



# HEALTH INNOVATION: DIAGNOSTICS, TESTING AND TRACKING IN THE AGE DNA OF BIG DATA

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science & innovation

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Science and Innovation  
REPUBLIC OF SOUTH AFRICA

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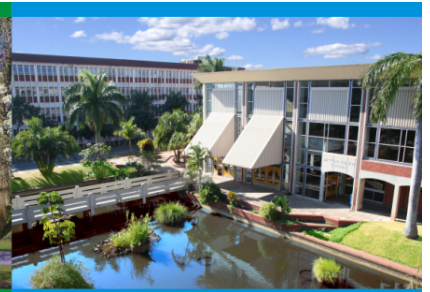
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NELSON R MANDELA SCHOOL OF MEDICINE



PIETERMARITZBURG CAMPUS



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UKZN INSPIRING GREATNESS

# qPCR diagnostic to support NHLS



Nelson R Mandela School of Medicine, UKZN

## - KRISP, CAPRISA and AHRI in KZN

Testing over 1,000 extra samples a day with turn-around time of < 12 hours

## - CPGR, UCT (CIDR), UCT (SATVI) in WC

Testing over 2,000 extra samples a day with turn-around time of < 24 hours

## - WITS, VIDA, iLEAD in GP

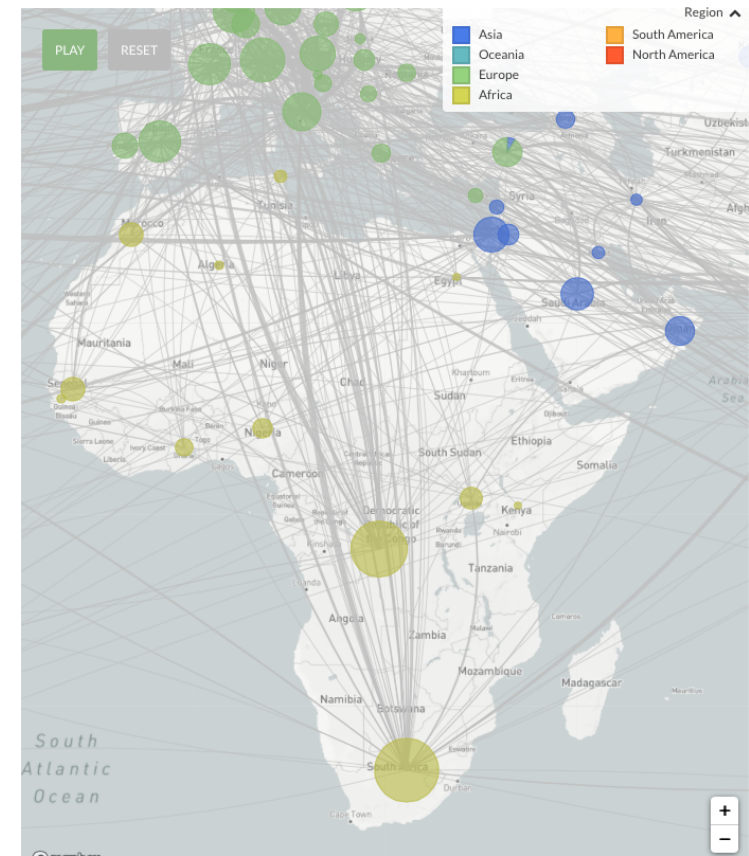
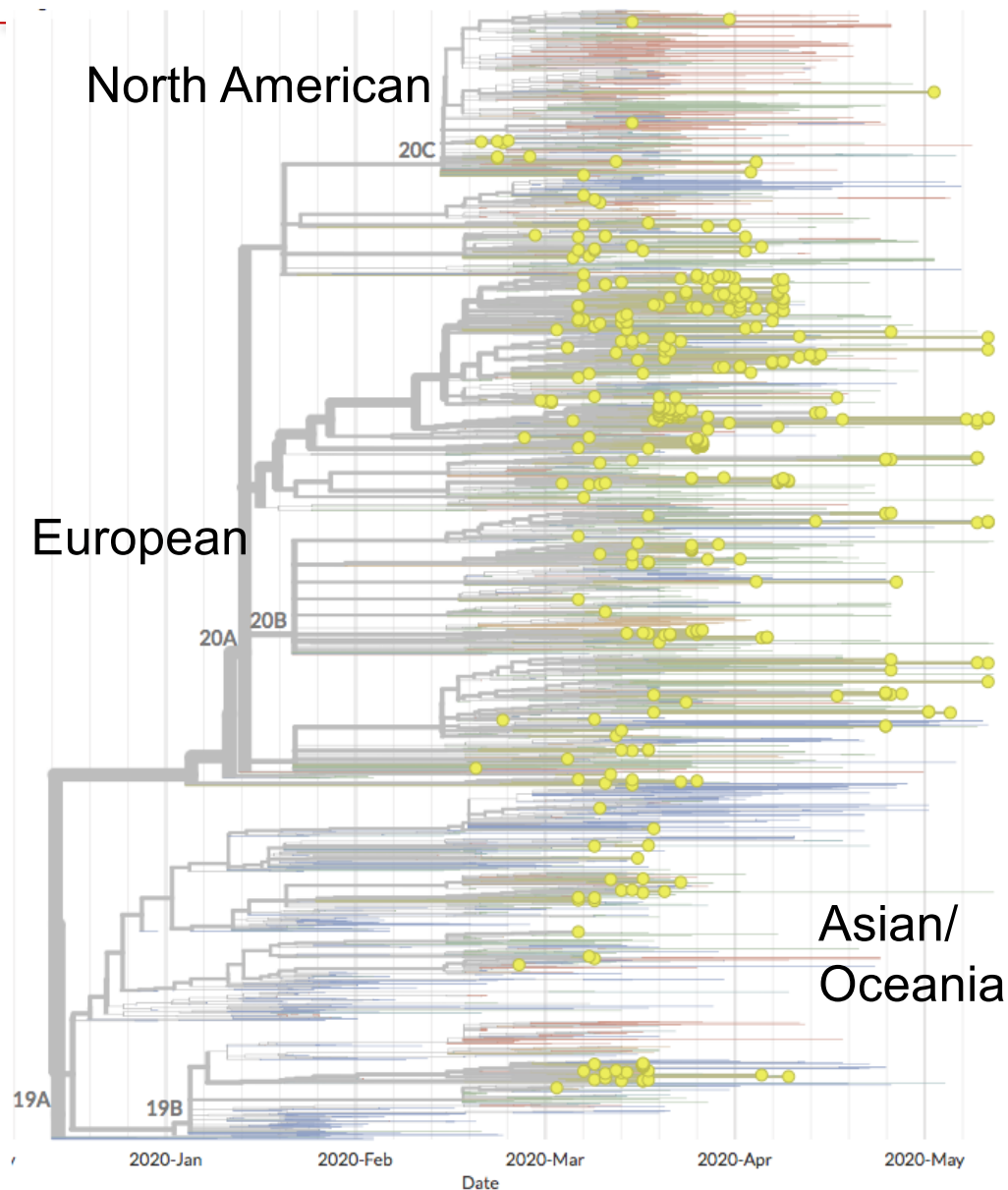
Testing over 2,000 extra samples a day with turn-around time of < 24 hours

Many other labs are also joining (e.g. ICGEB). Cost ZAR 469 per sample, which is half of the commercial labs.



