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DISCUSSION PAPER

THE OUTLYING EPIDEMIC: INDIA'S TUBERCULOSIS ELIMINATION GOALS AMIDST COVID-19

SHUBHANGI GOKHROO



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ABSTRACT

India accounts for one in every four tuberculosis (TB) cases around the globe. The fact that TB is easily transmitted to people with pre-existing conditions like HIV/AIDS, diabetes, and lung impairment, among other immunity deteriorating factors, is concerning in contemporary times. As India leaps to overcome the USA and become the nation most infected with Covid-19, the risk to current TB patients could rise exponentially. Moreover, the susceptibility to and treatment of Covid-19 among TB patients could both be impacted negatively, leading to a possible nullification of the progress towards eliminating TB in India by 2025. In this context, this paper evaluates the worsening state of the TB epidemic in India's battle against Covid-19.

THE FACE OF TUBERCULOSIS IN INDIA

TB is an airborne disease caused by the bacterium *Mycobacterium Tuberculosis* (MTB). It usually affects the lungs but may affect other parts of the body too. Despite being curable and preventable, the World Health Organization (WHO) has observed TB to be among the top 10 causes of death worldwide. In fact, about 25% of the world population is infected by MTB and is thus at risk of contracting TB (The Global Tuberculosis Report 2019).

The TB epidemic has been a significant public health issue in India for a long time. India bears the highest burden of this disease in the world, with about 2.4 million cases reported every year or about 6,575 cases every day (India TB Report 2020). The incidence of the multidrug-resistant (MDR)¹TB is also the highest in India with about one-quarter of the total cases (Chatterjee et al. 2018). With 79,000 deaths in 2019, India recorded the highest death toll due to TB in the world, totalling about 1,200 every day (India TB Report 2020).

Under-detection of TB cases is also a major problem in India due to a mix of poor access and incorrect diagnoses. The country "missed" the detection of about 56% of drug-resistant TB cases in 2018 and also missed three lakh such cases in absolute numbers in 2019 (WHO 2019; India TB Report 2020). Missing cases not only pose a disastrous risk of increased proliferation of TB but may also increase the chances of contracting drug-resistant forms of the disease.

With a share of 27% in the worldwide TB epidemic, India has been performing considerably worse than relatively poor economies (WHO 2019). As puzzling as the statistics may seem, India's socio-economic conditions provide a hospitable environment for TB to proliferate. Being an airborne disease, TB expectedly thrives in overcrowded spaces with poor sanitation, inadequate ventilation, inefficient health infrastructure, and persistent malnutrition (Indian Medical Association 2015).

Undernutrition and Poverty

Among these, malnutrition, and especially undernutrition, is a factor of extreme importance. The National Family Health Survey-4 (NFHS-4) pointed out that about 23% of adult women and 19% of adult men have less than required² nutrition. Various studies have labelled undernutrition to be one of the chief causes of TB incidence in India. About 50% of all active cases of TB could be attributed to undernutrition, for it reduces the body's capability to resist the TB bacterium (Padmapriyadarsini et al. 2016). It can thus be deduced that

¹ The MDR TB is a variation that is ineffective to two of the most powerful anti-TB medications and may lead to a plausible consequential failure in organs beside the lungs.

² An individual is said to be suffering from undernutrition when they have a body mass index lower than 18.5kg/m².

about a million new cases of TB annually could be prevented if India successfully eliminated undernutrition in the age group of 15-49 years (Gupta, R.S. et al. 2015). Additionally, a unit's decrease in the average Body Mass Index (BMI) in India could potentially increase TB incidence by about 13.8% (Lönnroth et al. 2010).

Identification of undernutrition as a major facilitator of TB incidence also highlights the possibility of a relationship between TB and poverty. Undernutrition, poor sanitation, and inefficient healthcare infrastructure are all characteristics of poor households. Poverty is linked to an increase in the vulnerability of a population to TB (WHO 2005). According to the self-reported statistic from Demographic Health Survey for India, a 5.5 times higher incidence of TB is observed in the lowest income quintile than in the highest one (Oxlande et al. 2012). Moreover, more than half of the TB patients belong to the below poverty line cohort (Bhargava & Shewande 2020).

