# Reflecting on COVID-19 response in South Africa


## Shabir A Madhi, MBBCH, FCPeds, PhD(Wits)

**Professor of Vaccinology, University of the Witwatersrand**

**Director: South African Medical Research Council Vaccines and Infectious Diseases Analytical Research Unit (VIDA).**

**Co-Director African Leadership in Vaccinology Expertise (ALIVE)**



**Acknowledgments: ZAPIRO (an unsung hero on providing the moral compass on Covid-19 and lots else)**

**Prof Jonny Myers (tireless generation of almost daily stats for 600 days)**

# Overview

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

- COVID-19 response in South Africa.
  - Impact on burden of Covid-19.
  - Indirect consequences of Covid-19 in South Africa.
- Covid-19 vaccine rollout in South Africa.
- Where to next for South Africa.

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VACCINES & INFECTIOUS DISEASES ANALYTICS

# South Africa embarks on most stringent lockdown globally, 27th March 2020

Fellow South Africans,

Our country finds itself confronted not only by a virus that has infected more than a quarter of a million people across the globe, but also by the prospects of a very deep economic recession that will cause businesses to close and many people to lose their jobs.

Therefore, as we marshal our every resource and our every energy to fight this epidemic, working together with business, we are putting in place measures to mitigate the economic impact both of this disease and of our economic response to it.

We are today announcing a set of interventions that will help to cushion our society from these economic difficulties.

We have learnt a great deal from the experiences of other countries.

Those countries that have acted swiftly and dramatically have been far more effective in controlling the spread of the disease.

As a consequence, the National Coronavirus Command Council has decided to enforce a nation-wide lockdown for 21 days with effect from midnight on Thursday 26 March.

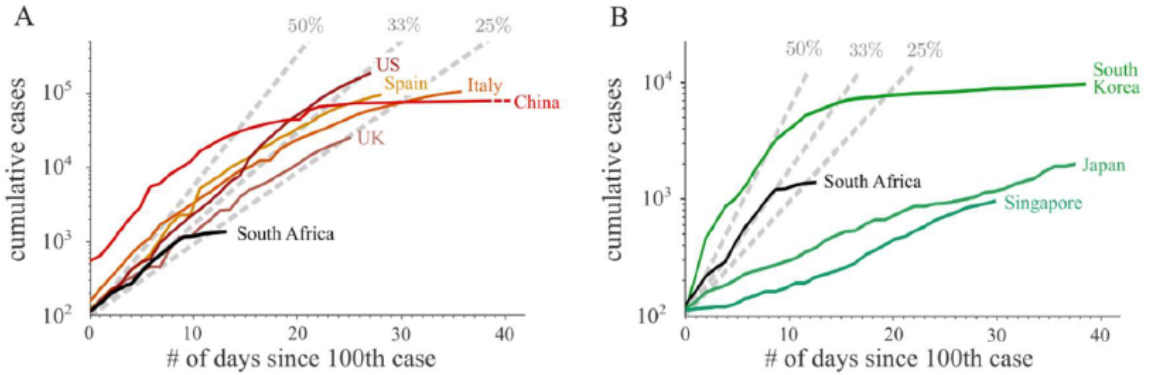
This is a decisive measure to save millions of South Africans from infection and save the lives of hundreds of thousands of people.

While this measure will have a considerable impact on people's livelihoods, on the life of our society and on our economy, the human cost of delaying this action would be far, far greater.

# Responding to an imminent threat - Covid-19 pandemic declaration.

# Early claims of victory and that the lockdown was "flattening the curve…..

## SA's epidemic trajectory is unique…




***Why is SA different - new cases declining to a plateau:***

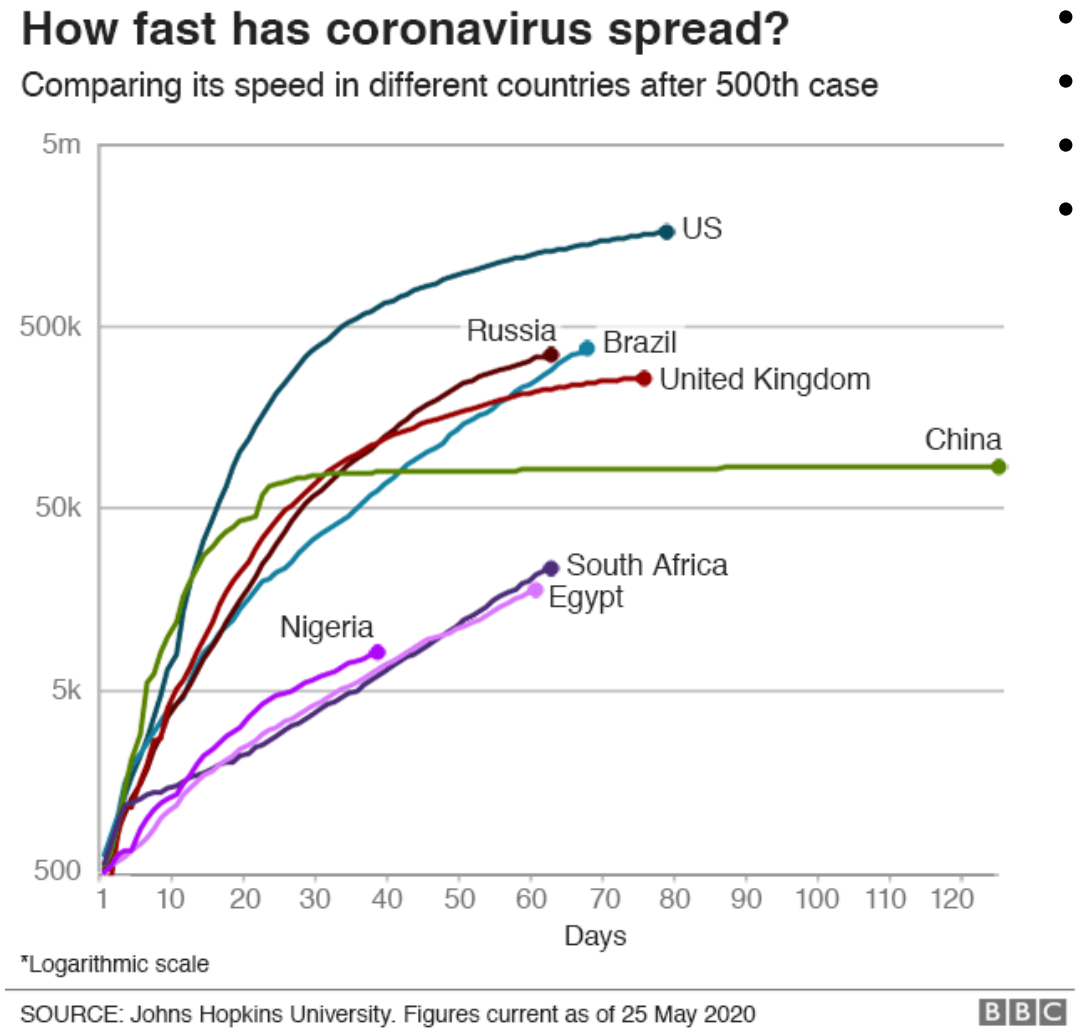
- **Are we missing cases due to low or declining testing coverage?**
- **Are there missing cases in poor communities due to skewed higher private lab testing?**
- **Is the reduction genuine and due to the interventions in SA's Covid-19 response?**

