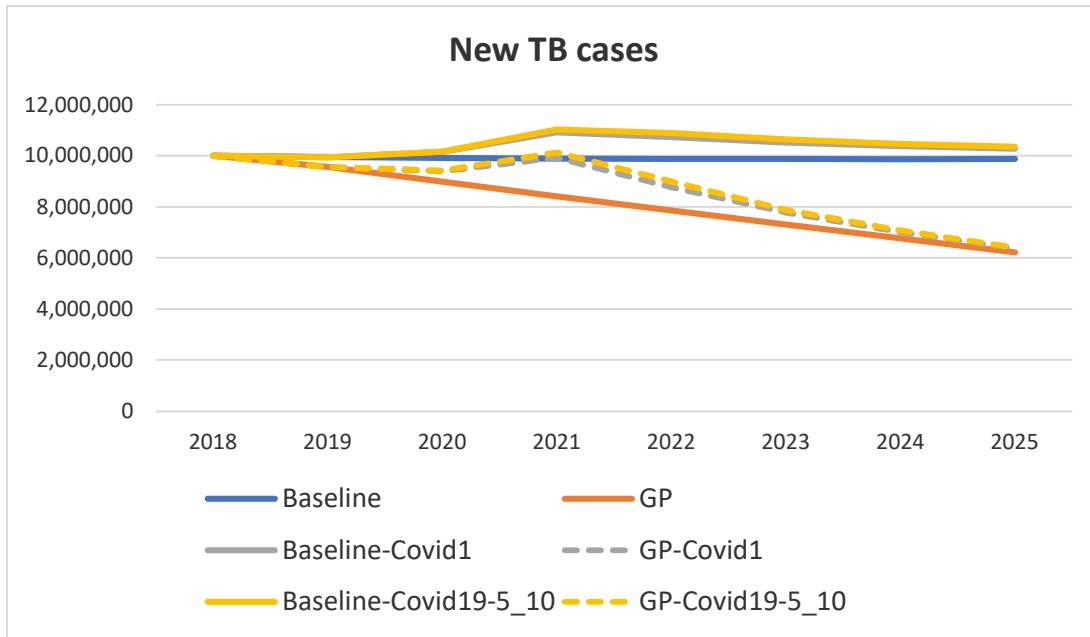

Figure 2: Impact on TB-deaths cases Impact on new TB cases following TB lockdown of 5 months, followed by 10 months to restore TB services to current levels
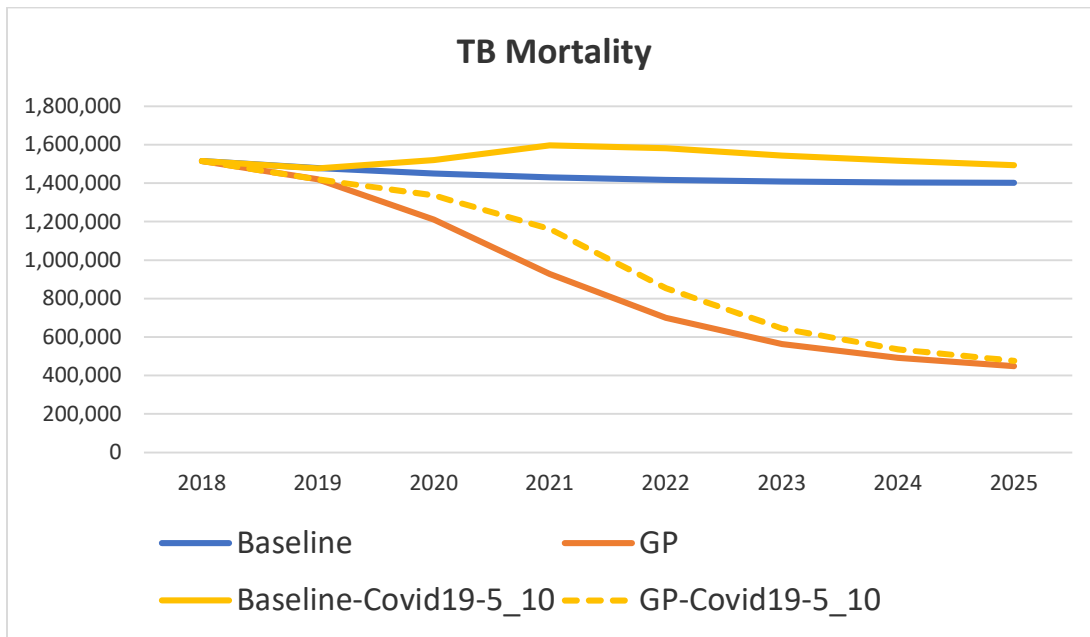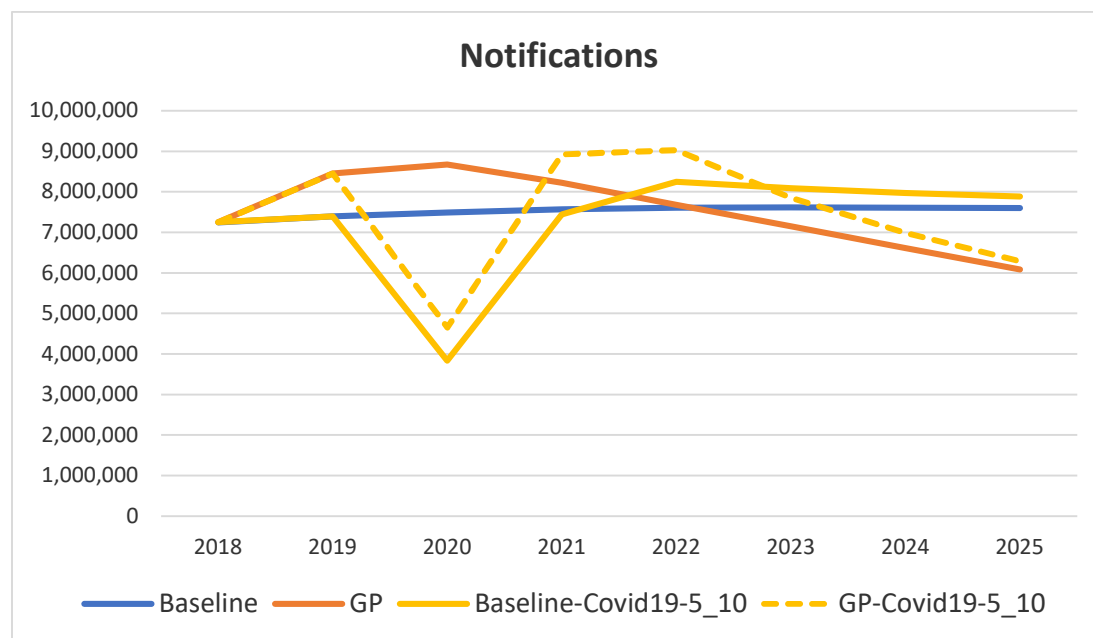
Figure 3: Impact on TB notifications following TB lockdown of 5 months, followed by 10 months to restore TB services to current levels

Impact of Covid-19 on unit costs

The resources needed to implement the GP was estimated by applying unit costs to service and patient volumes from the TIME impact modelling. These unit costs were derived from the WHO financial databases based on budget forecasts. The resource needs to implement the GP was estimated by applying these unit costs to service and patient volumes from the TIME impact modelling of the GP. The estimated resource need of the GP was 65 billion USD for the period 2018-2022.

Unit cost Increases

To estimate the impact of Covid-19 lockdown on GP resource needs, assumptions were made regarding the expected increase in unit costs in key program areas.

It is widely expected and already demonstrated from country program data, that significant investments will have to be made in reforming most aspects of TB programs:

These increases investments include:

- Frequent Covid testing in laboratory settings and TB facilities, providing PPE to exposed program staff and technicians, additional training to disseminate new testing protocols and other costs.
- New models of community engagement will have to be developed to reduce stigma related to Covid risk at TB centres and facilities.

- Increased transport costs for drugs and other commodities are expected to increase to deal with Covid-related safety concerns.
- Microplanning at all levels-pandemic preparedness and developing real-time response action plans and data systems.
- Additional human resources.