Additionally, delayed diagnosis and unaffordability of certain medicines add numerous hurdles in the path of curing TB for the poor. The high financial burden induced by the treatment procedure of TB can lead to an almost 30% reduction in annual household income and drive a person/family into poverty (Stop TB Partnership 2002).

Policy Measures

Over the years, the Government of India (Gol.) has taken various measures to tackle the spread of TB in the country. In 1962, Gol launched the National Tuberculosis Control Programme (NTCP) in the form of a District TB Centre model to enable the efficient detection and treatment of TB (National Health Portal India 2015). This programme also aimed to strengthen the state TB and demonstration centres and extend short-term chemotherapy (Khatri 1996).

Since this programme was not able to achieve the desired results, the Revised National TB Control Program (RNTCP) was launched in 1993 (Khedkar et al. 2014). This program initiated the use of DOTS (Directly Observed Treatment, Short-course chemotherapy) strategy, as was recommended by WHO (ibid). It has also been suggested that RNTCP was able to cover the entire nation by 2006, even though it had many loopholes and problems (WHO 2010). As a result, the National Strategic Policy (NSP) period of 2012-2017 mandated the inclusion of RNTCP in the National Health Mission, along with certain other recommendations. In 2012, the Central TB Division and National Informatics Centre collaborated to establish a case-based, web-enabled application called 'Nikshay' to bring both the public and private sector notifications on TB patients on a single platform to help facilitate universal access to the data.

During the union budget announcement of 2017, the Gol announced its plan to eliminate TB in India by 2025, ten years before the target year of WHO's Stop TB Strategy³ and five years before the deadline for the Sustainable Development Goal 3 (which includes ending TB deaths). The ambitious plan aims to access "new drugs, regimens and diagnostics" and bring "transformational improvements in India's End TB Strategy" (Purty 2018).

The government also introduced the Direct Benefits Transfer or the Nikshay Poshan Yojana scheme in March 2018 to provide nutritional assistance to all TB patients in accordance with the End TB Strategy. The

³ The goal of Stop TB Strategy is to reduce 95% of TB related deaths by 2035 and to reduce 90% of TB cases between 2015-2035.

scheme provides a direct transfer of Rs. 500 per month to the bank accounts of all notified TB patients. In January 2020, RNTCP was renamed National Tuberculosis Elimination Programme (NTEP) and was given a campaign-driven structure called “TB Haarega Desh Jeetega.”

THE EXTENSIVE DISRUPTION IN HEALTHCARE DUE TO THE LOCKDOWN

With the onset of a national lockdown on 24 March 2020, India hoped to prevent further transmission of the infection. The lockdown guidelines restricted all modes of transportation, among other things. This severely impacted patients requiring emergency health services. The disruption in healthcare services is visible in the data (table 1 below) uploaded on National Health Mission's Health Management Information System⁴. The limited data reflects a significant fall in the number of women who

accessed maternal healthcare during April 2020, lower rates of child immunisation procedures, and a fall in the treatment of severe kidney and cancer conditions compared to the same period in the last year.

Table 1: Year-on-Year Comparison of Healthcare Services Availed in April

Indicator	April 2019	April 2020	% Decline
Number of Institutional Deliveries conducted	14,09,794	11,24,543	20.23
TB Notifications	2,21,301	82,872	62.55
Total Abortions	48,727	36,924	24.22
Total Number of Pregnant Women registered for Antenatal Care (ANC)	23,77,679	14,29,843	39.86
Child Immunisation (BCG)	16,58,654	10,35,787	37.55
Child Immunisation DPT 1st Booster	17,07,761	6,26,328	63.32
Number of on-going DOTS (Directly observed Treatment, Short-Course patients registered	1,53,996	88,966	42.23
Inpatient Services- Tuberculosis	20,551	8,501	58.63
Number of blood transfusions done	1,80,655	97,730	45.90
Number of Anganwadi centres/ UPHCs reported to have conducted Village Health & Nutrition Day (VHNDs)/ Urban Health & Nutrition Day (UHNDs)/ Outreach / Special Outreach	6,33,408	3,07,376	51.47
Total Stock of BCG vaccine	40,38,455	22,24,111	44.93
Total Stock of Gloves	79,30,586	38,25,573	51.76
Number of women provided free medicines under Janani Suraksha Karyakram (JSSK)	9,76,785	4,11,347	57.89

Source: National Health Mission's Health Management Information System

⁴ The NHM-HIMS is itself believed to have reported results only from a limited number of healthcare facilities for the lockdown impacted the data collection process too.

