The impact of COVID-19 on TB and HIV services:

A public health surveillance project in three African countries

Protocol developed and finalised April 2020.

Background

A novel severe acute respiratory syndrome coronavirus 2, named SARS-CoV-2, that causes the disease, coronavirus disease 2019 (COVID-19), was identified in early January 2020 to be the cause of a cluster of atypical pneumonia cases reported two weeks earlier in Wuhan city, Hubei province, China. Since then, the virus has spread rapidly through China and to the rest of the world. By 15 April, 2020, over 1.9 million cases of COVID-19 had been reported globally to the World Health Organization (WHO) with 123,000 deaths.[1] The epicentres in April were Europe and USA. **AFRICA,** with its large volume of air traffic connections with China, USA and Europe, will probably be the next region hit hard by COVID-19.[2,3] Currently, reported case numbers are 11,367 with 523 deaths,[1] but if the spread of the infection follows the same trajectory as in other countries around the world, these will probably escalate in the near future.

With political attention, health care workers, resources and finances being directed to the health sector to enable it to cope with the COVID-19 crisis and with quarantine, restricted movement and increased time spent indoors, there is concern that countries with high burdens of tuberculosis (TB) and HIV/AIDS might be unable to provide uninterrupted and quality health care services to their patients.[4] Health seeking behaviour and access to care for affected patients might also be adversely affected. The Ebola virus disease outbreak in Sierra Leone and Liberia in 2014 took these two West African countries by surprise and, through restrictions in travel, "no touch" policies and community fear of health facilities, adversely affected the ability of the national TB programmes to diagnose TB, continue with HIV testing and, in the case of Liberia, ensure good treatment outcomes.[5, 6] Similarly, in both countries HIV testing capabilities for the general population decreased, although access to antiretroviral therapy was unaffected.[7,8] The Stop TB Partnership and WHO have issued guidance about how people with TB can protect themselves and how national TB programmes might adapt to the onslaught of COVID-19 and the lockdowns.[9,10] UNAIDS has provided similar advice to people living with HIV.[11] This global advice is augmented by an urgent call for practical planning to tackle the threat of COVID-19 in Africa.[12]

By 15 April, 2020, Kenya had reported 216 cases (with 9 deaths), Zimbabwe 18 cases (with 3 deaths) and Malawi 16 cases (with 2 deaths).[1] When the COVID-19 storm in each of these countries will arrive, how severe it will be and how long it will last are unknown. Being prepared, however, is key to being able to cope. Guinea in West Africa, for example, weathered the Ebola virus disease storm and managed to uphold TB services during this difficult period.[13]

Working in close collaboration with the relevant public health authorities, the project will, at the early stage of each country's COVID outbreak, strengthen the routine and real-time monitoring and evaluation system for TB and HIV case detection in Kenya, Zimbabwe and Malawi. Currently, recording and reporting is done on a quarterly (3-month basis). The project will now institute recording and reporting on a monthly basis. If there is a decline in numbers of presumptive TB patients, numbers being diagnosed with bacteriologically confirmed TB, numbers successfully treated or a decline in numbers presenting for HIV testing or numbers of HIV-positive persons being referred for antiretroviral therapy (ART), then programmes can act more quickly to ensure more decentralised services along with better use of community health workers / volunteers. Conversely, if numbers presenting to TB diagnostic facilities with cough and fever increase (due to patients with COVID-19 accessing these services), then programmes can act to ensure adequate numbers of sputum containers and laboratory resources to cope and increased vigilance to rule out COVID-19 and take necessary precautionary measures.

Aim and Objectives

Working in close collaboration with the relevant local public health authorities responsible for surveillance in each country, the overall aim of this public health surveillance project is to determine the impact of the COVID pandemic on TB case detection and care and HIV diagnosis and care through strengthened real time surveillance in selected health facilities in Kenya, Zimbabwe and Malawi.

