

Press Release: For Immediate Release

Issued by: Water Research Commission

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Heading: **Sewage testing gives advanced warning of the 3rd Wave in South Africa**

Water Research Commission (WRC) data confirms the third wave 3 weeks in advance and demonstrates the early warning capabilities of Wastewater Based surveillance of Covid-19.

In line with the global response to the COV 19, WRC led the South African initiative towards development of a robust SARS COV-2 WBE platform and launched the South African National initiative in partnership with SALGA in May 2020. Based on an accelerated science and development platform, it was essential to develop and validate the techniques and methodologies to be used through a series of proof-of-concept studies. The WRC initiated studies supported by those of SACCESS, have shown that SARS-CoV-2 RNA was detected in 98% of wastewater samples collected. This confirmed and demonstrated the power of wastewater surveillance of the SARS-CoV-2 virus responsible for COVID-19 and has demonstrated the proof of concept.

To constrain this fast-spreading pandemic of COVID-19, speed was essential. Preparedness measures must outpace the pace of transmission if the battle was to be won. One key measure is to rapidly identify infected people so they can be quarantined and treated. Due to resource limitations, developing countries like South Africa may not be able to afford or implement mass-screening programmes to uncover new infections. This will become a huge challenge as the pandemic peaks and more intervention is required.

To date, the wastewater-based epidemiology approach has been successfully scaled up as a national intervention in many developed countries where there is wide coverage of waterborne sanitation, such as the Netherlands, Turkey, United States of America, etc. However, given the varied water and sanitation services delivery mechanisms in South Africa (and lack of), a unique position to pioneer the development and piloting of an all-encompassing water and sanitation-focused approach for the surveillance of COVID-19 spread in serviced and in less serviced communities was needed. Risk hotspot mapping has proven to be an effective preparedness strategy in previous complex and dynamic extreme disaster events. This approach is now being replicated in an epidemiological risk context and adopted by most of the affected countries. It allows the countries to visualize COVID-19 incidences through timelines in specific geographical locations. The identification of dynamic risk hotspots allows countries to facilitate critical, risk-informed interventions that suppress the exponential spread of the virus. The COVID-19 pandemic poses wide-ranging challenges ranging from the need of early-detection to preventive actions such as containment and isolation. Rapid action is vital to outpace COVID-19.

The Durban University of Technology WBE COV 19 programme being supported by the WRC, in partnership with eThekweni Municipality and Umgeni Water is one which has made an important breakthrough. DUT has been monitoring treatment plants in the Durban area since July 2020. More specifically, the Central Wastewater Treatment Plant serving a large number of suburbs (nearly 61 including the CBD) is used as a case study. The continued monitoring has resulted in significant findings and confirmed some of the early positions of the WBE initiative as presented below:

- Detection and quantification of the N2 gene within the SARS-CoV-2 genome has been ongoing at the head of works at Central Wastewater Treatment Plant (CWWTP) since July 2020
- The number of active clinical cases in KZN and eThekweni Municipality has been increasing steadily since 20 April 2021 (Figure 2)
- Wastewater surveillance revealed an increase in (SARS-CoV-2) copy numbers as early as 30 March 2021- 3 weeks before reported clinical cases (Figure 3)
- Previous, and current data indicate that the easing of lockdown restrictions (level 3 to level 1) contributes significantly to the increased viral loads in wastewater (Figure 4)
- The number of active clinical cases in April/May 2021 is significantly lower when compared to February 2021 despite the viral loads in wastewater being almost the same (Figure 4)- suggesting that there may be a greater number of infected individuals within the population than what is being reported currently for eThekweni