During the union budget announcement of 2017, the GoI announced its plan to eliminate TB in India by 2025, ten years before the target year of WHO's Stop TB Strategy and five years before the deadline for the Sustainable Development Goal 3 (which includes ending TB deaths).



As can be observed, the services mentioned above were availed at a drastically lower level than during the same month last year. Of course, the reasons for these reductions are a combined function of the reluctance of people to visit hospitals and the shift in priorities of the healthcare workforce towards managing the burden of Covid-19. Experts claim that every immunisation missed today due to the lockdown could develop into a case of measles or tuberculosis or any other disease.

This highlights a new public health crisis in the making. The months of May and June showed little improvement in the spheres above (National Health Mission's Health Management Information System 2020). However, some experts have warned that India's attempt at managing the Covid-19 crisis may have been coming at a hefty price, one that is being paid not only by healthcare workers but also the healthcare infrastructure (Indian Public Health Association 2020).

IMPACT OF THE COVID-19 CRISIS ON TUBERCULOSIS

As the government sought to contain the spread of Covid-19, the resulting disruption in healthcare services also affected institutional attention towards the TB epidemic. Various studies have expressed their concern over the worsening state of TB patients and the entire treatment mechanism since the onset of the nation-wide lockdown.

A Shift in Priority Towards COVID-19

In a country with only 5.5 hospital beds per 10,000 people, the arrival of a pandemic meant the mobilisation of these beds largely towards the isolation and treatment of the Covid-19 patients (National Health Profile 2019). A direct repercussion of this has been the lack of availability of hospital beds for critical TB patients in need of extensive care due to the toxicity of anti-TB drugs or a worsening TB condition altogether. Media reports indicate that diagnostic kits, testing equipment and frontline TB support staff were redirected towards Covid-19, leaving a skeletal team for the administration and management of TB (Johari 2020).

In April 2020, India had 48,000 ventilators available with only 50% of ICU beds in both public and private sector equipped with a ventilator (Kapoor et al. 2020). Media reports suggest that though the PM-CARES fund allocated about Rs. 2,000 crores for supplying 50,000 (made in India) ventilators to government hospitals, the actual delivery has been significantly less than the target (The Economic Times 2020). This meant a further reduction in the availability of ventilators for TB patients.

Lack of Access amid Supply Shortages

In the initial months of the lockdown, outpatient departments were shut down, and some government and private institutions were reported to have refused TB diagnosis and treatment due to the overbearing burden of Covid-19. In addition to this, anti-TB medication was found to be inaccessible to migrating patients and those living in remote areas. Many TB patients who are on injectable drugs, like Amikacin or Streptomycin, complained about lower access to these injections (Jain et al. 2020).

On 24 April 2020, one month after the beginning of the lockdown, the Ministry of Health and Family Welfare (MoHFW) directed the states to enable uninterrupted and efficient treatment of TB (Press Information Bureau 2020). Any discontinuity in the consumption of anti-TB medication can lead to highly resistant forms

of TB which not only demand more toxic drugs but may also induce harsh side effects. The TB patients suffering from these side effects were also left to struggle with unaccommodating healthcare institutions. Additionally, the similarity in symptoms that cause Covid-19 and TB could have also led to a general apprehension of visiting hospitals out of the fear of being incorrectly diagnosed. However, accessibility hasn't been the only issue.

On 17 April 2020, in a letter to the Secretary at the Department of Drinking Water and Sanitation, the Secretary at the MoHFW highlighted the issue of shortage of anti-TB medication (Chandna 2020). The letter also stated that the limited workforce and shortage of Active Pharmaceutical Ingredients could eventually impact the production capacity of leading anti-TB drug manufacturers. The manufacturers also communicated the possibility of delayed medical supplies due to restricted access to transportation and inadequate workforce required for production, among other things (ibid).

