

It's Time To Use Covid-19 Innovations And Systems to Reimagine TB Care

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Even as the world comes to grips with the mounting death toll due to the Covid-19 pandemic, the WHO released its 2020 [Global Tuberculosis Report](https://www.who.int/publications-detail/global-tuberculosis-report-2020) last week. The news is not good. Nearly 1.4 million people died from TB in 2019. Of the estimated 10 million people who developed TB that year, some 3 million were either not diagnosed, or were not officially reported to national authorities.

[https://www.forbes.com/sites/madhukarpai/2020/10/22/time-to-tap-covid-19-innovations--systems-to-reimagine-tb-care/](https://www.forbes.com/sites/madhukarpai/2020/10/22/time-to-tap-covid-19-innovations--systems-to-reimagine-tb-care/?sh=6030d5c2494d)

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As expected, the Covid-19 pandemic is making things worse, with 25-30% drops in TB notifications reported in 3 high burden countries – India, Indonesia, the Philippines – between January and June 2020 compared to the same 6-month period in 2019. These reductions in case notifications and ongoing [disruptions to TB services](#) could substantially increase TB deaths.

As I [previous wrote](#), together, Covid-19 and TB pose a deadly, dual threat - a syndemic. Tremendous catch-up work, advocacy, and funding is needed, to get back on track, even as the pandemic is pushing millions of people into extreme poverty. That cannot be good for TB, since Poverty and TB are old pals.

In the early days of the pandemic, there was optimism that TB technologies and systems could help end the Covid-19 pandemic. Indeed, molecular technologies widely used for TB are being used to test for Covid-19, and the BCG vaccine for TB is being tested for Covid-19. National TB program staff (e.g. contact tracers) are engaged in the Covid-19 response. TB wards have been re-purposed to serve as Covid-19 wards.



Mobile testing for Covid-19 in South Africa. Photographer: Waldo Swiegers/Bloomberg, © 2020
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But now, given the massive setback to progress in reaching any of the TB targets, it's time for the TB community to ask: are there Covid-19 innovations and systems that can be effectively leveraged to [reimagine TB care](#)?

"In many low- and middle-income countries, TB programs became the foundation of an effective early response to Covid-19. Now, as we are urgently rebuilding disrupted core health services for TB and other conditions, we have an opportunity to draw on the toolbox of innovations that have been created for Covid-19," said [Catharina Boehme](#), CEO of [FIND](#), Geneva.

By speaking with a large number of experts, I could indeed identify several opportunities for the TB field (and **vice-versa**).

Education, risk assessment & screening

Mobile apps & services (e.g. using Whatsapp & chatbots) are being widely used for public education on Covid-19, for risk or self assessment, screening and linkage to testing, for contact tracing and mapping.

For example, South Africa, building on its success with [Mom Connect](#), has reached over 7 million people using a suite of [digital tools](#) (e.g. COVID-19 Health Alert & COVID-19 Health Check). India's open-source [Aarogya Setu](#) mobile app has been downloaded by over 150 million individuals. If these apps can enhance TB contact tracing, that would be a huge advance, since contact investigation is an effective but underused intervention in many high TB burden countries.



In South Africa, the National Department of Health's COVID-19 digital responses have connected the ... [+]

DEPARTMENT OF HEALTH, SOUTH AFRICA

According to [Zameer Brey](#), a Senior Program Officer at the Bill & Melinda Gates Foundation in South Africa, these platforms and technologies are being repurposed for TB. "The 'disruptive' innovations that emerged during the Covid-19 pandemic were waiting beneath the surface to really enhance patient-centered care across the most vulnerable communities. The biggest tragedy would be to quickly bury those innovations and bury the hope of a more patient centric system," he said.

Another way to screen for TB and Covid-19 is to use digital chest x-rays (highly portable systems now exist), with artificial-intelligence (AI) solutions to make the interpretation easier and less reliant on expert radiologists. Such AI-based solutions already exist, for [TB](#) as well as [Covid-19](#). AI-based algorithms can also identify [CT scans](#) with COVID-19 associated pneumonia.



Following long collaborative efforts, DOPASI, Stop TB and Fujifilm launch TB screening of 400, 000 ... [+]

DOPASI ORGANIZATION FOR SUSTAINABLE DEVELOPMENT, PAKISTAN

“While TB needed AI interventions, the development of such technologies was slow because TB was (and still is) a poor person’s disease. Covid-19 has not only ushered more adoption for existing AI interventions, but forced us to think what we can build beyond usual offerings,” said [Prashant Warier](#), CEO of [Qure.ai](#). “Initially, while a lot of TB solutions were repurposed for Covid-19, now there is an opportunity to reverse-purpose several Covid-19 solutions for TB,” he added.