health
Department:
REPUBLIC OF SOUTH AFRICA

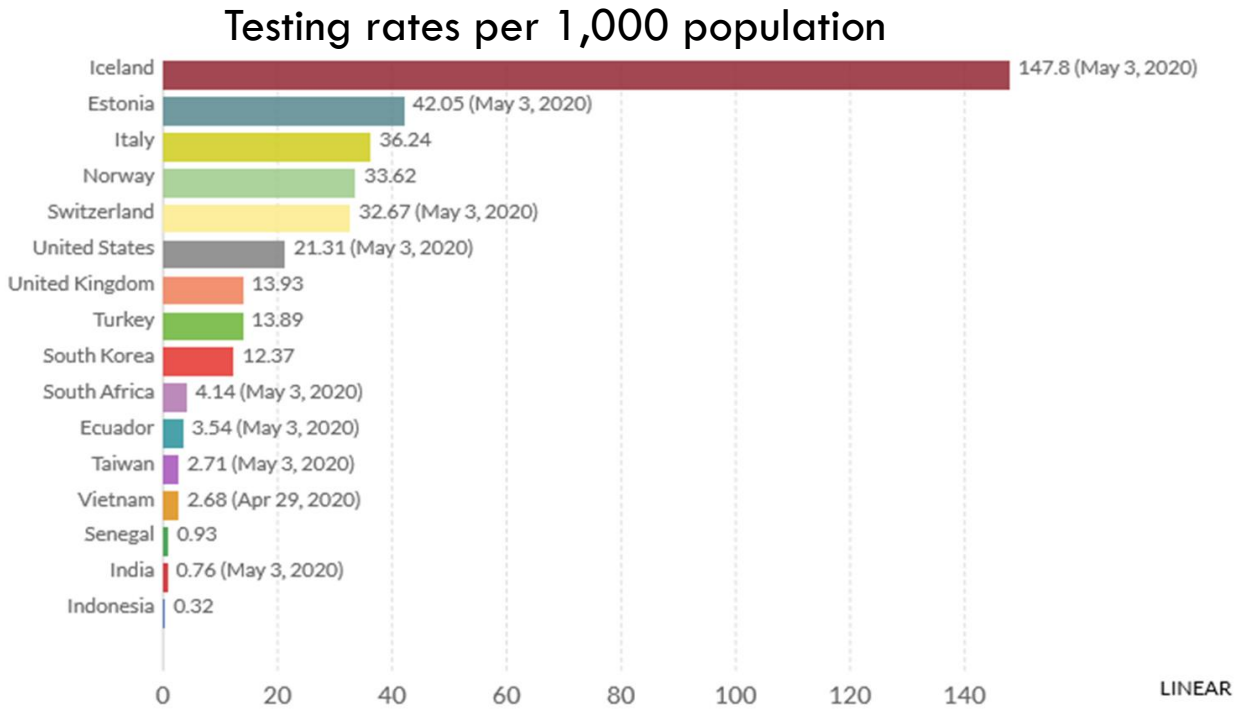
*Diagram source*: Tulio De' Oliviera & KZN CoV Big Data Consortium

CAPRISA

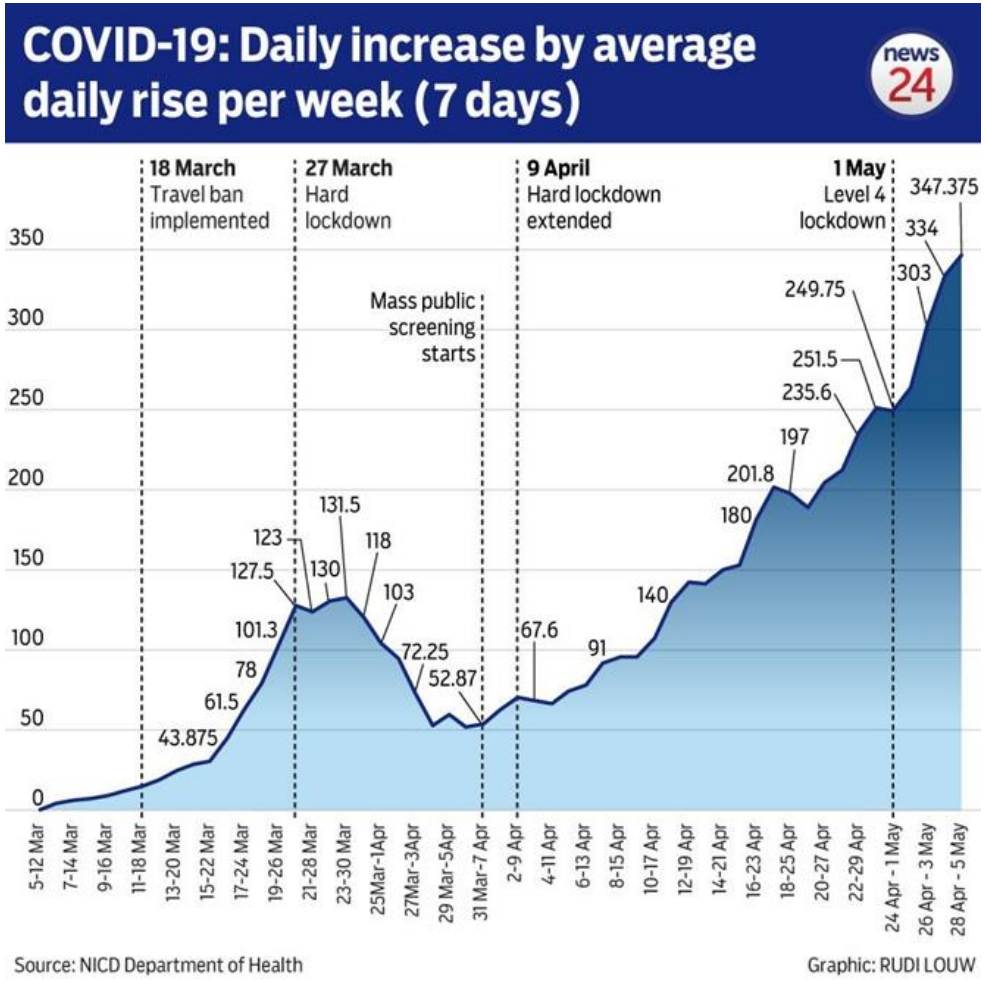
# The problematic comparison of trends in increase in number of cases between countries.

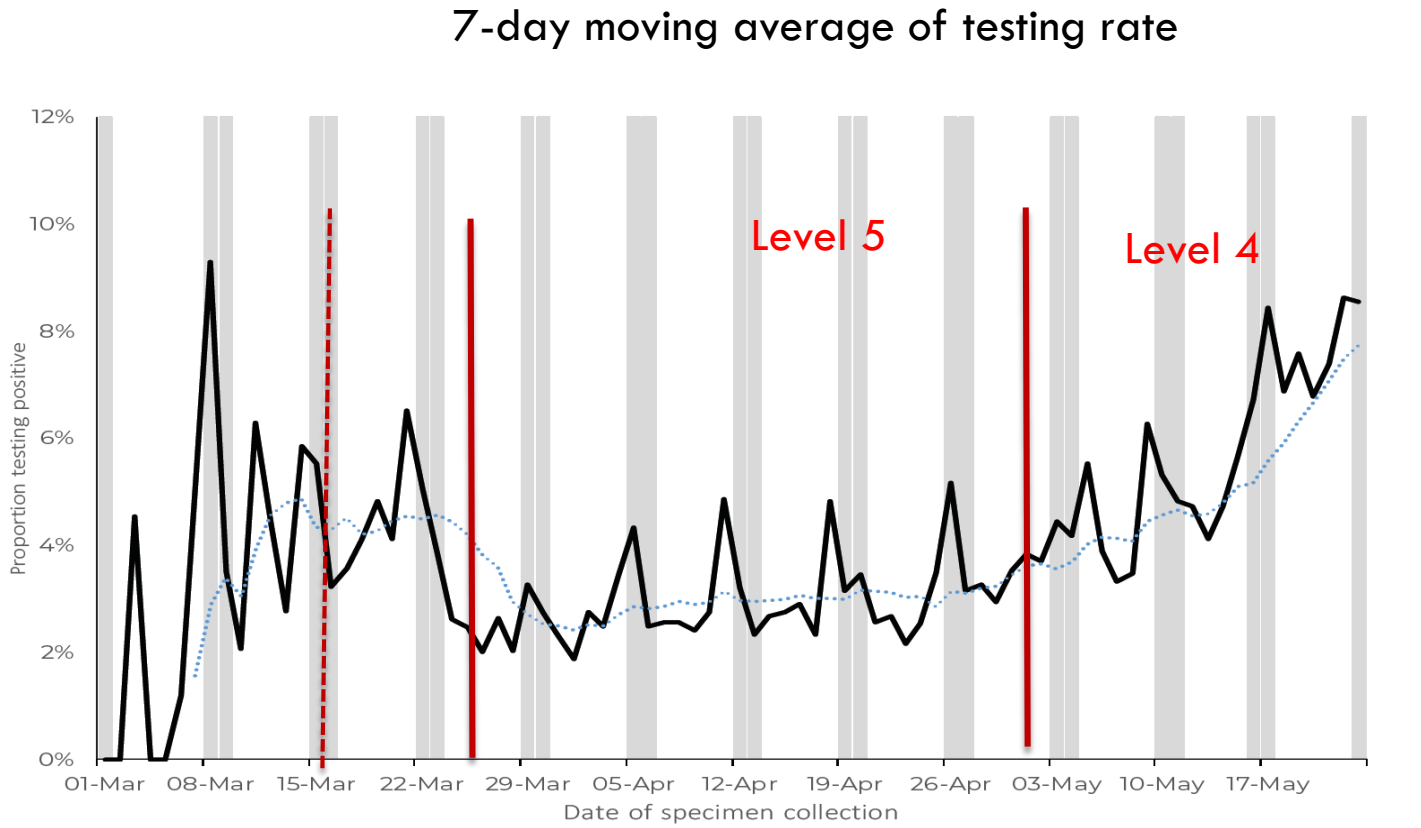



- Population size.
- Timing of seeding of virus and community transmission.
- Testing rate and testing capacity.
- Testing strategy underpinned by different objectives.