The convenor of Survivors Against TB mentioned in an interview with IndiaSpend that even before the Covid-19 crisis, Clofazimine, an essential drug for drug-resistant TB, was out of stock in the private sector (in some parts of India) (Shetty 2020). Even the immunisation and antenatal care outreach programmes have been disrupted due to the onset of Covid-19. This is clearly reflected in the year-over-year fall in Bacillus Calmette–Guérin (BCG) vaccinations by 38% in April 2020 despite their possible ability to lower incidence to coronavirus (National Health Mission 2020).

Near-term Consequences

All of the reasons mentioned above have led to a massive under detection of TB during the lockdown. For every additional month of lockdown, India will have to manage 2,32,335 excess cases of TB (Clinical and Microbiology Infection 2020). In the first week of September, the Government of India reported a 60% decline in TB notifications across the country due to the lockdown since March.

The following figure (Fig. 1) clearly shows a significant drop in the number of TB cases notified in the first few months of the nation-wide lockdown. The National TB programme also expects an additional 5 lakh cases of TB and 1 lakh additional deaths due to TB in the next five years due to the prevalence of undiagnosed cases and uncontrolled household transmission. This may have undone the slight progress achieved by India in its goal to eliminate TB by 2025.

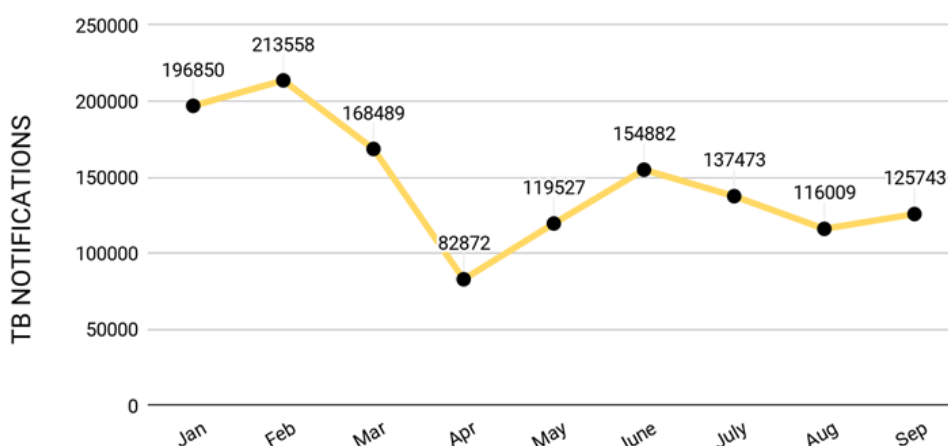


Figure 5: Month-wise TB Notifications in 2020

Source: Nikshay Reports Online Database

The under detection of TB might have some extremely negative implications. Primarily, this may lead to a higher incidence of TB in the next few years due to delayed diagnosis and treatment. A fact sheet by WHO suggests that “a person with active TB can infect 5-15 other people through close contact in the span of one year” (WHO 2020).

As mentioned previously, delayed diagnoses can also lead to drug-resistant forms of TB that demand an increasingly toxic treatment of a longer period of time with a higher probability of irreversible side-effects. A high rate of under-detection may also lead to higher levels of TB-related deaths with one study claiming that every additional month taken to return to regular TB services in India would cause an additional 40,685 deaths between 2020-2025 (Stop TB Partnership 2020). Table 2 below lists three studies that evaluate the estimated number of excess TB cases and deaths due to the disruption of healthcare services during the lockdown.