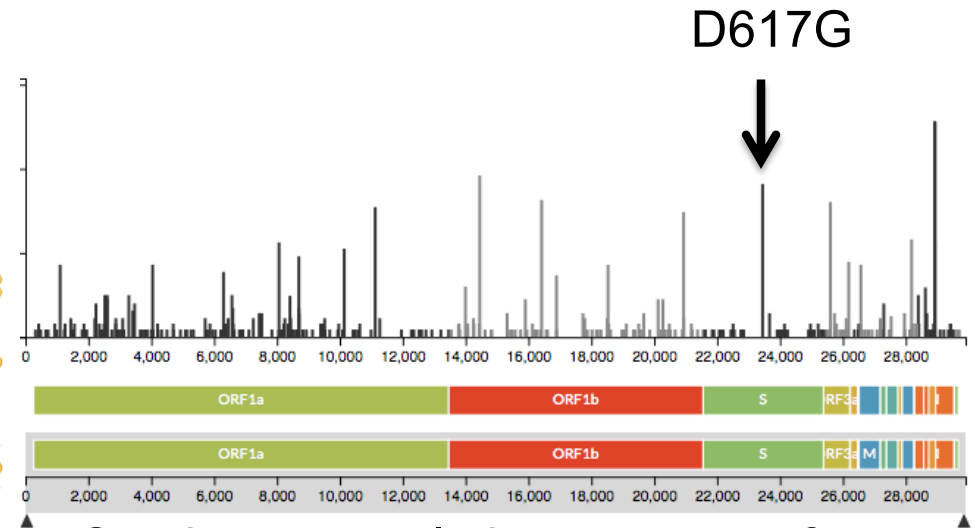
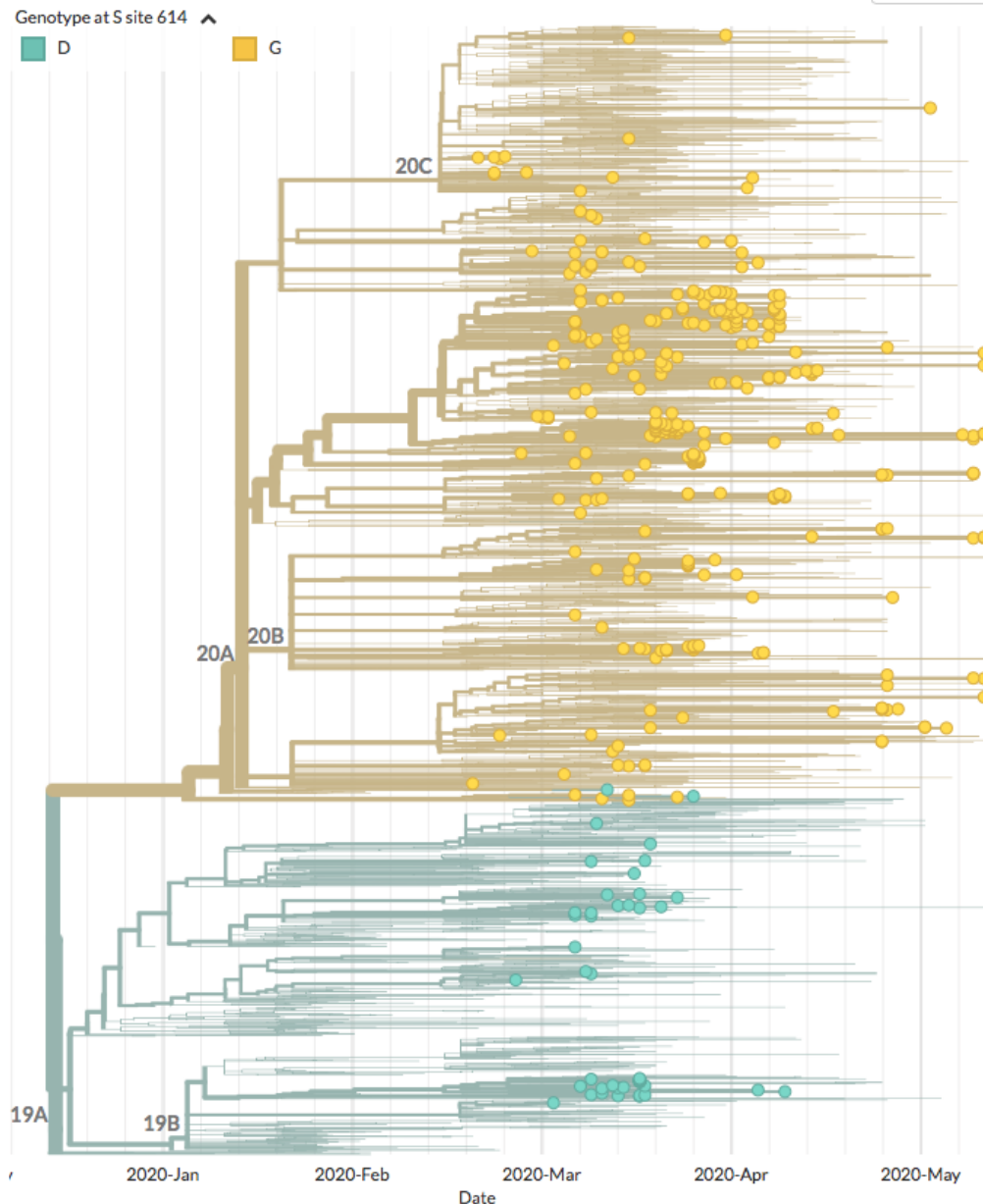
Lead by Prof Bavesh Kana and Dr Richard Gordon