Automated [recognition of cough](#) duration and sound patterns might help encourage care-seeking and potentially screen for conditions such as TB and Covid-19. Indeed, innovative R&D around this is happening (e.g. [Hyfe](#) cough tracker app). “How could the ability to detect and classify coughs not be transformational?” asked [Peter Small](#), a TB expert and innovator at Global Health Labs.

[Raghu Dharmaraju](#), a VP at [Wadhwani AI](#) is hopeful about [cough-based screening](#) as well as greater use of [data science](#) or pandemic response. “My deepest hope is that we use this crisis to accelerate the shift to truly data-driven health systems,” he said.

Innovative sample collection and diagnosis

“Innovative community-based (decentralized) testing and enhanced case finding can be lessons learned from Covid-19 and scaled up for TB,” said [Antonio Flores](#), a HIV/TB specialist with Médecins Sans Frontières.

[Puneet Dewan](#), a physician and TB expert with Global Health Labs agrees. “There has never been so much enthusiasm and money in diagnostic testing,” he says. He hopes some good can come out of the current crisis. “We have to ensure we end up with products and systems that meet TB control needs,” he said.

The demand for rapid and simpler Covid-19 testing has pushed companies and health systems to innovate around what samples to collect, where to collect them, and how to make testing easier to access. For example, samples such as saliva, rinse and gargle, oral swabs, and even sampling of face masks are being actively tried out. Better and cheaper swabs have been developed (e.g. polyester-based [Q-tip-type swab](#)).

Tremendous effort is being made to develop home-based, self-tests for Covid-19. Mobile testing sites, drive-through testing, and sample collection via community health workers, neighborhood pharmacies, schools and workplaces are all happening.



A researcher from the Sys2Diag laboratory, from the biotechnology company SkillCell, takes a saliva ... [+]

AFP VIA GETTY IMAGES

Currently, TB testing is highly reliant on sputum, a sample that is not easy to collect and process. TB testing is also not easily accessible at the primary care level. So, if some of the innovative approaches around Covid-19 sample collection & near-patient access can be applied to TB, this might help reduce the massive diagnostic gap in TB.

“The unprecedented speed with which Covid-19 tests have been developed is proof that even technically challenging diagnostics can become reality in record time,” says [Morten Ruhwald](#), Head of TB at FIND, Geneva. He believes there is huge potential to expand Covid-19 technologies across a spectrum of respiratory diseases.

There are several [rapid molecular](#) diagnostic platforms that are currently running Covid-19 and TB tests. Some of them are designed for point-of-care use (e.g. [GeneXpert](#) and [TrueNat](#)), while others are meant for high-throughput, centralized laboratories (e.g. [BD Max](#), [Abbott m2000](#), [Roche Cobas](#)). Wider use of molecular technologies and [bi-directional testing](#) can only be good for TB, and help the field get rid of suboptimal tools such as smear microscopy.

In addition, great progress has been made with rapid, point-of-care [antigen testing](#) for Covid-19. Adapting this to develop simpler POC tests for TB would be a massive advance. Rapid, high-sensitivity urine LAM antigen detection technology holds [great promise](#) and will benefit from all the technology development around Covid-19 rapid testing.

“Simple self-sampling (e.g. from [face masks](#)) appears within reach – and in combination with cutting-edge molecular detection assays like [CRISPR](#), this could make at-home diagnosis of respiratory infections not just as straightforward as a pregnancy test, but as accurate as conventional diagnostic methods,” said Morten Ruhwald.

“I am very enthusiastic about the possibility of porting true point-of-care, non-sputum based diagnostic systems for use in TB. It's not just the instrumented platforms, but non-instrumented disposables that have taken a flying leap forward,” said Puneet Dewan.

Innovations in care delivery

“Remote service provision has come to stay due to Covid-19,” said [Ifeanyi Nsofor](#), CEO of EpiAFRIC and Director of Policy and Advocacy at Nigeria Health Watch. And everyone now sees the value of care close to home (primary care).

Indeed, because of lock-downs and physical distancing requirements, tremendous advances have been made in the area of tele-health, online consultations, house calls by doctors, use of call centers, e-pharmacies, use of [digital adherence technologies](#) (e.g. smart pillboxes, video observed therapy), and [home delivery of medicines](#) using health workers, ride-sharing services, etc. All of these can and should be leveraged for TB, at a larger scale than what is currently happening.

“Covid-19 is providing a huge boost to the at-home delivery market for medicines,” said [Prashant Yadav](#), a supply chain expert and professor at INSEAD. “The infrastructure that many privately funded startups & social enterprises are creating could be extremely useful for TB patients especially if sometime in the future we transition to even shorter treatment regimens which can be self-administered with a tele-consult follow-ups,” he added.