# 7-day moving average of testing in South Africa

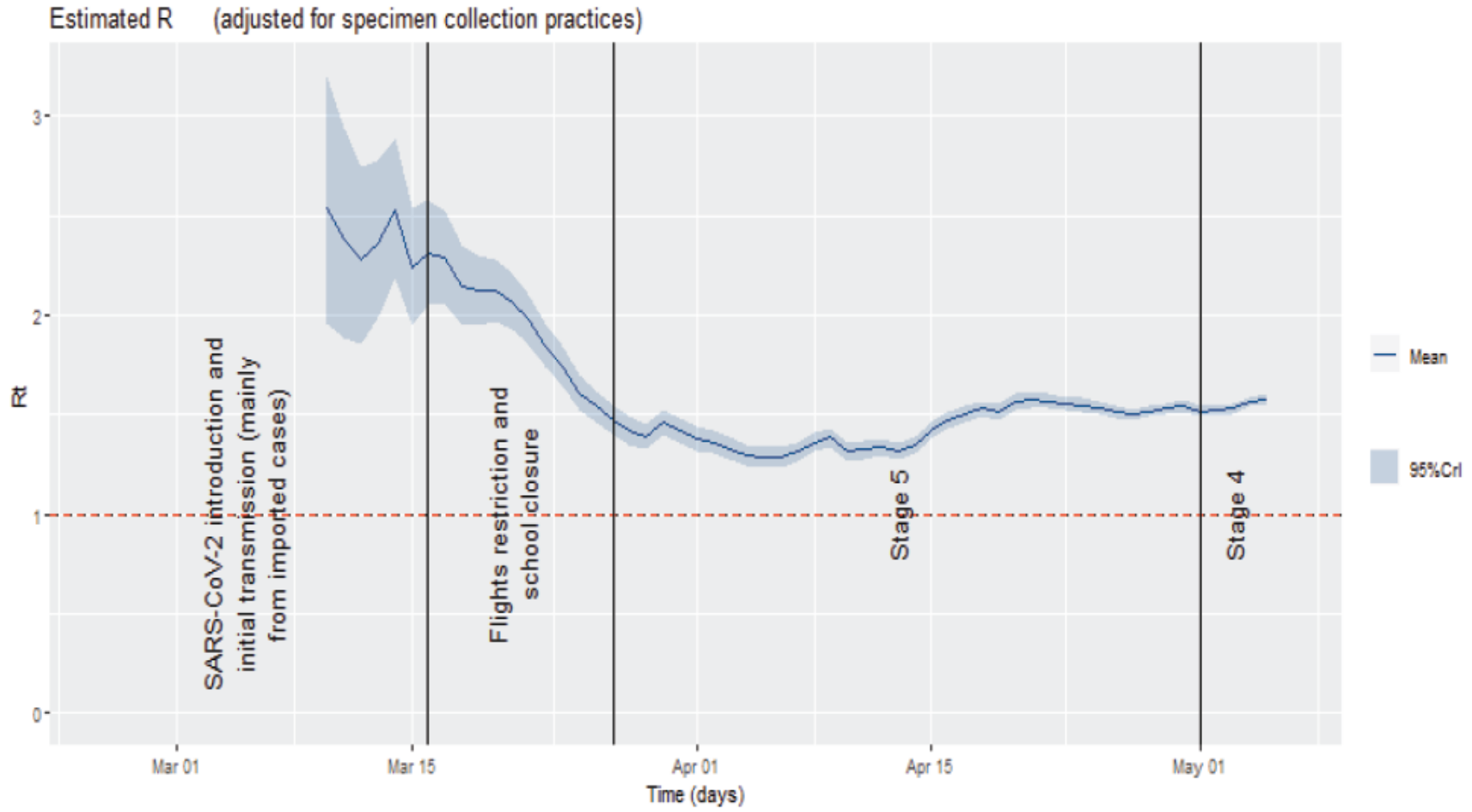



Source: NICD

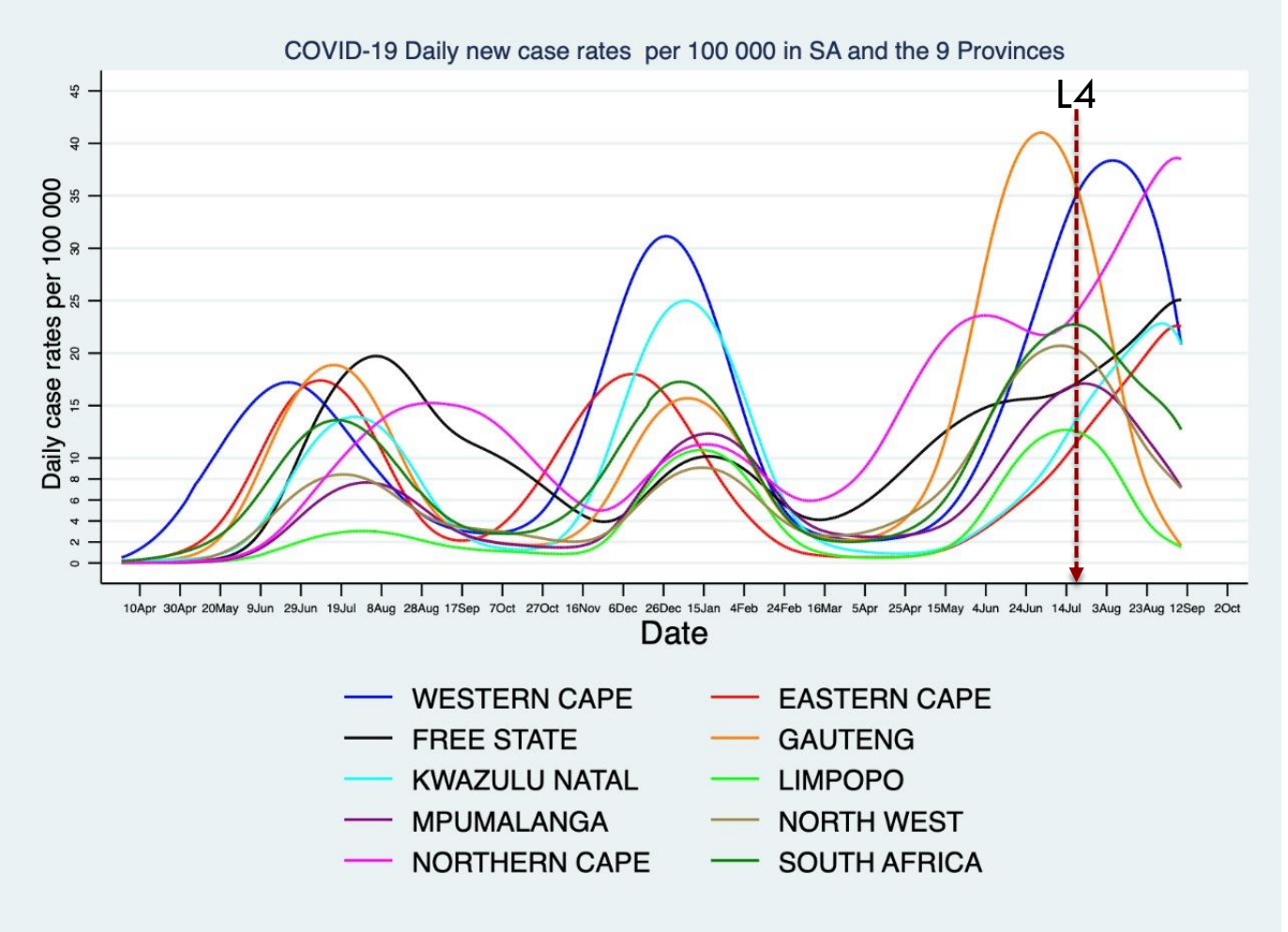
# Effective reproductive rate over time in SA.

**Adjusted for changes in testing rate, but NOT for testing strategy and who is targeted for testing.**




Effective reproductive rate =Ro x fraction of susceptible

# Covid-19 cases rates in South Africa and Provinces




Courtesy Jonny Myers

# Racial and economic class disparity in Covid-19 cases detection.

## Source: Gauteng City-Region Observatory

Figure 2: Percentage of respondents reporting COVID-19 in their household and respondents who tried to test for COVID-19 and were refused, by race. Data source: GCRO QoL 6 (2020/21).