Table 2: Comparative analysis of various methodologies that predict the excess TB cases and TB deaths due to the overall disruption caused by the onset of Covid-19

Authors	Methodology	Key findings (detection of TB)	Deaths Expected	Qualitative findings (if any)
Stop TB Partnership, Imperial College, Avenir Health, Johns Hopkins	Consideration of a 2-month lockdown period assumed to be followed by a two-month restoration period	Excess cases between 2020-2025 (% increase) 514,370 (3.55%)	Excess deaths between 2020-2025 (% increase) 151,120 (5.70%)	-
University and USAID	3-month lockdown + 10-month recovery period (worst case)	1,788,100 (12.32%)	511,930 (19.31%)	
McQuaid CF, McCreesh N, Read JM, et al.	Worst case scenario, where COVID-19 interventions to reduce social contacts are minimal, but TB health services are badly affected is considered	-	Increase in TB deaths between 2020-2024 149,448 (85,000-2,33,602)	In scenarios with substantial health service disruption, they project an increase in both TB cases and deaths, regardless of the level of social distancing.
Anurag Bhargava and Hemant Deepak Shewade	Using the 2018 estimates from India, the model developed by P. Glaziou was applied, which assumed “absence of a rebound in the case detection above values prior to the lockdown”	The already observed reduction of 59% in TB case detection between end March and May 2020 was used	Estimated additional 87,711 TB deaths [19.5%] increase in 2020	-

According to the International Labour Organization (ILO) estimates, about 400 million informal workers may have been pushed into poverty due to the lockdown.



Unemployment and Undernutrition

One important implication of the lockdown has been an increase in the unemployment rate in the country, which reached a peak of 23.9% in the first week of April (Centre for Monitoring Indian Economy 2020). Other sources suggested that about 140 million people had lost their jobs owing to the current economic and health crisis in India (Clinical and Microbiology Infections 2020). According to the International Labour Organization (ILO) estimates, about 400 million informal workers may have been pushed into poverty due to the lockdown. The joblessness and the resultant loss in income can be particularly harmful to those already struck by poverty and living in overcrowded, unsanitised facilities. A significant loss in earnings could lead to a decrease in expenditure on food, thus causing undernutrition.

On 26 March 2020, the GoI announced a relief package for the “poorest of the poor”, which included affordable access to food grains. Under the Pradhan Mantri Garib Kalyan Anna Yojana, the GoI declared the provision of 5 kg wheat or rice (per head) and 1 kg of pulses to all poor households for three months, free of cost (Mishra 2020). However, a study highlighted that this monthly provision of cereal would add only up to 1000 calories per day to the subsidised 5 kg of rice already being arranged through the Public Distribution System, which provides about 500 calories per day to each beneficiary (Bhargava & Shewade 2020). Moreover, the pulses ration of about 8 g per day in a four-member family isn't adequate to meet the calorie amount required to maintain a healthy body mass index (ibid).

Hence, the calorie composition from the additional ration provision combined with the existing PDS provisions was still less than the recommended dietary intakes for Indians engaging in light work (2320 calories for men and 1900 calories for women). Notably, at the same time, government granaries were overflowing with stocks reaching 77 million tonnes in March, which raises questions on the rationale for the provisions for grains as part of government measures (Dreze 2020).

Higher Risk of COVID-19 among TB Patients

Besides the indirect impacts, TB patients are at a higher risk of contracting the coronavirus. The World Health Organisation admitted that despite the lack of experience since both TB and Covid-19 primarily impair the functioning of the lungs, current or cured TB patients may be more likely to acquire the Covid-19 infection (WHO 2020). Moreover, the development of latent TB may become a risk factor for the SARS-CoV-2 infection. A guidance note issued by the MoHFW in the last week of August noted that “Tuberculosis is associated with a 2.1-fold increased risk of severe Covid-19 disease. In addition, TB patients also tend to have co-morbid or living conditions (malnutrition, diabetes, smoking, HIV etc.) that increase their vulnerability” (Press Information Bureau 2020).

Certain preventive measures mandated by the government to deal with the coronavirus could, however, assist in reducing the spread of TB. These include wearing masks, practising social distancing, self-isolation, etc. For a country like India, though, the disruption in the diagnosis and treatment of TB caused by the lockdown and Covid-19 certainly outweigh the benefits that mandatory preventative measures may have had.

MANAGING TB ALONGSIDE COVID-19

The table below compares the progress on proposed targets for 2020 under India's National Strategy Programme 2017-2025 for eliminating TB.