Indeed, we now have hopes for a [1 month](#) treatment for latent TB infection, a [4-month](#) treatment for active TB, and a [6-month](#) oral treatment for drug-resistant TB. If these can be combined with tele-consults and at-home delivery of medicines, it could revolutionize TB care.



Coronavirus emergency (Covid 19). Volunteers of the Italian Red Cross engaged in the delivery of ... [+]

MONDADORI PORTFOLIO VIA GETTY IMAGES

According to Yadav, Covid-19 has created a sudden and growing interest in improving healthcare supply chains. “Many of the initiatives are focusing on resolving system bottlenecks in procurement, distribution and supply chain information systems. These will go a long way in ensuring healthy supply chains for all medicines,” he said.

Better data, data visibility and usage

Most TB programs still rely on annual reports and paper-based reporting systems that are no longer fit for purpose. Covid-19 shows us the power of real-time data aggregation, analysis and usage.

During this pandemic, an astounding number of real-time Covid-19 trackers, vulnerability indices, geospatial mapping tools and dashboards have been launched, often by collaborative networks of scientists and citizens. This has provided real-time data for public health and personal use. Rapid data sharing has also provided early epidemiological and clinical insights. Most countries are conducting rapid prevalence and infection surveys, to enhance routine surveillance. Covid-19 has also accelerated the use of electronic medical records.

TB has never seen this level of investment in data systems. Lack of good data has always blunted effective TB response and made it harder to ensure accountability.



UKRAINE - 2020/04/29: In this photo illustration the Coronavirus COVID-19 Global Cases world map by ... [+]

SOPA IMAGES/LIGHTROCKET VIA GETTY IMAGES

“Investments on data systems and tools like vulnerability indices are key to deploying a more precise response (for Covid-19 or TB),” says [Sema Sgaier](#), Director of Surgo Foundation. “[Vulnerability indices](#) can be powerful predictive tools that enable policy makers to identify geographies that will have the hardest time to mitigate the health, social, and economic impacts of a disease like TB, and guide policy makers to the types of mitigation interventions they should be betting on,” she added. Machine learning and big data can also help [precisely target](#) those who need extra support.

Infection control & behavior change

Despite being an airborne respiratory infection with high risk of occupational transmission, TB infection control has received [little attention](#) in high-burden countries. Covid-19 shows that healthcare systems can find ways to protect healthcare workers and people can change their behaviors to reduce risk, for themselves and others.

“The overlooked story is how human behavior change can interrupt transmission. A no holds barred attack on how we change behavior should be essential response to this pandemic and TB,” said Peter Small.

Routine use of personal protection equipment by healthcare workers, large-scale use of face masks by the public, better triaging and cohorting within health facilities, safer disposal of respiratory secretions, and advances in research into aerosols & airborne transmission (and [engineering](#) controls) can all help interrupt TB as well as Covid-19 transmission.

Because of Covid-19, the use of face masks has become less stigmatized, and there is wider acceptance that anyone can get a respiratory infection. Hopefully, this will make TB less stigmatized.

Social safety

Covid-19 has taught the world about the importance of [social safety nets](#) that include paid sick leave, unemployment benefits, direct cash transfers, food supplements, and a heightened focus on social determinants. Greater education of the public and community engagement is also evident in many settings. And public health investment is now clearly understood as a ‘social good.’

Since TB is primarily a disease of poverty and is highly correlated with social determinants such as malnutrition and poor housing, such social security benefits must be more widely available to all persons with TB, especially in low- and middle-income countries. A purely biomedical approach to TB is unlikely to succeed. In the same vein, greater engagement of communities most affected by TB is critical for success.

Public-private partnerships for care delivery

During this crisis, governments across the world have found a variety of mechanisms (e.g. price caps, strategic purchasing of services, better regulation) to tap into the private health sector for Covid-19 testing and treatment. As noted by WHO, many LMICs have a large and growing contingent of private sector health service delivery actors that have historically been weakly governed and poorly coordinated. “Now more than ever LMICs need a [whole-of-government and whole-of-society approach](#) as they immerse in the battle against COVID-19.”

A [recent survey](#) showed wide variations in the cost of Covid-19 testing in the private health sector across LMICs. However, some countries have successfully made Covid-19 testing more affordable and accessible via private laboratories. Similar private-provider initiatives are also underway for TB, and deserve to be [taken to scale](#), since the private health sector is a major source of TB care in several high TB burden countries.

Global partnerships & collaborative research

The pandemic has transformed medical research and publishing. We now have rapid access to information via pre-prints and open access publications. Most medical and scientific conferences are now free and easily accessible to people around the world.