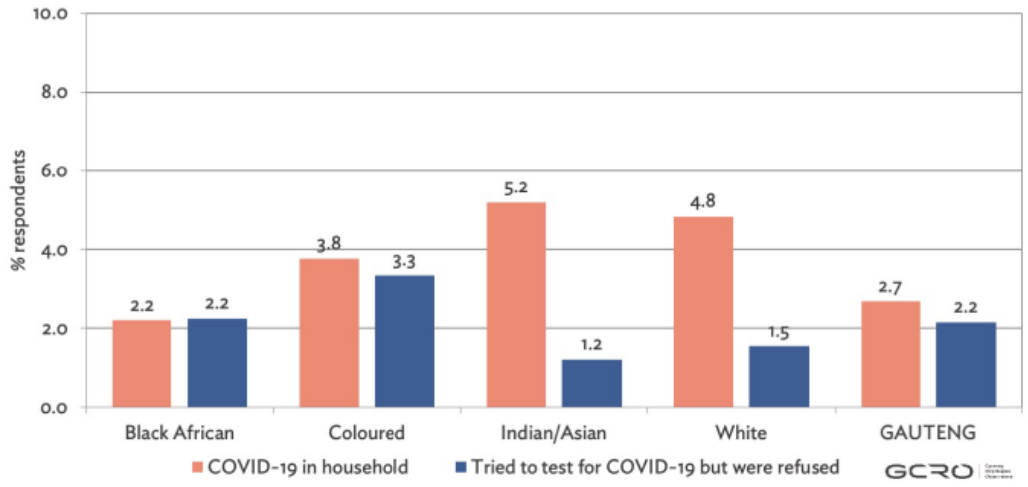
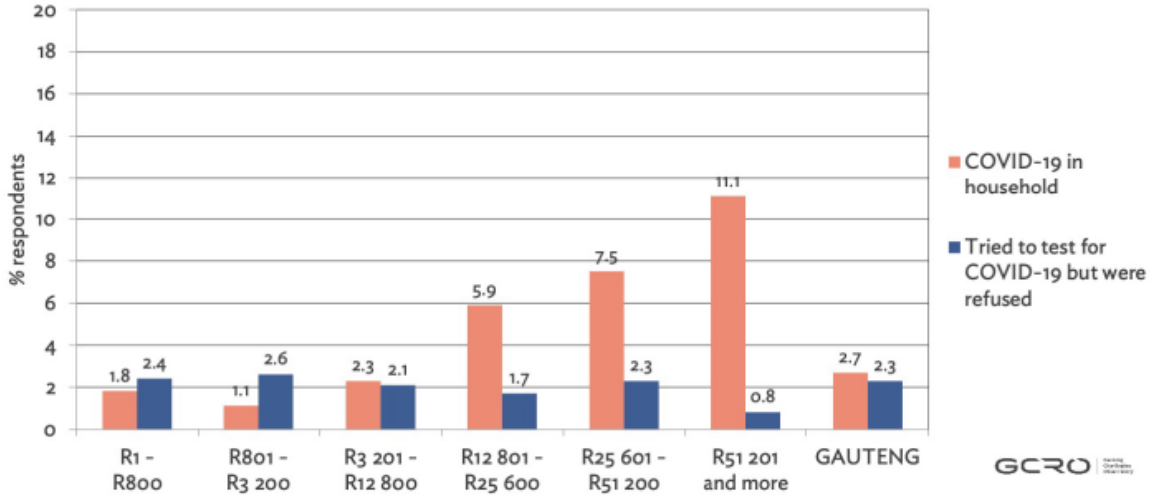



Figure 3: Percentage of respondents reporting COVID-19 in their households and respondents who tried to test for COVID-19 and were denied, by income group. Data source: GCRO QoL 6 (2020/21).

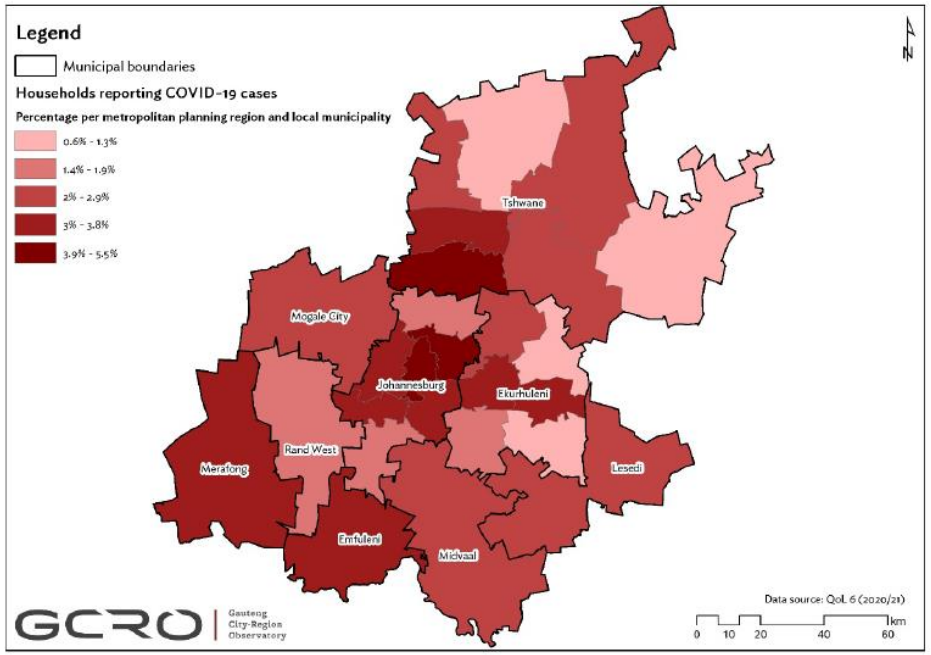



Maree, G., et al .Gauteng City-Region: Findings from the GCRO's Quality of Life Survey 6 (2020/21).
Data compilation as of May 2021.

# Reported Covid-19 cases and SARS-CoV-2 sero-prevalence by sub-district

## Report through to May 21

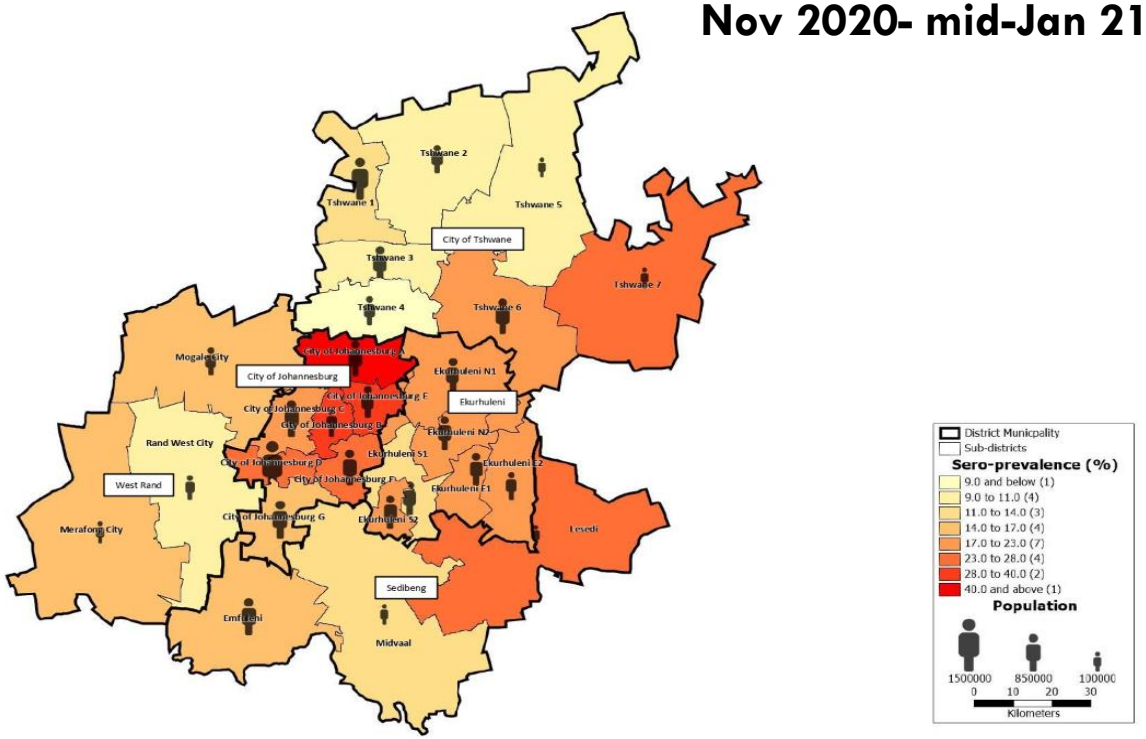
Figure 1: Map of Gauteng showing respondents reporting COVID-19 in their households, by metropolitan planning region and local municipality. Data source: GCRO QoL 6 (2020/21).




