NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

Impact of COVID-19 intervention on TB testing in South Africa

10 May 2020

BACKGROUND

South Africa carries a disproportionate burden of tuberculosis (TB) per capita and is listed in all three categories of priority countries by the World Health Organization (TB, TB/HIV and RR-MDR-TB). The estimated number of incident TB cases in SA for 2018 was 301 000 while the estimated number of deaths due to TB in the same year was 63 000[1]. Significant progress has been made in improving the diagnosis of TB in the country with universal testing of all individuals with symptoms suggestive of TB (cough, fever etc.) using Xpert MTB/RIF Ultra (Xpert) assay with > 2 million individuals tested annually in South Africa[2]. This assay is highly sensitive in detecting TB and also tests for rifampicin resistant TB. The introduction of new and re-purposed drugs to treat drug resistant TB has had significant impact on improving outcomes and reducing mortality due to drug resistant TB. Overall the burden of TB and drug resistant TB has shown positive signs with annual decline in incidence observed[3].

The novel SARS-CoV-2 virus is the causative agent for Coronavirus disease first diagnosed in 2019 (COVID-19). The first laboratory case of COVID-19 in South Africa was on confirmed on the 5th of March 2020 and the number of cases have continued to increase with the total number of new infections over 10 000 as of 10 May 2020[4]. The concerns of excess mortality and potential impact on overwhelming health capacity in a very short time has led to introduction of various measures to reduce the transmission of this disease. Social distancing measures were announced by the President of South Africa on Sunday 15th March with restrictions on international travel, school closures (18th March), and mass gatherings. The national lockdown (level 5 restrictions) commenced on Friday, the 27th of March[5]. Level 4 restrictions commenced on 1 May 2020[6].

We analyse the changes in TB testing volumes, number of cases detected and positivity in relation to the measures introduced to curb the spread of COVID-19 in South Africa.

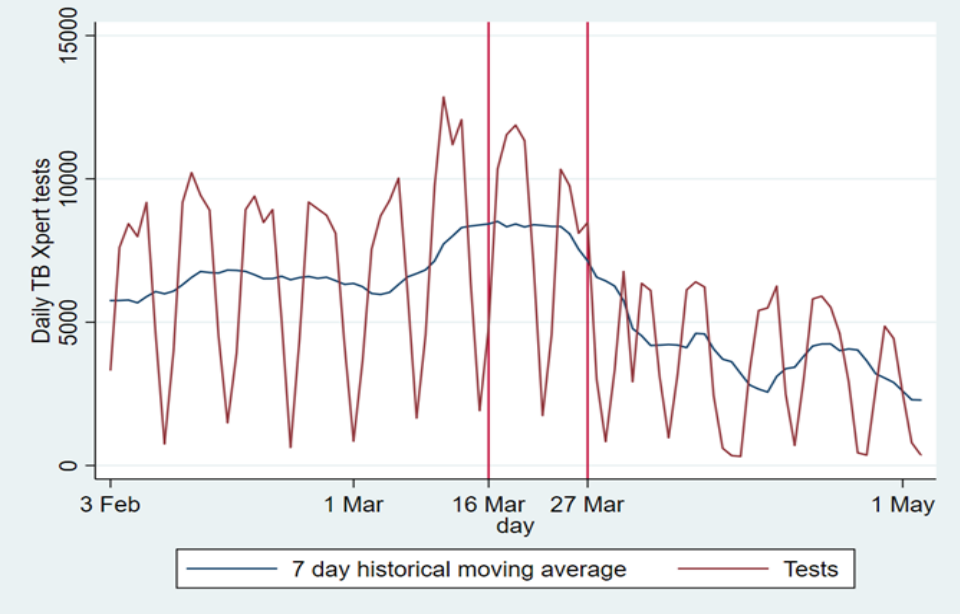
METHODS

Data was extracted for the period 3 February 2020 to 3 May 2020 from the surveillance data warehouse (SDW) at the National Institute for Communicable Diseases a division of the National Health Laboratory Services. The data extracted was restricted to the Xpert MTB/RIF Ultra assay as this is the primary diagnostic tool widely used in South Africa. This test data included, the tests conducted, results of the tests and date when the test were registered in the laboratory. Aggregation of the data to a national level and, by day, and week was undertaken. The analysis was primarily descriptive in nature and included a 7 day historical moving average. The positivity rate was calculated as the number of positive tests over the total number of tests. For this analysis the test data were not de-duplicated. Analysis was conducted using STATA version 15.

RESULTS

Over the period a total of 511 708 Xpert tests were conducted and 41 432 were positive for Mycobacterium tuberculosis complex. The period covered 6 weeks before the interventions were introduced, and subsequent periods of interventions: social distancing (2 weeks) and lock down (5 weeks).

The daily testing volumes are shown below. The social distancing measures implemented from 16th-27th March resulted in a decline in daily testing volumes compared to the preceding week. Daily testing volumes declined sharply after commencement of the national lockdown on the 27thof March and have continued to decline.