Specific objectives in each of these countries are to:

i) Collate and report on a monthly basis the numbers and demographic characteristics of patients presenting with presumptive TB and the numbers diagnosed with TB (stratified by bacteriologically confirmed TB, clinically diagnosed TB and extra-pulmonary TB) and by HIV testing and HIV-status and to analyse these data in light of the local COVID pandemic burden

ii) Collate and report on a monthly basis the numbers and demographic characteristics of persons being HIV tested, numbers diagnosed HIV-positive and of those numbers referred to start ART and to analyse these data in light of the local COVID pandemic burden

iii) Document on a monthly basis the numbers of cases of COVID-19 reported to WHO from each of the countries

iv) Examine any changes in treatment outcomes for TB cases in light of the local COVID pandemic burden

v) Provide local public health authorities with a regular summary and analysis of data to allow them to respond in real time to improve programmatic response to changes in TB case detection, treatment and HIV testing patterns detected during the project

Methodology

Generic:

Tuberculosis: The project will work in selected health facilities in Nairobi (Kenya), Harare (Zimbabwe) and Lilongwe (Malawi) as selected by the local public health authorities where regular daily data are captured in the standard, existing monitoring tools: numbers of patients registered with presumptive TB, and of those the numbers diagnosed with bacteriologically confirmed TB (source = presumptive TB register, laboratory register or appropriate electronic register); numbers of patients registered with TB, stratified by bacteriologically confirmed TB, clinically diagnosed TB and extra-pulmonary TB (source = paper-based or electronic TB patient register); and numbers of TB patients tested for HIV and of those the numbers diagnosed HIV-positive (source = paper-based or electronic TB patient register). Once registered TB patients are on treatment, the outcomes of each monthly cohort will be documented at 6-months to assess whether programmatic treatment outcomes have deteriorated. At the end of each month, the established staff working in these facilities who are already responsible for this surveillance activity will be asked to collate the data for that month and enter into a specific data collection template developed for the purpose of this surveillance project using EpiCollect5. See **Annex 1** for data variables to be collated each month. Only this aggregated, collated data will be received by the project team members outside of Ministry staff. No new staff will be introduced to undertake this work. The coordinator in each country, assisted by other data collectors, will visit each of the selected

sites on a monthly basis one to two weeks after the end of the month (to allow for sputum results to be obtained and entered to registers). At that time, he/she will check the site aggregate data against numbers in the appropriate registers. Actions at the local facility level and at the national level that are taken if numbers are found to be decreasing or increasing will be documented and these shall be noted in the comments box in each monthly report. Back at the office, the coordinator will collate the aggregate data for the total number of selected sites as well as the actions taken to mitigate changes in trends. These monthly aggregates shall be sent to the TB programme managers and also to the Monitoring and Evaluation Unit of the Centre for Operational Research (COR) of The Union.

HIV: The project will work in selected health facilities in Nairobi (Kenya), Harare (Zimbabwe) and Lilongwe (Malawi) where the regular daily data are captured in the standard monitoring tools: numbers of persons tested for HIV and diagnosed HIV-positive (source = HIV testing centre register); and numbers of HIV-positive persons referred to start ART (source = HIV testing centre register). Similar to the situation with TB, at the end of each month, the established staff working in these facilities who are already responsible for this surveillance activity will collate the data for that month and enter into a specific data collection template developed for the purpose of this surveillance project using EpiCollect5. See **Annex 2** for data variables to be collated each month. Only this aggregated, collated data will be received by the project team members outside of Ministry staff. No new staff will be introduced to undertake this work. The coordinator in each country, assisted by other data collectors, will visit each of the selected sites on a monthly basis one to two weeks after the end of the month (to allow for HIV test results to be obtained and ART referrals to be documented). At that time, he/she will check the site aggregate data against numbers in the appropriate registers. Actions at the local facility level and at the national level that are taken if numbers are found to be decreasing or increasing will be documented and these shall be noted in the comments box in each monthly report. Back at the office the coordinator will collate the aggregate data for the total number of selected sites as well as the actions taken to mitigate changes in trends. These monthly aggregates shall be sent to the HIV/AIDS programme managers and also to the Monitoring and Evaluation Unit of the COR.