**2.7% reported Covid-19 in household**

**Source: Gauteng City-Region Observatory**

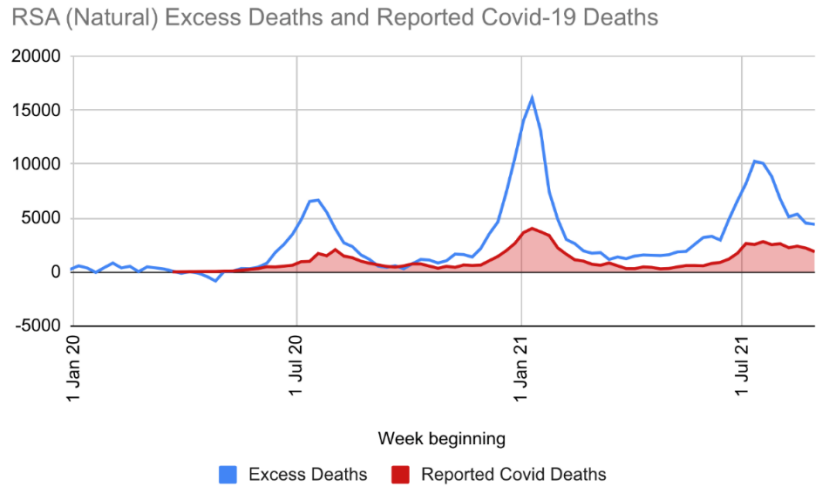
## Nov 2020- mid-Jan 21



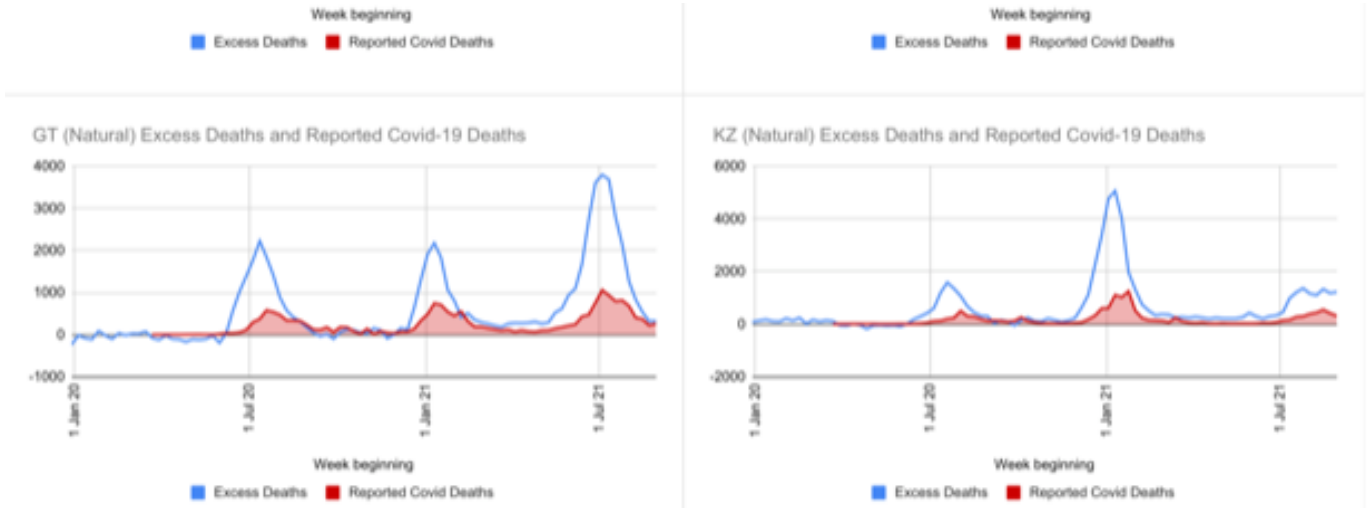

- **Sero-prevalence (19%) ranged between 5.5% (1.8-15.6) to 43.2% (95%CI:37.5-49.0) in sub-districts.**
- **Possible under-estimate re: waning of antibody.**

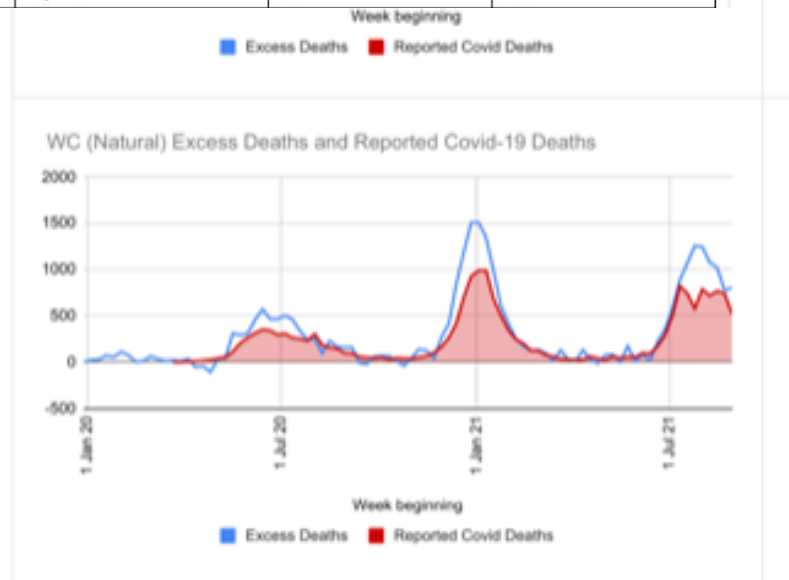
Mutevedzi P et al. Int J Infect Dis. In Press

# Covid-19 death rates in South Africa.




| Region | Excess deaths 3 May 2020 - 4 Sep 2021 | Excess deaths per 100,000 population | Age-standardised excess death rate per 100,000 population |
|---|---|---|---|
| South Africa | 253,813 | 426 | 426 |
| **Province** | | | |
| Eastern Cape | 40,502 | 615 | 496 |
| Free State | 14,138 | 486 | 486 |
| Gauteng | 54,512 | 349 | 384 |
| KwaZulu-Natal | 51,327 | 448 | 516 |
| Limpopo | 26,320 | 446 | 390 |
| Mpumalanga | 19,769 | 411 | 443 |
| Northern Cape | 6,434 | 550 | 514 |
| North West | 14,786 | 367 | 377 |
| Western Cape | 26,025 | 369 | 325 |