Red line indicates the start of the interventions: 16 March 2020 social distancing and 27 March 2020 lockdown.

Figure 1. Trends in daily Xpert tests between 3 February 2020 to 3 May 2020, N=511 708.

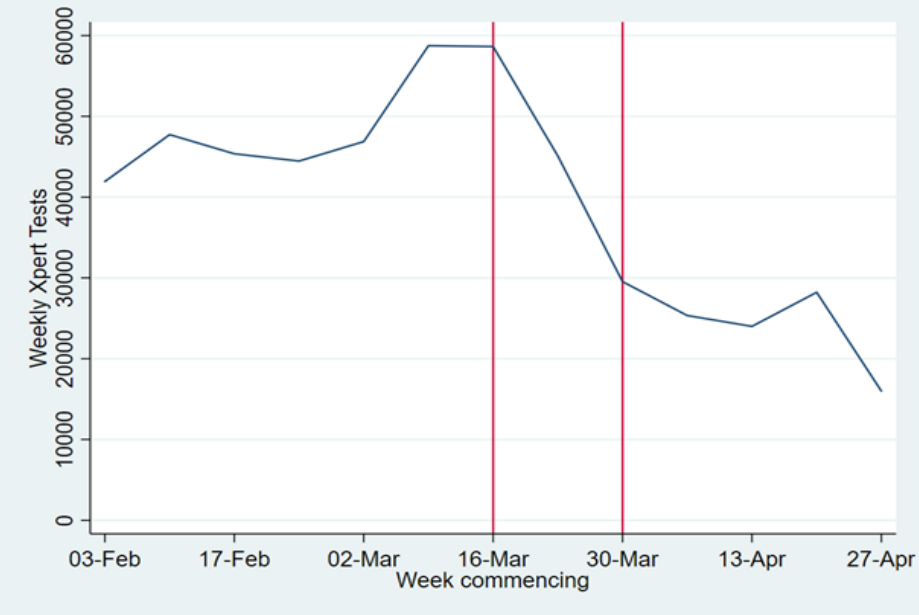
Weekly testing volumes, positive tests and positivity rates are provided in the table below. Testing volumes declined more rapidly than the TB cases detected resulting in an increase in the weekly positivity rate during the lockdown period. The peak of tests in the week during the non-intervention period was 58 742 and dropped to 15 991 in the last week of this analysis in the intervention period. The number of Xpert positive tests exceeded 3000 in all the non-intervention weeks and dropped to a low of 1826 during the national lockdown. The average test volumes during the non-intervention period was 47 520 per week while it was 24 574 during the lockdown period which was a 48% decline. A similar but less dramatic decline was observed for Xpert positive tests, the average test positive per week during the non-intervention period was 3710 while it was 2473 during the lockdown period which was a 33% decline.

Table 1. Weekly volumes of Xpert tests, positive tests and positivity stratified by COVID-19 interventions.

Week commencing	COVID-intervention	Positive Xpert tests	Total Tests	Positivity Rate
03-Feb-20	None	3 600	41 937	8.6%
10-Feb-20	None	3 974	47 738	8.3%
17-Feb-20	None	3 730	45 366	8.2%
24-Feb-20	None	3 640	44 463	8.2%
02-Mar-20	None	3 412	46 873	7.3%
09-Mar-20	None	3 903	58 742	6.6%
16-Mar-20	Social distancing	3 692	58 639	6.3%
23-Mar-20	Social distancing/Lockdown	3 167	45 082	7.0%
30-Mar-20	Lockdown	2 482	29 310	8.5%
06-Apr-20	Lockdown	2 386	25 345	9.4%
13-Apr-20	Lockdown	2 778	24 006	11.6%
20-Apr-20	Lockdown	2 842	28 216	10.1%
27-Apr-20	Lockdown	1 826	15 991	11.4%

The data in the table is shown graphically in Figures 2a,b,c.

Weekly TB Tests



Red line indicates the start of the interventions: 16 March 2020 social distancing and 27 March 2020 lockdown.