COVID-19: using case and mortality data that are publicly available from the World Health Organization (WHO), the project will record on a monthly basis on the last day of the month the number of reported cases of COVID-19 in each country and the number of reported COVID-19 deaths according to data updated on the WHO website.[1] This will be done by the PI and Monitoring and Evaluation Unit at the COR.

Duration of project: The project will run for ten months. It will collect data prospectively but will also collect monthly aggregate data for the previous 12 months retrospectively so that there is a baseline comparison that allows for seasonal changes.

Evaluation and reporting: each country coordinator will obtain and check the monthly data from the sites, collate these data sets from each site using EpiCollect5 and send these on a regular monthly basis to the Monitoring & Evaluation Officer of COR. The COR will plot the aggregate data variables for each month in each country and assess these in relation to i) numbers reported in the same month in the previous pre-COVID year and ii) numbers of reported COVID-19 cases and deaths in the month of study. The COR will also document what actions were taken during the month to mitigate increases or decreases in case numbers These monthly aggregate data and assessments will be shared with all co-investigators including Vital Strategies (VS). The monthly aggregates as well as the summary and analysis will be provided to the public health authorities for consideration in their response to the COVID epidemic. The public health authorities remain the owners of all data generated as part of the project.

Finally, we will report quarterly to all investigators including VS about 3-month trends in TB case detection and HIV testing as compared with historical controls, and if required we could hold webinars to share the findings with other interested stakeholders. At the end of the project we will write up the findings for publication in an open-access peer reviewed journal.

Ethics: this project is one of public health surveillance. The protocol will be submitted to the local ethics committees of each country for approval or a formal waiver given that the project is about strengthening routine public health surveillance. We shall also submit this proposal to the Union Ethics Advisory Group (EAG) for a records review ethics approval. Given the involvement and funding support of Vital Strategies, the project will also be submitted to the Vital Strategies' Human Protection Administrator (HPA) for review. We will not use any names or other means of identifying clients during data collection so patient confidentiality is assured. Only aggregated data will be received and analysed. Data ownership will remain with the local Ministries of Health. We will disseminate the findings in an open access publication as well as with responsible authorities in each country.

Kenya:

The project will take place in Nairobi, the capital city. This is because nearly 80% of COVID-19 cases in Kenya so far have come from Nairobi. This will also mean that we will

not incur large project coordination costs such as transport and per diem that would be required if the project was to be implemented in other counties. The County of Nairobi is divided into 10 TB sub-counties: to achieve good geographical representation, we aim to select two facilities in each of these 10 sub-counties to serve as project sites. These sites will be purposively selected in consultation with the head of the TB Programme and the County TB and Leprosy Co-ordinator. Selected sites will have the following characteristics: on site TB diagnostic capability (Xpert MTB/RIF assay on site); TB treatment services on site; HIV testing and antiretroviral treatment services on site. Available staff will be used who are already working in these sites delivering TB and HIV services. The routine tools currently used by the TB and HIV programmes to monitor programme activities will be used including: presumptive TB register, TB laboratory register, TB facility patient register, HIV testing and ART register for HIV. The only new tool to be introduced is the data collection template on EpiCollect5 for collating the monthly data. The estimated numbers of cases per month in the 20 selected sites are: Presumptive TB = 1700; Diagnosed TB = 260; Being HIV tested = 10,000; Diagnosed HIV-positive = 200. The project coordinator will work with the Sub-County TB and Leprosy Coordinators to visit the sites one to two weeks after the end of each month, check the data and then collect and aggregate the data before submitting it to the National TB and HIV/AIDS Programme Directors, the County TB and Leprosy Coordinator and also to the Centre for Operational Research at the Union. The protocol will be submitted to the Scientific and Ethics Committee of the Kenya Medical Research Institute (KEMRI).