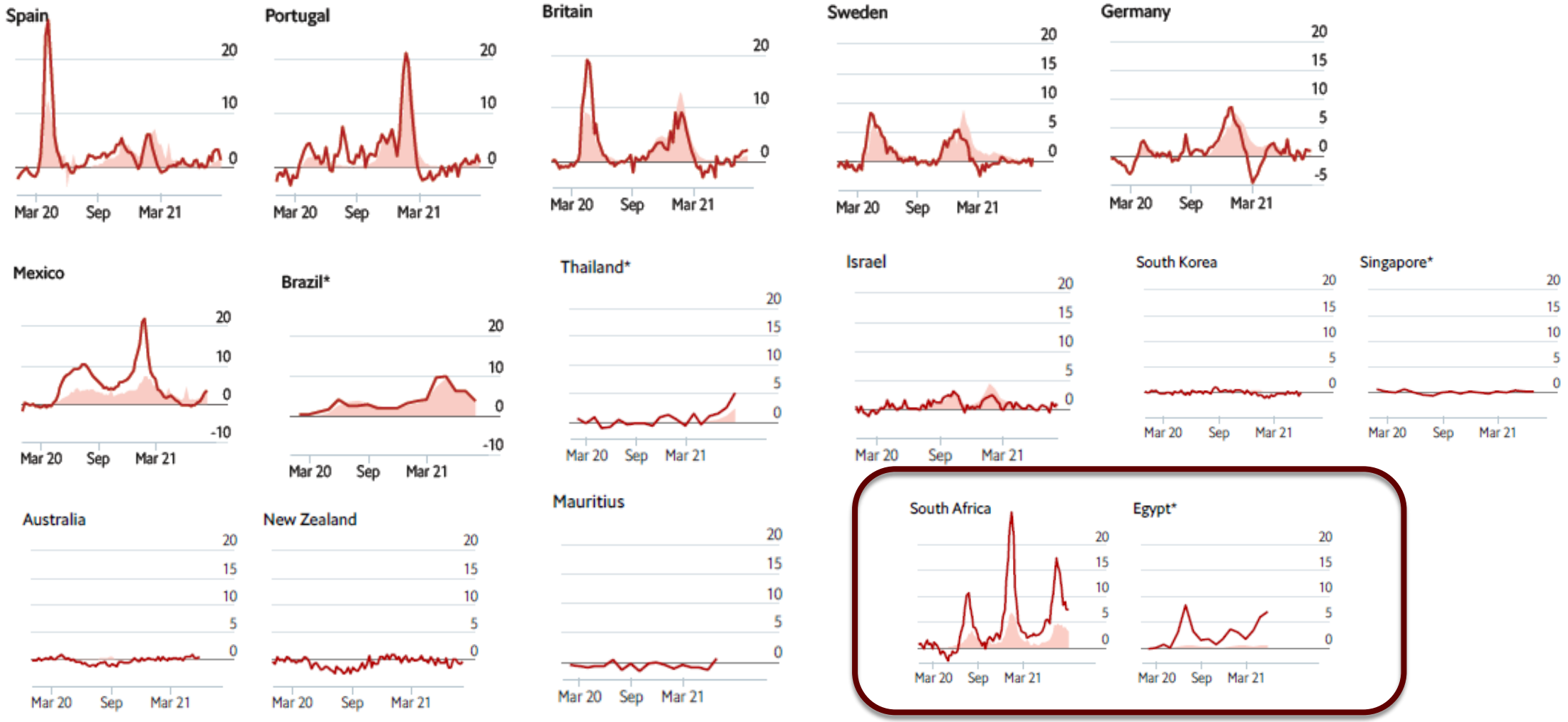



Source: South African Medical Research Council

# Recorded Covid-19 deaths and excess mortality trends

Source: The Economist



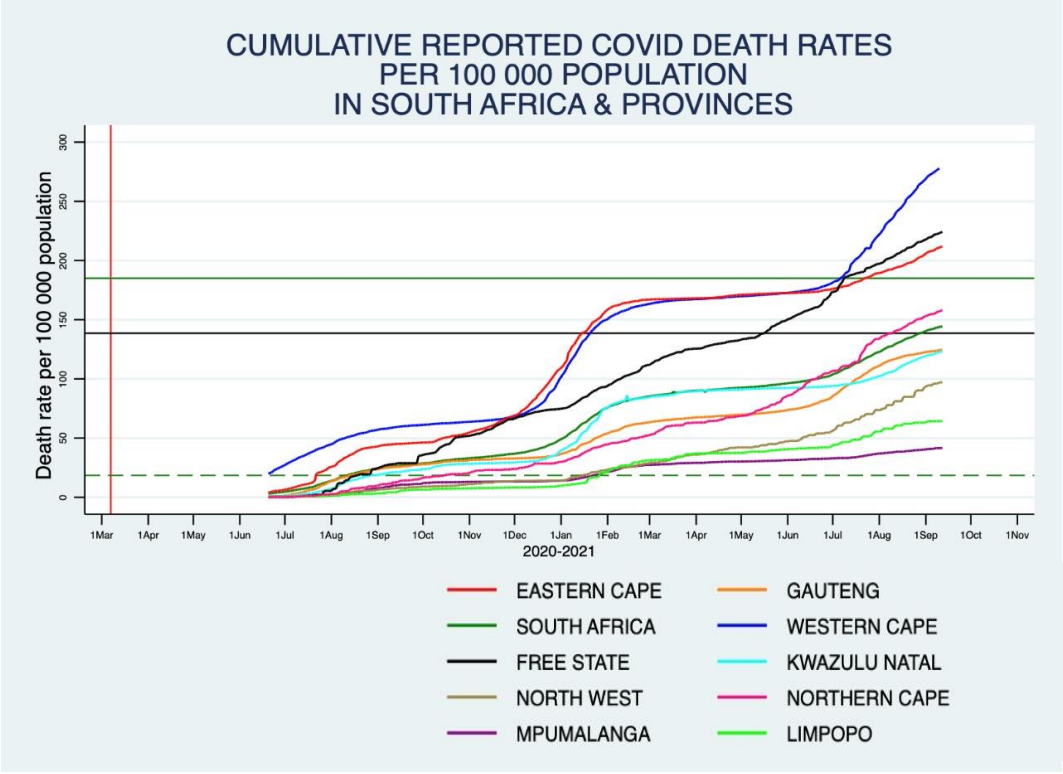
# Top 10 countries with the highest Covid-19 attributable death rate per 100,000 capita.

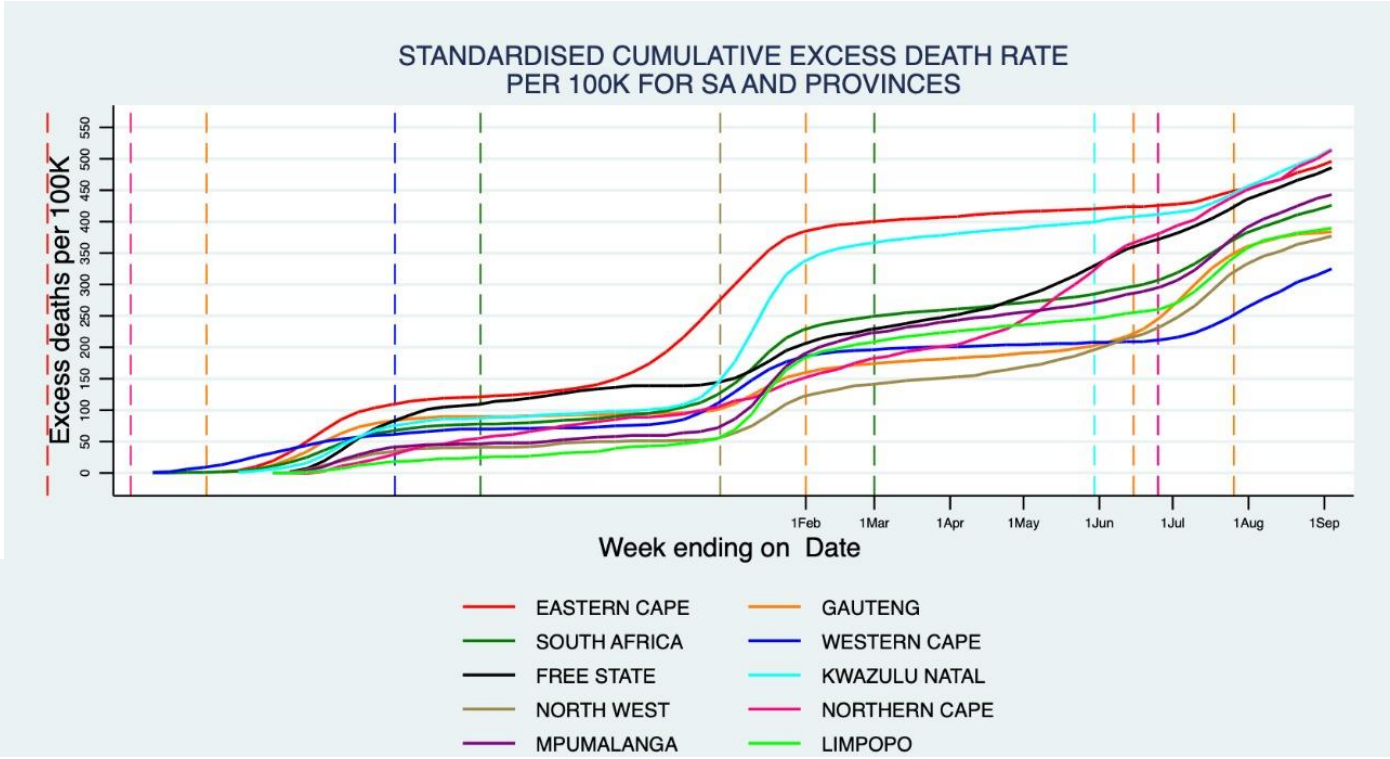
Source: The Economist

**Excess deaths since country's first 50 covid deaths**
Last updated on September 10th

| | COVID-19 DEATHS | EXCESS DEATHS | EXCESS DEATHS PER 100K |
|---|---|---|---|
| **Peru** Mar 23 2020- Sep 5 2021 | 198,450 | 194,570 | 593 |
| **Bulgaria** Apr 20 2020- Aug 29 2021 | 18,690 | 36,510 | 525 |
| **North Macedonia** Apr 1 2020- Jun 30 2021 | 5,480 | 10,470 | 504 |
| **Russia** Apr 1 2020- Jul 31 2021 | 155,940 | 652,070 | 446 |
| **Serbia** Apr 1 2020- Jul 31 2021 | 7,100 | 30,810 | 445 |
| **Moldova** Apr 1 2020- May 31 2021 | 6,100 | 11,050 | 419 |
| **Lithuania** May 25 2020- Aug 29 2021 | 4,490 | 11,510 | 412 |
| **South Africa** Apr 12 2020- Sep 4 2021 | 83,320 | 234,980 | 394 |
| **Paraguay** Aug 1 2020- Jul 31 2021 | 14,930 | 16,310 | 390 |
| **Mexico** Mar 30 2020- Aug 8 2021 | 244,400 | 485,980 | 386 |