# DNA sequencing to map viral diversity in Africa



1,100 sequences passed quality from GISAID.  
>350 introductions, >80% from Europe, but  
also introductions from Asia, Oceania and the  
Americas.

# DNA sequencing to map viral evolution for diagnostics, vaccine and therapy development.



Continuous evolution at a rate of 2 mutations per month.

Important to diagnostics, vaccine and therapy development.

> 500 genomes from South Africa.



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# KRISP's Scientific Diplomacy

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- WG 3 SARS-CoV-2 viral evolution.
- Handbook for SARS-CoV-2 DNA Sequencing.
- WHO forum for the AFRO and EMRO regions on SARS-CoV-2 genetic diversity.



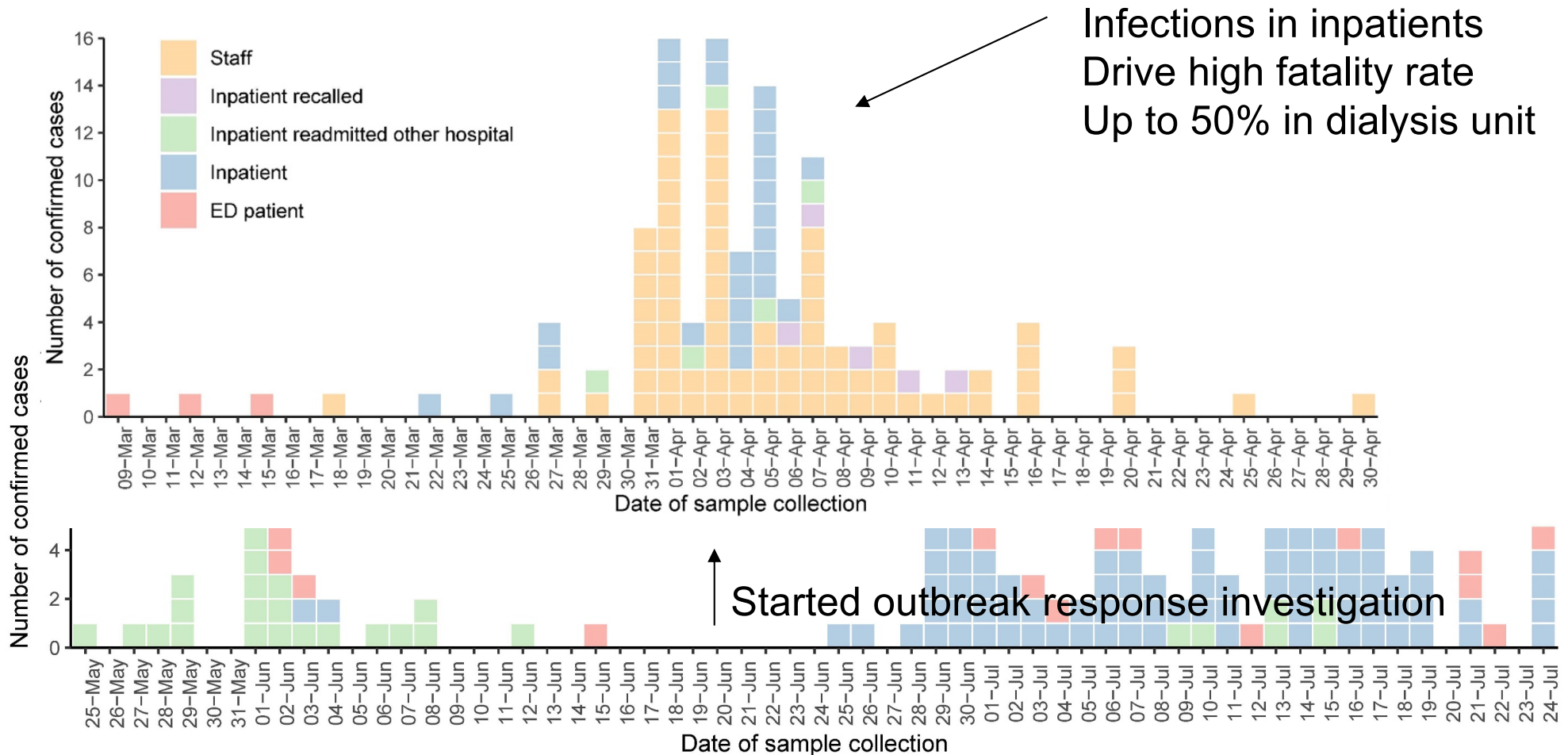
John N. Nkengasong, Sofonias Tessema et al.  
Accelerating genomics-based surveillance for  
COVID-19 response in Africa. *Lancet Microbe*,  
2020.