Zimbabwe:

The project will be conducted in Harare, the capital city, because it accounts for 90% of the confirmed COVID-19 cases reported in Zimbabwe and is therefore more likely to have routine health services being negatively impacted by the ongoing COVID-19 health crisis. This will also limit the logistical challenges associated with long distances and associated travel costs to districts which are outside the capital and allows for more rapid and frequent data collection and verification visits to Harare City study sites by the project coordinator. Harare City consists of 8 districts that include 46 public health facilities of which 44 are under the Harare City Health Department. These provide general health services integrated with TB and HIV services whilst the other two are government central hospitals which provide specialized health services. Of the 44 public health facilities under the Harare City Health Department, 13 are polyclinics which additionally provide maternity services, 29 are satellite clinics and 2 are infectious disease hospitals (of which one is now reserved as the

COVID-19 isolation centre). Through stratified sampling from each district, 10 health facilities will be selected from a list of high-volume health facilities based on more than 1000 patients receiving life-long antiretroviral therapy as a proxy for the volume of presumptive TB patients seen per year.

Data collection will be done by the available staff who provide TB and HIV services. Data, including the study demographics, will be extracted from the health facility presumptive TB registers, health facility TB treatment register and HIV testing register for number of presumptive TB patients, number of TB case notifications, numbers of TB patients and others HIV tested and numbers referred to antiretroviral therapy. The only new tool to be introduced is the data collection template on EpiCollect5 for collating the monthly data. The estimated numbers of cases per month in the 10 selected sites are: Presumptive TB = 240; Diagnosed TB = 90; Being HIV tested = 6,600; Diagnosed HIV-positive = 420. The project coordinator will work with other designated colleagues to visit the sites one to two weeks after the end of each month, check the data and then collect and aggregate the data before submission to the National TB and HIV/AIDS Programme Directors and to the Center for Operational Research at The Union. Ethics clearance for this study will be sought from the Zimbabwe Medical Research Council and classified under "expedited review studies": this should allow clearance within 2 weeks of submission since the study will be utilizing routinely collected aggregate patient data which poses no risk to recipients of TB and HIV services.

Malawi:

The project will be conducted in Lilongwe, the capital city, at a tertiary hospital (Kamuzu Central Hospital), a district hospital (Bwaila Hospital) and six health centres (A25 HC, A18 HC, Kawale HC, Mitundu HC Chileka HC. and Lumbadzi HC). HIV diagnostic assistants who are already working in these sites will collate weekly study data from the routine HIV and TB registers (these include the presumptive TB registers, the TB patient registers and HIV testing registers). The only new tool to be introduced is the data collection template on EpiCollect5 for collating the monthly data. The estimated numbers of cases per month in the 8 selected sites are: Presumptive TB = 660; Diagnosed TB = 130; Being HIV tested = 19,500; Diagnosed HIV-positive = 720. The Lighthouse Monitoring, Evaluation and Research Director (*Hannock Tweya*) will coordinate the study and as for Kenya and Zimbabwe will visit the sites one to two weeks after the end of each month to validate the data and collate it for onward submission to the National TB and HIV/AIDS Programme Directors and the Centre for

Operational Research at the Union. The protocol will be submitted to the local ethics board (the National Health Science Research Committee) for expedited review.

Centre for Operational Research (COR), The Union:

The Ministries in Malawi, Zimbabwe and Kenya have agreed that the COR coordinates this project. As such the COR will be responsible for: i) checking and validating the monthly data, analysing the data and disseminating the data in the form of figures and graphs to all co-investigators from the three African countries, COR, WHO-TDR and Vital Strategies – this should allow the public health authorities to make timely public health responses; ii) quarterly reporting on technical progress to all co-investigators with trends in TB cases and HIV testing and financial management, iii) quarterly dissemination of findings to all interested stakeholders if required (e.g., in a webinar), and iv) writing a scientific paper in an Open Access journal and disseminating the findings. The COR will only have access to aggregated data from each country as outlined in the data variable tables in Annexes 1 and 2. No individualized data will be accessed.