There are many open data data platforms to foster research collaborations & R&D. “Despite TB being the biggest infectious diseases burden, and especially affecting LMICs, many publications are still sitting behind a paywall,” laments [Muge Cevik](#), a clinical lecturer in infectious diseases at the University of St Andrews.

The pandemic has also inspired several multilateral global collaborations and partnerships (e.g. [ACT Accelerator](#), [COVAX](#)), pooling of funding for new tool development & delivery, patent pools to increase access, and other approaches to increase access to new tools.

Such partnerships are urgently needed for TB, where slow access to new tools is a long-standing concern. ‘We have demonstrated that with global solidarity, a lot can be achieved in a short time. Open data, open access research and (to some extent) pooling of technology have all become the norm and should be continued for global threats like TB,’ said [Soumya Swaminathan](#), Chief Scientist at WHO.

Rapid, multi-centric trials & evaluation studies (e.g. [Solidarity](#) trial, [Recovery](#) trial), faster regulatory approval processes, greater cohesion among scientists for evidence-driven interventions (e.g. [John Snow Memorandum](#)), and multi-sectoral responses within and across countries have all been noticeable during this crisis. “Wouldn't it be great to see the same concerted efforts to develop TB drugs and tests as we've seen for Covid-19?” asked Antonio Flores.

Muge Cevik would like TB researchers to be more open to adaptive clinical trial designs. “It seems like we are constantly stuck in long phase 3 studies of single drugs,” she lamented.

[Jennifer Furin](#), a TB physician and advocate, laments that TB has received almost no attention compared to Covid-19, despite the fact that TB kills millions of people each year. “Research predicts a gloom-and-doom scenario for TB as a result of Covid-19, but if we are smart, persistent, and creative in adapting some of Covid-19's successes, this could actually become our finest hour,” she argued. Along with her colleagues, she has listed potential [collateral benefits](#) from the Covid-19 pandemic to TB and HIV services.

[Aakriti Pandita](#), an infectious diseases physician at the University of Colorado has survived both Covid-19 and TB. “Covid-19 is unclogging many novel pathways towards medical advancement that otherwise would have taken a lifetime to develop. In fact, in time, Covid-19 may actually prove to be one giant leap in medical science and global health if we use it our advantage,” she said.

Beyond disease silos

While the Covid-19 crisis has brought a great deal of attention to health, it is unclear whether such interest will sustain when the crisis dies out. Will Covid-19 create more disease silos, or will we finally see stronger health systems that can offer better primary healthcare? Will countries continue to invest in public health?

[Daksha Shah](#), Deputy Executive Health Officer for the Municipal Corporation of Greater Mumbai in India has coordinated services for both TB and Covid-19. “Right now, the health system is most receptive (she highlighted the [“My Family, My Responsibility”](#) campaign in her state as an example) and we should build on this for improving care for TB, non-communicable diseases, and other conditions,” she said.

[Grania Brigden](#), Director of the TB Department at [The Union](#) agrees. “I, personally, do not want to see another vertical disease program established with separate funding streams/donors/multinational organizations,” she said. “I think there is a benefit to thinking how/if TB integrates with the Covid-19 response and in high burden contexts becomes the cornerstone of a comprehensive approach to lung health,” she added. Since Covid-19 has put the spotlight on the importance of comorbidities, she hopes a similar attention will be paid to addressing comorbidities that often accompany TB (e.g. HIV, diabetes, malnutrition).

[Yogan Pillay](#), country director of CHAI in South Africa, sees great potential for leveraging Covid-19 innovations for TB. The problem, he said, is “none of these are new to the TB community. How to get everyone to take TB seriously as they are with Covid-19?”, he asked.

Jennifer Furin has similar concerns. “The dazzling list of innovations for Covid-19 only happened because wealthy nations are just as at risk of Covid-19 as poor nations,” she said. “So we need to be fierce advocates to make sure these tools for Covid-19 are applied to TB because rich countries have revealed themselves for what they are: self-interested to the core,” she added.

Jennifer Furin is right - the billions of dollars invested in Covid-19 vaccines is orders of magnitude higher than the investments made in TB vaccine development since the dawn of humankind. We might have Covid-19 vaccines within a year, but will still be using a 100-year old vaccine for TB next year.

[Saurabh Rane](#), a drug-resistant TB survivor and advocate has a compelling message. "I don't want to know why the world didn't respond this way for TB when it kills over a million people every year. But now that we are building tools to fight Covid-19, I beg everyone to use them to fight TB as well," he said. I agree wholeheartedly with him. There cannot be a more opportune moment for the TB community to leverage Covid-19 innovations to reimagine TB care, and make universal health coverage a reality.