Nokukhanya Msomi, Koleka Mlisana et al.  
A genomics network established to respond  
rapidly to public health threats in South Africa.  
*Lancet Microbe*, 2020.



# Controlling outbreaks to save lives and protect health care workers

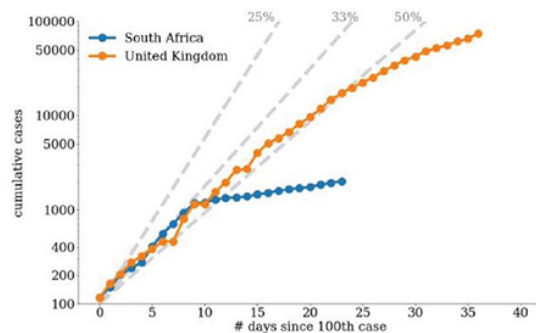


Study tells 'remarkable story' about COVID-19's through a South African hospital, Science, 9 May 2020 – Report used in 120 countries to prevent hospital infections

# Big data to follow SA trajectory

In the initial period of infection, both South Africa and the United Kingdom had similar trajectories in the rate of infection. However, after South Africa implemented the national lockdown, its trajectory changed drastically as compared to the UK.

**Covid-19 cases - SA vs UK**  
**SA's expected vs actual trajectory**

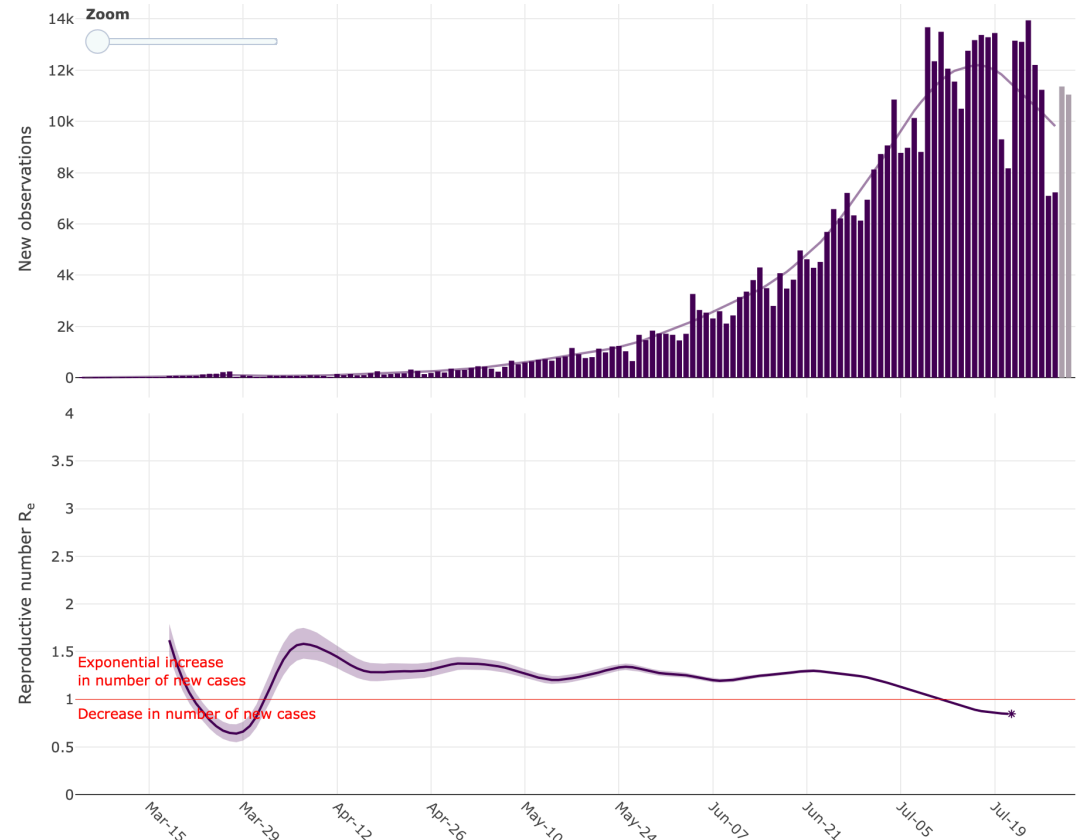


Learn more to Be READY for #COVID19:  
[www.sacoronavirus.co.za](http://www.sacoronavirus.co.za)