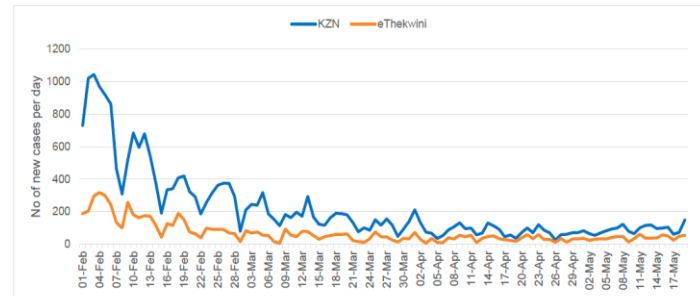


Figure 1: Number of new clinical cases per day in KZN and eThekweni Municipality (Feb – May 2021)

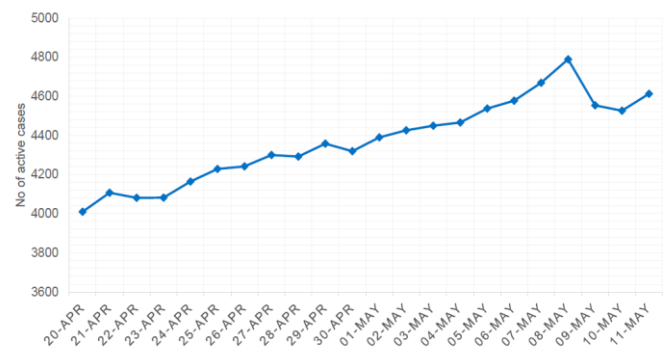


Figure 2: Number of active clinical cases in KZN (April – May 2021)

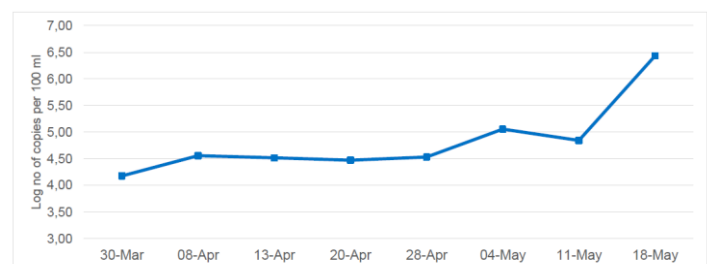


Figure 3: Increase in SARS-CoV-2 viral load in wastewater (March – May 2021)



Figure 4: Monitoring of SARS-CoV-2 at CWWTP by IWWT (January – May 2021)

- There has been a significant increase in SARS-CoV-2 copy numbers in wastewater (Table 1 and Figure 3) observed over the last 4 weeks (28 April 2021 – 18 May 2021) indicating that a spike in clinical cases in the coming weeks is imminent – and requires urgent attention from the relevant authorities.

Table 1: Quantification of SARS-CoV-2 viral load in wastewater (March – May 2021)

Date	Copies per 100 ml of wastewater
30 March	15100
08 April	36300
13 April	33000
20 April	29872
28 April	34112
04 May	117000
11 May	70000
18 May	2710000

The most first important finding from the interpretation of the data and information confirms that Wastewater Based Epidemiological Surveillance is an a cost effective means of providing an early warning of the spread and increase in infections. In the above case the signals in the wastewater of the increases already has a 3 weeks lead before the clinical cases were starting to increase and be reported.

The second important finding is the increase in the viral loads or increase in the amplification of the RNA signal offers a very effective signal on the increases in infections, as it is able to capture the asymptomatic cases as well which form a pathway for the spread of infections.

This progress has demonstrated the importance and effectiveness of WBE surveillance and why it needs to be escalated at a national level in the fight of this pandemic, but also in the future be used to determine the impact of the large rollout of vaccinations in the country.

COV-19 is an issue of national security and wastewater-based epidemiology contributes to the aspect of security. Vaccines and other interventions are more immediate, however WBE plays a longer-term role as well in tracking the virus and tracking any future waves.

South Africa needs to invest and establish such platform because of its diversity and inequity. It will offer a longer term and cost-effective measure to manage the spread of the virus in schools, universities, large mining and industrial sites and settlements.

End.

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