These assumptions, as they pertain to the unit cost categories of the GP, are summarized in Table 2 and in Table 3, by year remaining in the GP, i.e. 2020, 2021 and 2022.

These unit cost increases are applied to all countries, although much variation is expected at country level. Until TB program and commodity price data emerge, these costs cannot be made more precise.

The task force agreed to taper these increases so that the increases will drop by 50% after the first six months, as new program efficiencies are expected to be found. After six more months these increases are assumed to drop by a further 25% until the end of the GP at the end of 2022.

Findings

Results are shown in Figure 4 and in Tables 4 and 5. Expenditures are expected to drop in 2020 due the large expected drop in TB notifications in 2020. In the GP costing model this results in a drop in need for 2020. However, if the service target levels of the GP are reached by the end of 2022, a sharp increase in notifications and resource needs will follow the slump in 2020. Over the period of the GP, 2018-2022, an additional need of 6.5 Billion USD (representing a 10% increase on the 65 Billion USD of the GP) is needed to fully implement the GP targets, in the time remaining after the assumed end of lockdown.

It must be pointed out that the increase in resource needs due to Covid-19 is largely driven by the unit cost assumptions, rather than its modelled impact on TB burden and notifications. This is due to the GP resource needs being proportional to notifications, which is expected to drop in 2020, but then increase to a level results that is about 5% lower than the originally planned 40 million patients notified and treated.

Further, seeing that TB program investment always precedes impact, that the approximately 10% increase in TB resource needs should be mobilized immediately.

Costs related to Covid-19 testing of TB suspects

A new cost category, not in the original GP cost structures, is introduced to account for an expected recommendation to test TB symptomatics over the next 2 years for Covid-19, after which risk for Covid-19 infection is expected to decrease to levels not requiring Covid-19 testing.

This recommendation is not yet accompanied by a definition of which TB symptomatics should be tested.

Testing all TB symptomatics, roughly 72 million per year (7.2 million notifications in 2018 and assuming 10 tested to diagnose and notify one case), will cost about 1.8 Billion USD per year assuming a cost of 25 USD per Covid-19 test. The number of symptomatics per case found would be significantly higher under the GP implementation (as case finding is one of its pillars) but as demonstrated an increase in notifications is not expected to occur while Covid-19 lockdowns (mitigation Covid-19 risks) are in place.

National guidelines for Covid-19 testing for TB symptomatics are still emerging. Many symptoms for Covid-19 and TB are similar, including fever, coughing frequently and shortness of breath. Guidelines are expected to state that any of these symptoms, together with the presence of co-risk factors and comorbidities (including age, having diabetes), having had known contact with someone known to have TB or Covid-19 or having been in an area with high rates of TB and/or Covid-19, should trigger a test for both TB and Covid-19.

According to https://www.worldometers.info about 300 million Covid-19 tests have been conducted globally at a rate of 40,000 per million population. In North America and Europe, the rate is 100,000 per million, or roughly one in ten tested for Covid-19.

In the 29 highest TB burden countries (a list of 30 countries but excluding the Democratic People's Republic of Korea here due to a lack of publicly available Covid-19 data) the current Covid-19 testing rate is about 30,000 per million population.

If the high-TB burden countries were to test for Covid-19 at a rate approaching that of North America and Europe, it would require another roughly 340 million tests in 2020 alone, which far exceeds a recommendation to tests all TB suspects in high-TB burden countries or globally. The current Covid-19 rate, for which 145 million people have been tested for Covid-19, also far exceeds a one to ten ratio in TB suspects to test to find one case in the high-TB burden countries.

Covid-18 test costs are not included in the resource needs estimated in the tables below as it is unlikely to be funded by TB programme budget.

Table 2: Summary of assumptions for increased unit costs increases due to Covid-19 lockdown and expected TB program reforms.