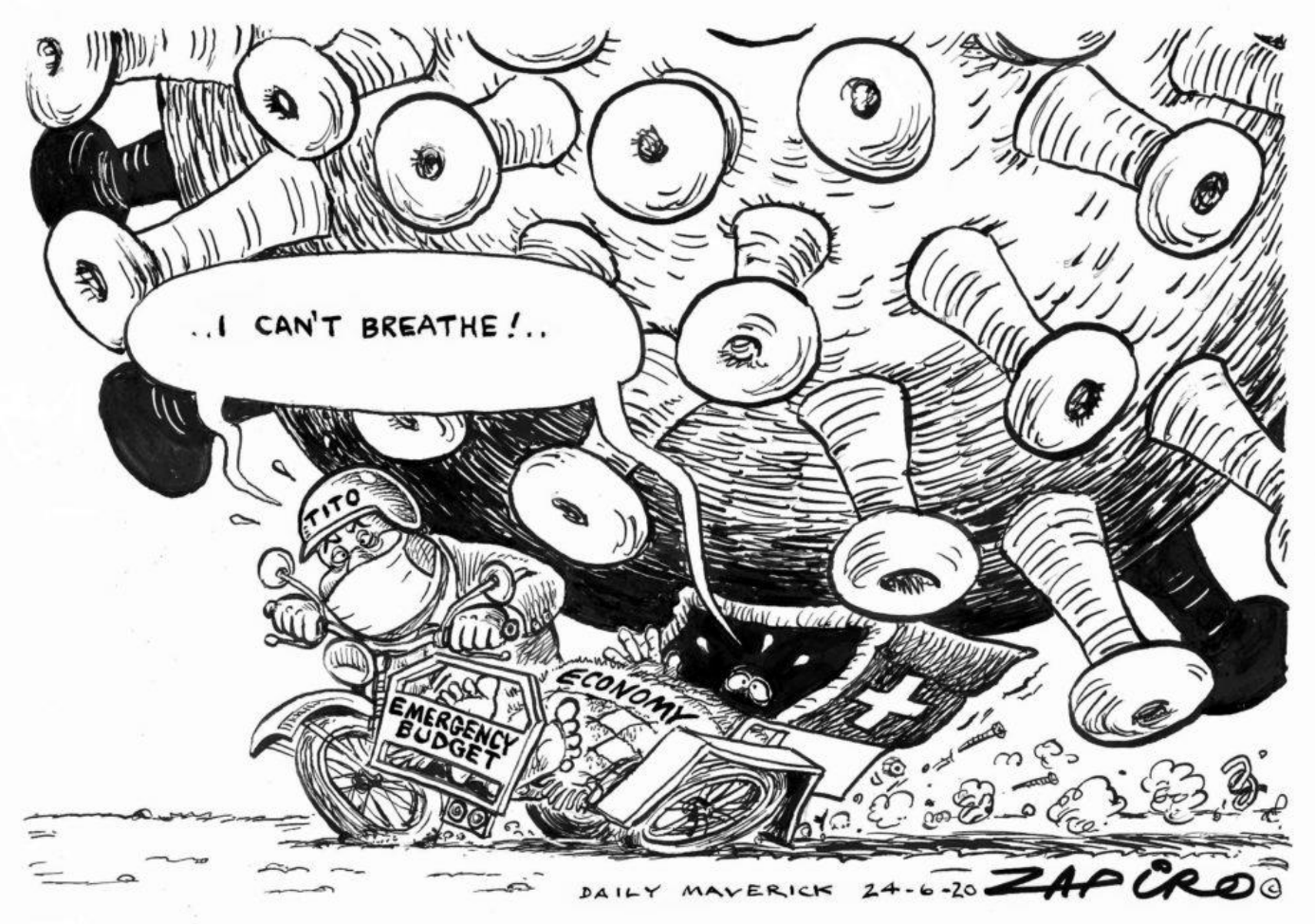
# Cumulative excess mortality data in South Africa.



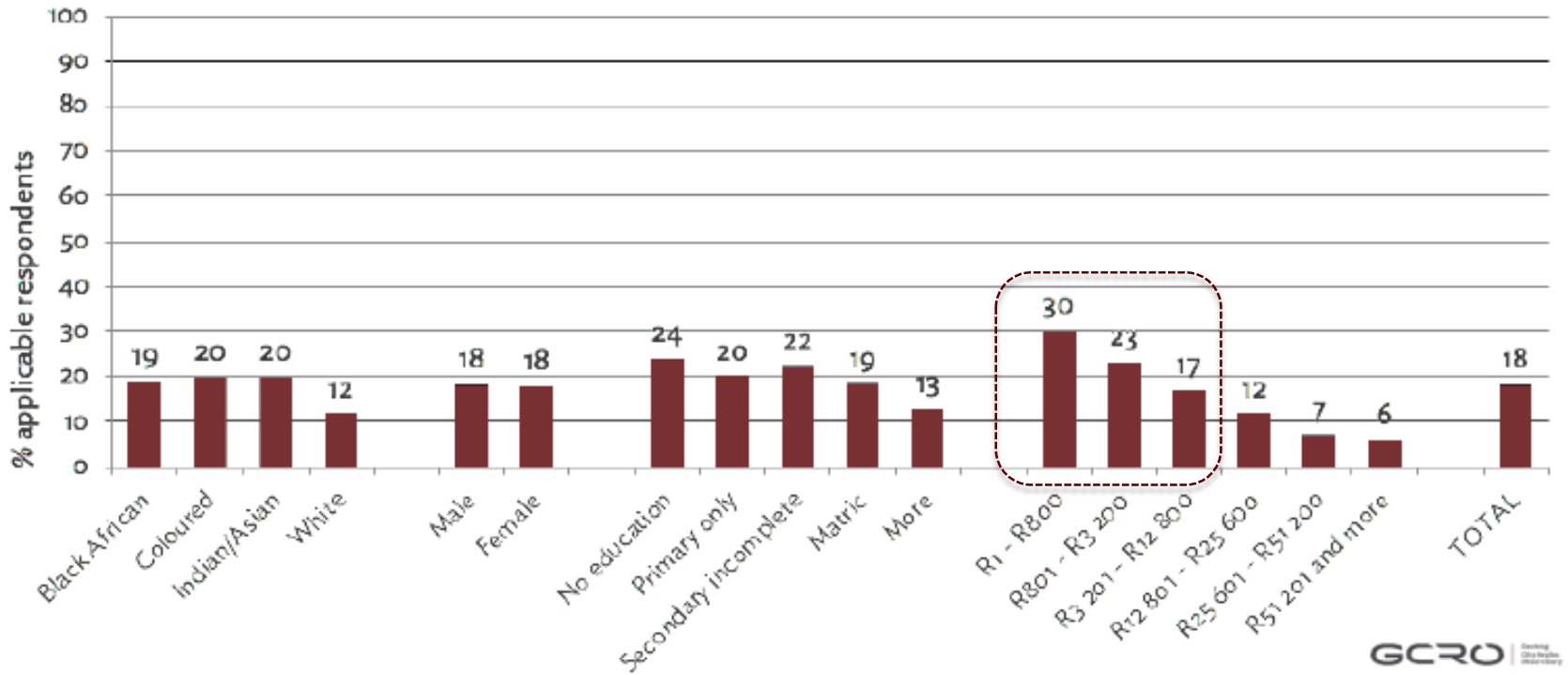

Courtesy Jonny Myers

# Covid-19 economic devastation in South Africa.



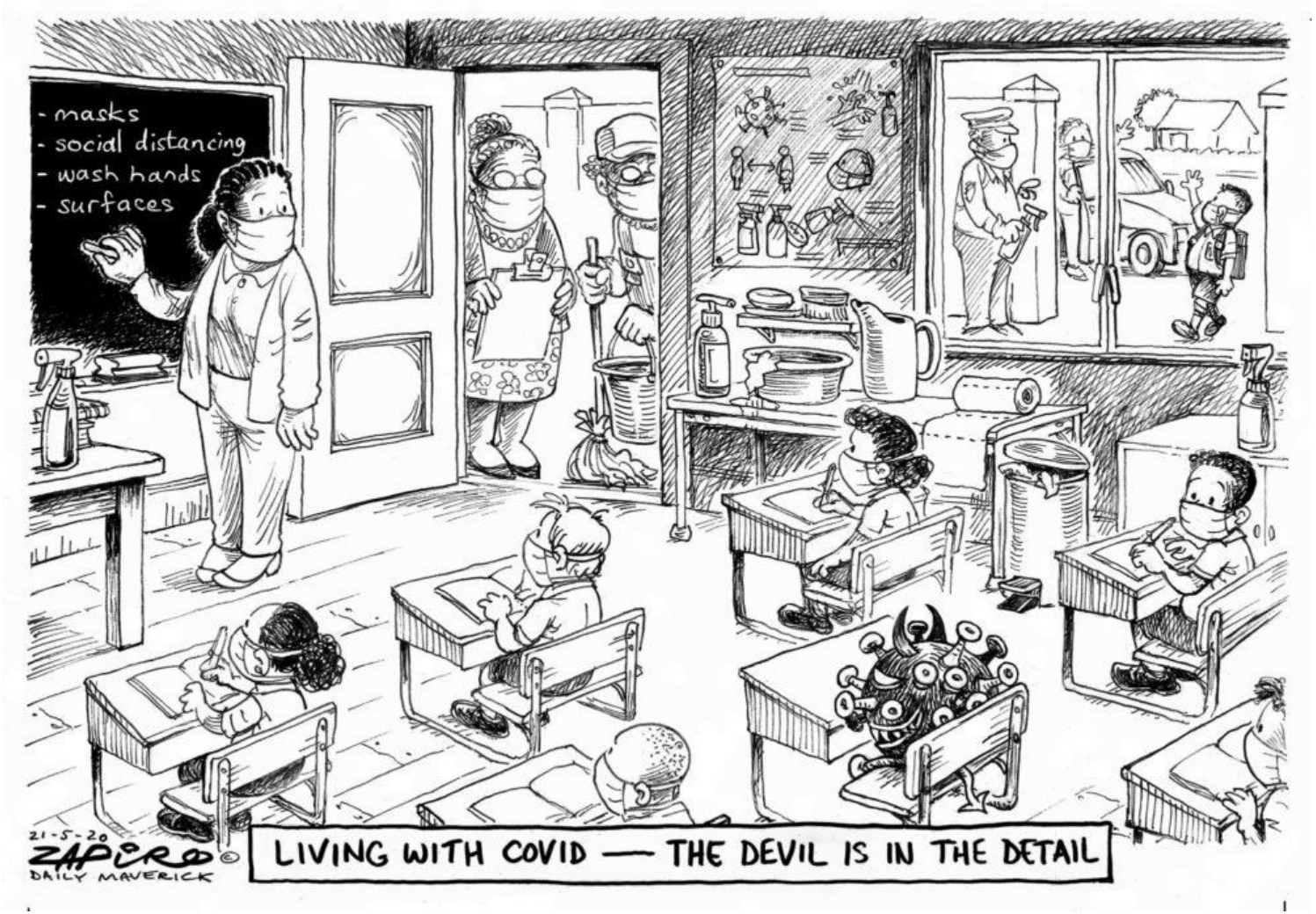
# Societal impact of Covid-19 responses in Gauteng.