NICD Hotline: 0800 029 999  
WhatsApp 'Hi' to 0600 123 456



Early response

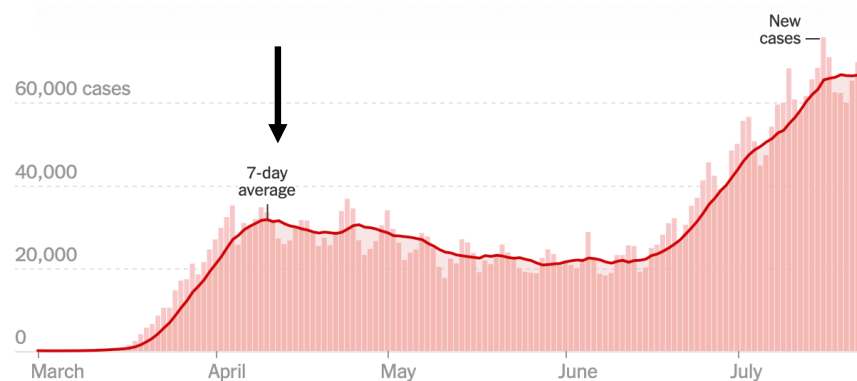


Today: First signs of peaking and  $R < 1$

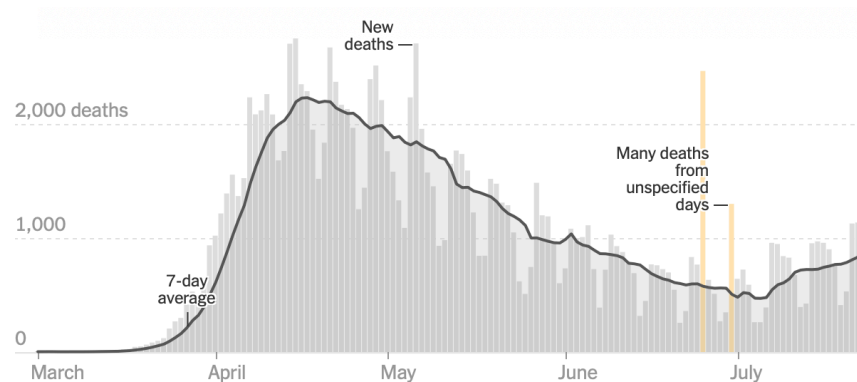
In collaboration with Prof. Salim Abdool Karim, Francesco Petruccione and Tanjs Stadler (ETH- Zurich)

# No time for complacency: Starking similarities between the pandemic in South Africa and United States

New reported cases by day in the United States

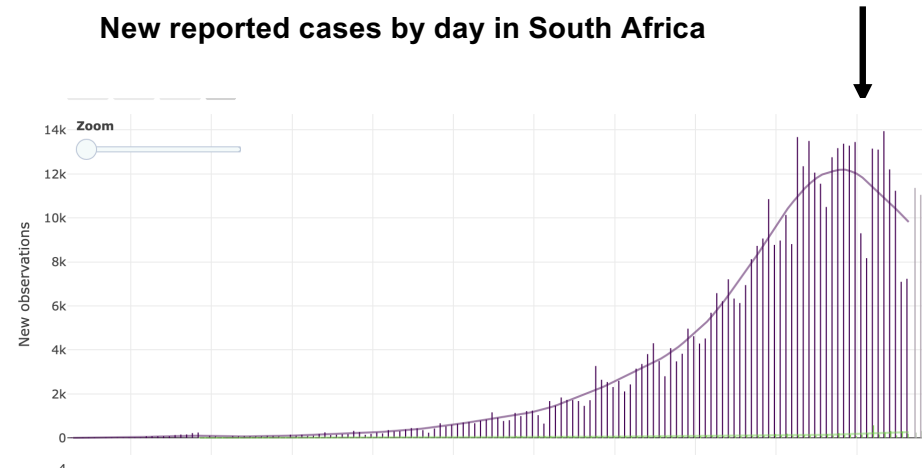


New reported deaths by day in the United States

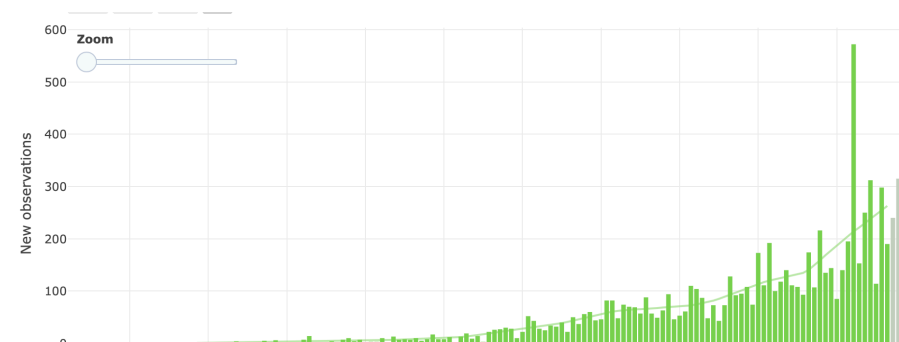


These are days with a data reporting anomaly. Read more [here](#).

New reported cases by day in South Africa



New reported deaths by day in South Africa



# Next Steps in Research, Diagnostic and Tracing collaboration



'Lab in a Box' – 2 weeks to construct inside a warehouse.

Laboratory for quick response: > 3,000 qPCR and 200 Viral Genomes a day (once COVID ends, it will be used for HIV, TB, Influenza and other pathogens).

Air freight to quickly access samples and bulk reagents in a special economic zone with premier air logistic platform & industrial zone to manufacture it...



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“A Luta continua, vitória é certa”

Together, public, business, government and scientific community will help us to win the fight against COVID-19 in Africa.