Unit cost category	Unit cost increase	Reduction in increase after 6 months	Reduction in increase after 6 more months to end of 2022
First Line Drugs	10.0%	50.0%	25.0%
Second Line Drugs	10.0%	50.0%	25.0%
Drug-resistant TB: programme costs	5.0%	50.0%	25.0%
Collaborative TB/HIV activities	0.0%	0.0%	0.0%
Laboratory infrastructure, equipment and supplies	20.0%	50.0%	25.0%
Drug-susceptible TB: programme costs	20.0%	50.0%	25.0%
National TB program staff	30.0%	50.0%	25.0%
Patient support	20.0%	50.0%	25.0%
General HS drug-susceptible	20.0%	50.0%	25.0%
General HS drug-resistant	20.0%	50.0%	25.0%
Preventative therapy	10.0%	50.0%	25.0%
Program enabling activities	20.0%	50.0%	25.0%

Table 3: Summary of assumptions for increased unit costs by years remaining of TB Global Plan 2018-2022: 2020, 2021, 2022.

Unit cost category	2020	2021	2022
First Line Drugs	3.3%	5.0%	2.5%
Second Line Drugs	3.3%	5.0%	2.5%
Drug-resistant TB: programme costs	1.7%	2.5%	1.3%
Collaborative TB/HIV activities	0.0%	0.0%	0.0%
Laboratory infrastructure, equipment and supplies	6.7%	10.0%	5.0%
Drug-susceptible TB: programme costs	6.7%	10.0%	5.0%
National TB program staff	10.0%	15.0%	7.5%
Patient support	6.7%	10.0%	5.0%
General HS drug-susceptible	6.7%	10.0%	5.0%
General HS drug-resistant	6.7%	10.0%	5.0%
Preventative therapy	3.3%	5.0%	2.5%
Program enabling activities	6.7%	10.0%	5.0%

Figure 4: TB Global Plan 2018-2022 resource needs with and without Covid-19 excess burden and unit cost increases directly and indirectly related to Covid-19.
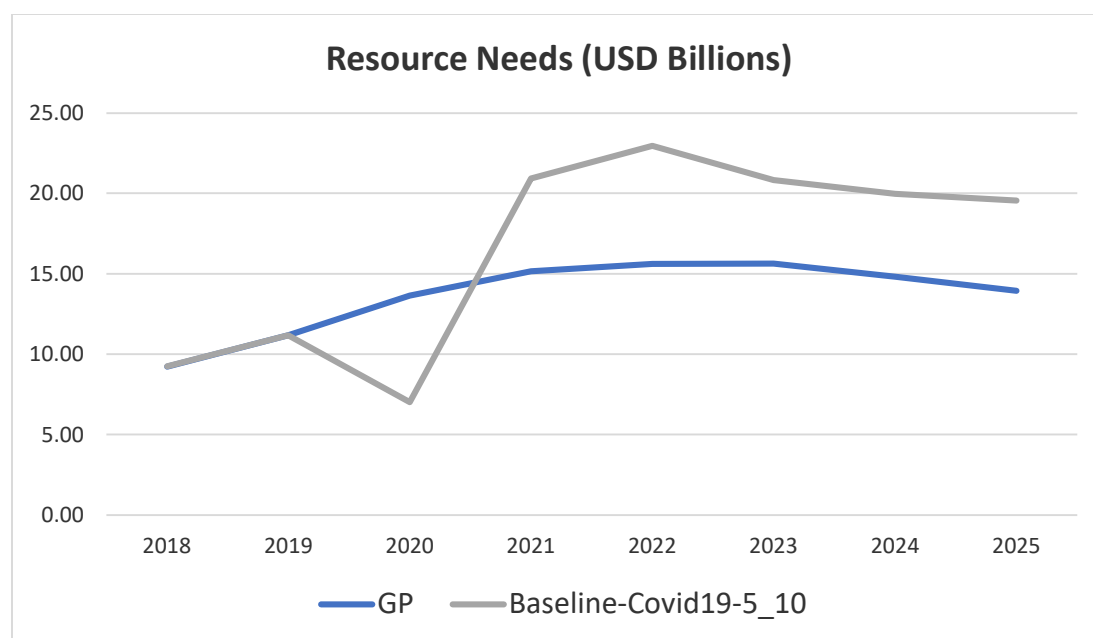
Table 4: Resource Needs, by Cost Category, including Enablers of a Covid-19 scenario of 5 months lockdown and 10 months restoration.