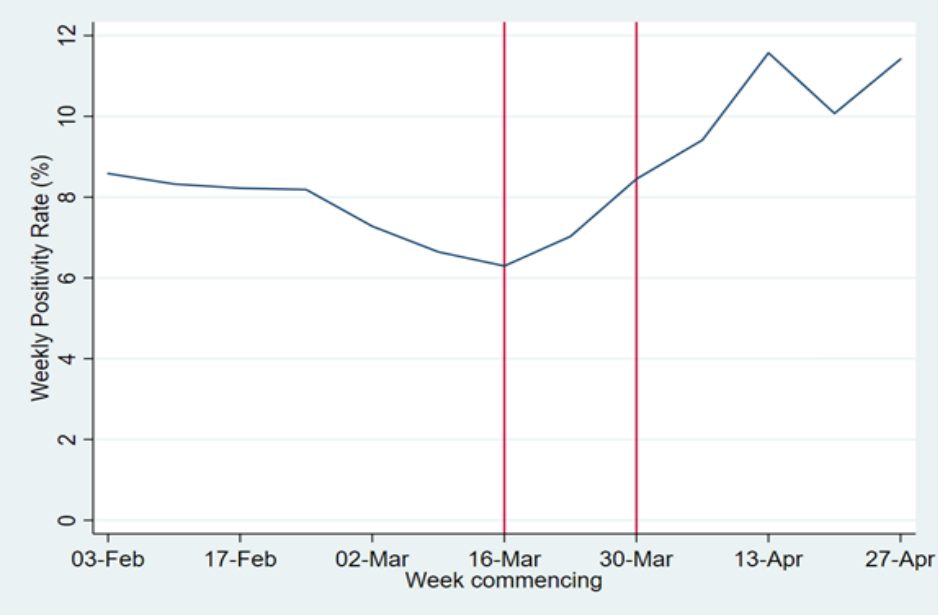
Figure 2a. Trends in weekly Xpert tests between 3 February 2020 to 3 May 2020, N=511 708.

Weekly TB Positive Tests

Red line indicates the start of the interventions: 16 March 2020 social distancing and 27 March 2020 lockdown.

Figure 2b. Trends in weekly positive Xpert TB tests between 3 February 2020 to 3 May 2020, N=41 432.

Weekly TB positivity Rate



Red line indicates the start of the interventions: 16 March 2020 social distancing and 27 March 2020 lockdown.

Figure 2c. Trends in weekly Xpert TB positivity rate between 3 February 2020 to 3 May 2020, N=41 432.

Weekly testing volumes are shown below with the social distancing week (16th March 2020) in yellow, the social distancing-lockdown week of the 23rd in orange and the three lockdown weeks in red.

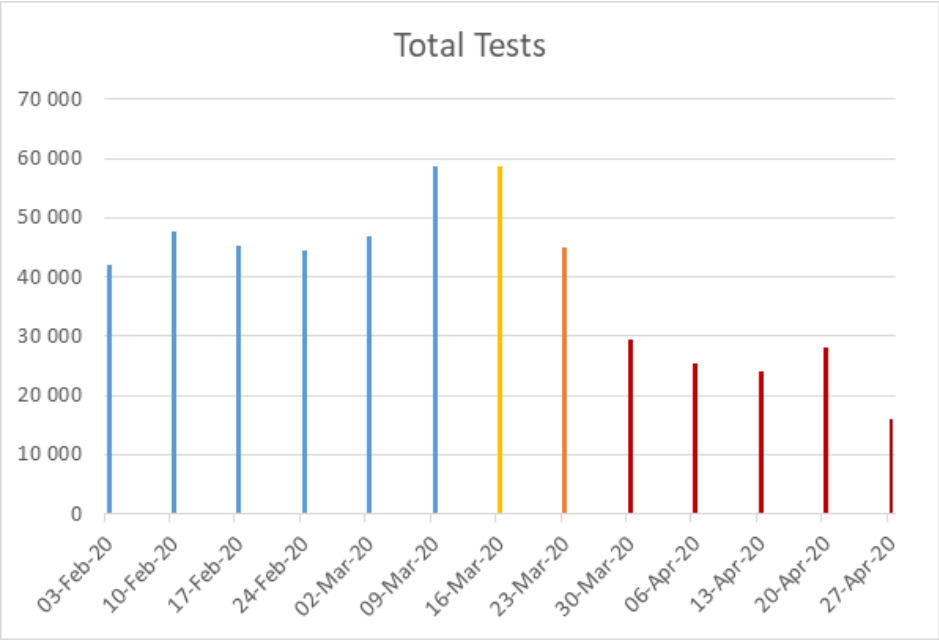


Figure 3. Weekly testing volumes stratified by social distancing intervention.

CONCLUSION

The COVID-19 level 5 restrictions has resulted in a ~ 48% average weekly decrease in TB Xpert testing volumes while, the number of TB positive declined by 33%. The relative difference resulted in a higher weekly positivity rate during the lockdown period. These unintended consequences will have a negative impact on efforts to control TB which remains the leading infectious disease cause of death in South Africa currently[7].

The dramatic declines in tests conducted for TB investigations are not explained by reduced testing capacity nor health service availability for TB as these were available and operational during the intervention period. The primary factor is restrictions introduced limiting movement and thereby access to services. During the lockdown period availability of public transport was severely limited. Individual motivation to seek care is another factor in the face of the restrictions and it is possible that only those more with advanced TB would seek care. This may explain the increase in positivity during the lockdown period.

The implications of undiagnosed TB are serious and will compromise past successes in reducing the burden and mortality associated with TB and DR-TB. As both TB and COVID-19 share similar clinical presentation (cough, fever, shortness of breath etc.) and are transmitted through respiratory droplets and aerosols, a combined strategy needs to be applied. This would utilise resources effectively while providing both short term and long term benefits.

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Data Source

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