References

1. World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report-86. 15 April, 2020: Available: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports (accessed 15 April 2020).
2. Gilbert M, Pullano G, Pinotti F, et al. Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. Lancet 2020; 395: 871-877.
3. Nkengasong JN, Mankoula W. Looming threat of COVID-19 infection in Africa: act collectively, and fast. Lancet 2020; 395: 841-842.
4. Pang Y, Liu Y, Du J, Gao J, Li L. Impact of COVID-19 on tuberculosis control in China. Int J Tuberc Lung Dis 2020; doi: 10.5588/ijtld.20.0127.
5. Bah OM, Kamara HB, Bhat P, et al. The influence of the Ebola outbreak on presumptive and active tuberculosis in Bombali district, Sierra Leone. Public Health Action 2017; Suppl 1: S3-S9.
6. Konwloh PK, Cambell CL, Ade S, et al. Influence of Ebola on tuberculosis case finding and treatment outcomes in Liberia. Public Health Action 2017; Suppl 1: S62-S69.

7. Gamanga AH, Owiti P, Bhat P, Harries AD, Kargbo-Labour I, Koroma M. The Ebola outbreak: effects on HIV reporting, testing and care in Bonthe district, rural Sierra Leone. Public Health Action 2017; 7(S1): S10-S15.
8. Jacobs GP, Bhat P, Owiti P, Edwards JK, Tweya H, Najjemba R. Did the Ebola outbreak in Liberia affected HIV testing, linkage to care and ART initiation? Public Health Action 2017; 7(S1): S70-S75.
9. Stop TB Partnership. TB and COVID-19. Available: http://www.stoptb.org/covid19.asp?utm_source=The+Stop+TB+Pa (accessed 15 April 2020).
10. World Health Organization. WHO Information note Tuberculosis and COVID-19. 4 April 2020. WHO, Geneva, Switzerland.
11. UNAIDS. COVID-19 and HIV. Available: https://www.unoads.org/en/vovid19 (accessed 15 April 2020).
12. Chiang C-Y, El Sony A. Tackling the threat of COVID-19 in Africa: an urgent need for practical planning. Int J Tuberc Lung Dis 2020; doi: 10.5588/ijtld.20.0192.
13. Ortuno-Gitierrez N, Zachariah R, Woldeyohannes D, et al. Upholding tuberculosis services during the 2014 Ebola storm: an encouraging experience from Conakry, Guinea. PLOS ONE 2016; 11: e0157296.

Annex 1: Data variables and sources on TB case detection and treatment

Category	Data variable	Data source
Presumptive TB	Total number each month	Presumptive TB register Laboratory sputum register
	Number adults aged ≥15 years	
	Number children aged <15 years	
	Number males	
	Number females	
	Number bacteriologically positive	
Registered TB	Total number each month	TB patient register
	Number bacteriologically positive PTB	
	Number clinically diagnosed PTB	
	Number EPTB	
	Total number HIV-tested	
	Total number HIV-positive	
TB outcomes at 6-months in those enrolled for treatment (using standard definitions)	Total number enrolled for treatment Number with treatment success Number lost to follow-up Number who died Number who failed treatment Number not evaluated	TB patient register

Note: Numbers HIV-positive may have to be back dated

Annex 2: Data variables and sources on HIV testing

Category	Data variable	Data source
HIV testing, results and referral to ART	Total number HIV tested each month	HIV Testing register ART register
	Number adults aged ≥15 years	
	Number children aged <15 years	
	Number males HIV tested	
	Number females HIV tested	
	Number HIV-positive	
	Number HIV-positive referred to ART	

Note: Numbers HIV-positive and referred to ART may have to be back dated