Table 3: Deviation of current levels from the Target Levels as mentioned under NSP 2017-2025

Indicator	Actual Count	Target to be achieved by 2020
Total TB patient notification	1.19 million (as on 11th Sept)	3.6 million
Proportion of notified TB patients receiving financial support through DBT	42% (January- June 2020)	80%

Source: National Strategy Programme 2017-2025; Central TB Division, Nikshay Reports Online Database

The slow progress on this front has taken an even more regressive hit due to the Covid-19 pandemic as discussed in previous sections. In the worst-case scenario, any progress made until March 2020, may have possibly been nullified due to the inefficiencies in access to healthcare by current and latent TB patients. In this context, it is crucial to identify the modifications that are being undertaken and required in India's current strategy to combat TB such that it accommodates for all Covid-19 induced inefficiencies.

On 04 September 2020, the Central TB division issued a rapid response plan to recoup the progress lost under the NTEP (Sachdeva 2020). The plan states various strategies aimed to process the "revival of NTEP services in Covid-19/Post Covid-19 scenario" to be incorporated by the Health Departments of all states and union territories. The plan suggests the replacement of smear microscopy by NAAT testing to make the process of case finding more efficient in the public sector. It also suggests the collection of samples from home in containment areas and proposes a "systematic active TB finding campaign to be initiated after mapping of those areas with rapid decline of TB case notification due to COVID-19".

Bi-directional Testing for TB and Covid-19

Additionally, considering that both Covid-19 and TB have similar symptoms, the revival plan proposes that the testing and screening services for both infections should be integrated. A proactive decision of the Ministry of Health and Family Welfare in this direction has been to advise all states to test all TB patients for Covid-19 and all Covid-19 patients for TB. It has been argued that the government, in addition to this, should draw inspiration from successful public-private partnerships in the field of TB care and encourage greater involvement of private healthcare institutions to help manage the increasing demand of TB-related services (Pai et al. 2020). This approach of the public-private mix will enable the building of health capacity amidst the crisis, thus providing instantaneous reinforcements in addition to a higher rate of identification of the "missing" TB cases.

Modifications in the Traditional TB Treatment Approach

The government may be required to switch from Directly Observed Treatment (DOT) to Video-Observed Therapy (VOT) to evaluate the plight of current TB patients and their inability to access medication and visit healthcare centres for treatment follow-ups regularly. The rapid response plan mentions the need to adopt modified DOT modalities and enable the provision of a monthly supply of drugs, at the least, with the option of them being delivered at home. It also proposes a special strategy for urban slums based on “doorstep screening, sample collection and transportation and referral linkages for diagnosis and treatment.” The government might also need to shift from injectable-based regimens for treatment of Drug-resistant TB to a purely oral-based regimen (WHO 2020). This could further help reduce unnecessary visits to healthcare institutions and would thus be able to reach a larger number of beneficiaries at once.

Best Practices and Recommendations

The Shatabdi Hospital in Mumbai presents itself as an outstanding example of efficiently continuing the treatment of its TB patients even during the pandemic. Media reports suggest that their outpatient department had been functional throughout the lockdown with OPDs being scheduled on alternate days and practices of social distancing and sanitation being necessarily followed by all (Bedi & Yadavar 2020). In UP's Meerut, healthcare providers have been keeping in touch with their TB patients over the phone and sending medications to their homes in case they are running out of them. A similar advisory has been given to state health departments to identify one person in each district who can handle the TB patient/public calls and assist them with any service (Central TB Division 2020). All confirmed TB patients are also recommended to be provided with TB ID cards to enable their “unrestricted mobility” in healthcare facilities and ease the accessibility to treatment and follow up procedures (ibid).

An additional recommendation pertains to the nutrient content of the grains provided under the relief package and the PDS. The quantity of cereals being made available through the relief package may be required to increase so that at the least, the minimum recommended calories are consumed (Bhargava & Shewade 2020). Focus must also be placed on the provision of protein-rich diets to the most vulnerable.

At the current stage of the crisis, it is vital for the government to not only resume the public health outlet for the treatment of TB emergencies but also to turn to telemedicine for follow-ups and drug stock maintenance. Taking strategic measures to enable the notification of current missing cases of TB will have a significant impact on restricting the spread of TB and the development of drug-resistant forms.

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