Resource Needs (USD Millions)						
Cost Category	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
First Line Drugs	339.1	404.9	253.6	527.3	558.2	**2,083.0**
Second Line Drugs	408.7	1,010.6	541.9	2,701.2	3,237.4	**7,899.8**
Laboratory infrastructure, equipment and supplies	705.3	1,000.3	795.6	2,134.6	2,746.7	**7,382.6**
Drug-susceptible TB: programme costs	2,560.8	2,947.8	1,879.0	4,682.5	4,915.8	**16,985.9**
Drug-resistant TB: programme costs	1,191.0	1,346.1	733.8	3,540.5	3,435.7	**10,247.2**
General HS drug-susceptible	2,489.4	2,640.4	1,450.6	3,151.7	3,192.4	**12,924.6**
General HS drug-resistant	445.6	494.7	224.8	1,172.8	1,431.2	**3,769.1**
Collaborative TB/HIV activities	155.8	156.6	157.5	158.2	158.6	**786.7**
Preventative therapy	207.3	219.3	228.7	455.3	665.5	**1,776.1**
Enablers	741.8	960.8	752.6	2,407.8	2,621.5	**7,484.5**
Total	**9,244.8**	**11,181.6**	**7,018.0**	**20,931.8**	**22,963.2**	**71,339.4**

Table 5: Resource Needs, by Income Status, TGF eligibility, Global Plan country group, WHO region and BRICS membership of a Covid-19 scenario of 5 months lockdown and 10 months restoration.

Resource Needs (USD Billions), with enablers						
	2018	**2019**	**2020**	**2021**	**2022**	**Total**
GLOBAL TOTAL						
Total (Global, including OECD countries	9.24	11.18	7.02	20.93	22.96	**71.34**
Total (Global, excluding OECD countries)	8.54	10.48	6.66	20.03	22.09	**67.80**
BY INCOME STATUS						
Low income	0.87	1.13	0.94	2.23	2.65	**7.82**
Lower middle income	3.20	4.36	2.87	8.77	10.62	**29.82**
Upper middle income	4.52	5.05	2.87	9.10	8.89	**30.42**
High income	0.66	0.65	0.34	0.84	0.80	**3.28**
GFATM ELIGIBLE COUNTRIES, BY INCOME STATUS						
Low income	0.87	1.13	0.94	2.23	2.65	**7.82**
Lower middle income	3.20	4.35	2.87	8.76	10.62	**29.80**
Upper middle income	1.57	1.82	1.13	3.10	3.23	**10.85**
Total	5.64	7.31	4.94	14.09	16.49	**48.47**

GLOBAL PLAN COUNTRY SETTING						
High MDR burden, Centralized Care	2.53	2.74	1.61	5.70	4.74	**17.32**
High TB/HIV, SADC	0.86	1.09	0.72	2.20	2.53	**7.39**
High TB/HIV, non-SADC	0.84	1.20	1.05	2.83	3.31	**9.23**
Moderate Burden, COE	0.31	0.42	0.27	0.84	1.08	**2.91**
High Burden, Private Sector	1.15	1.66	1.13	3.36	4.31	**11.61**
Moderate Burden, Middle Income	0.89	1.03	0.53	1.39	1.65	**5.49**
India	0.88	1.14	0.62	1.87	2.35	**6.85**
China	1.02	1.13	0.59	1.65	1.93	**6.33**
Low Burden, High Income	0.77	0.79	0.51	1.08	1.06	**4.21**
WHO REGION						
EMR	0.28	0.43	0.31	1.13	1.51	**3.67**
AFR	1.97	2.65	2.04	5.75	6.74	**19.15**
AMR	0.71	0.82	0.42	1.11	1.30	**4.36**
EUR	2.85	3.05	1.78	6.11	5.13	**18.93**
WPR	1.86	2.09	1.12	3.20	3.76	**12.03**
SEA	1.57	2.14	1.33	3.63	4.53	**13.19**
BRICS (BRA,CHN,IND,RUS,ZAF)						
Total	3.96	4.60	2.48	8.48	8.70	**28.23**