Figure 18: Percentage of applicable respondents who lost a job since March 2020, by race, sex, education and income group. Data source: GCRO QoL 6 (2020/21).




Source: Gauteng City-Region Observatory

# Covid-19 and chid wellbeing.

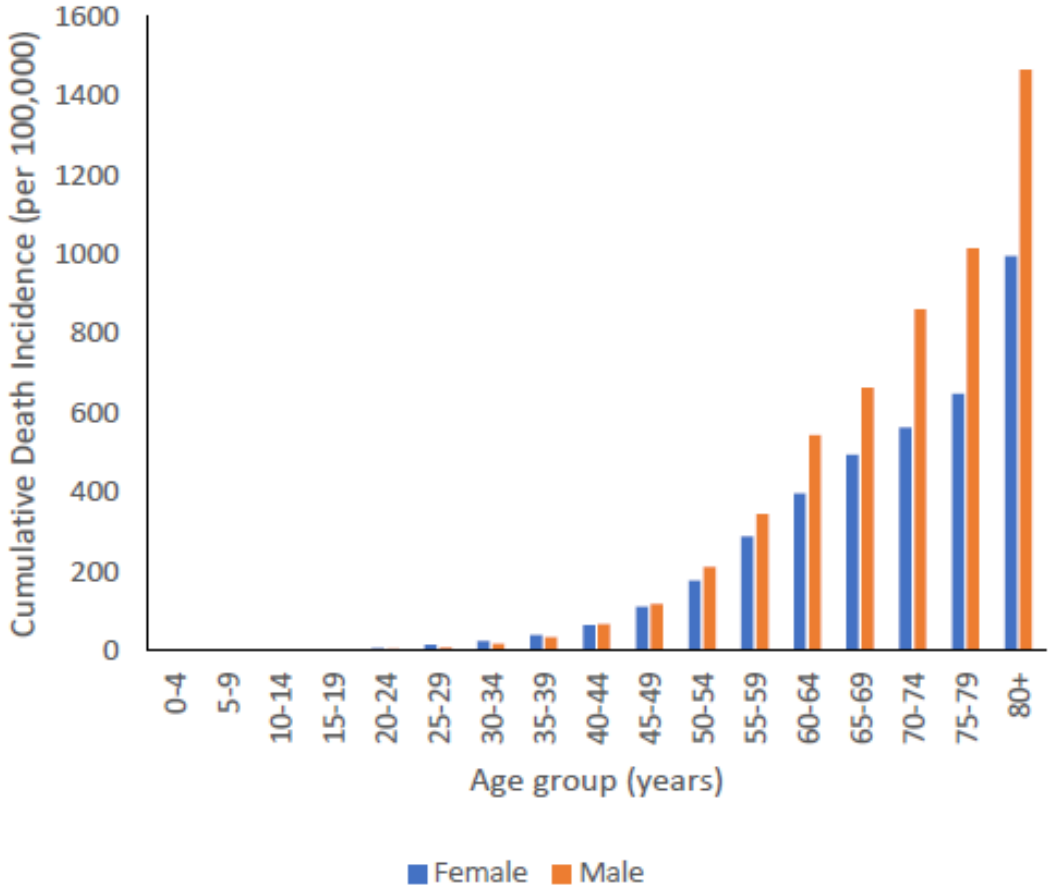


# Cumulative Covid-19 in-hospital and death incidence (per 100,000) by age group and sex, South Africa (5 June 2021)

**SARS-CoV-2 sero-positivity (mid-Jan 21)**

**Overall: 19.1%**
**<12 years: 17.7%**
**12-18 years: 16.9%**
**>18 years: 19.0%**

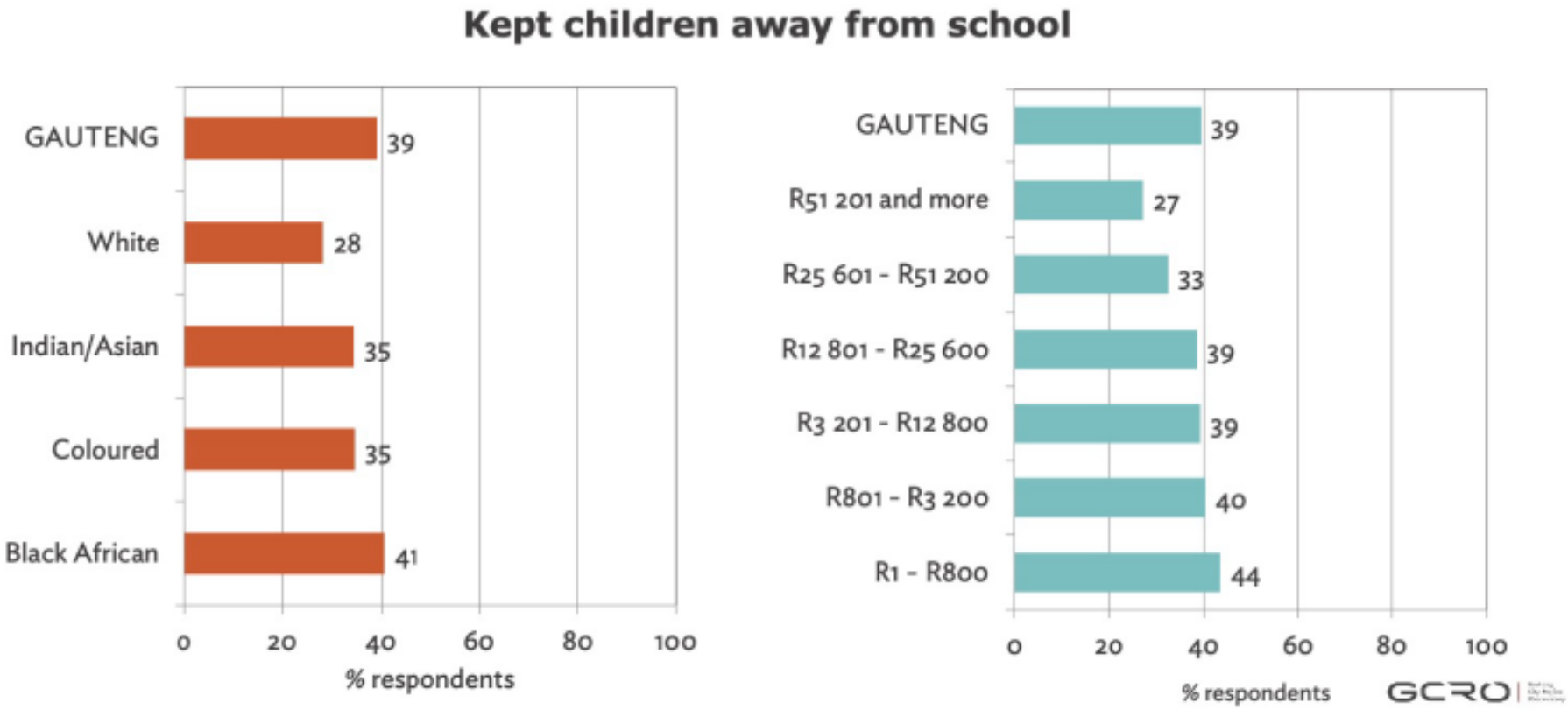
Mutevedzi P et al. Int J Infect Dis. In Press




www.nicd.ac.za NICD COVID-19 and DATCOV Teams

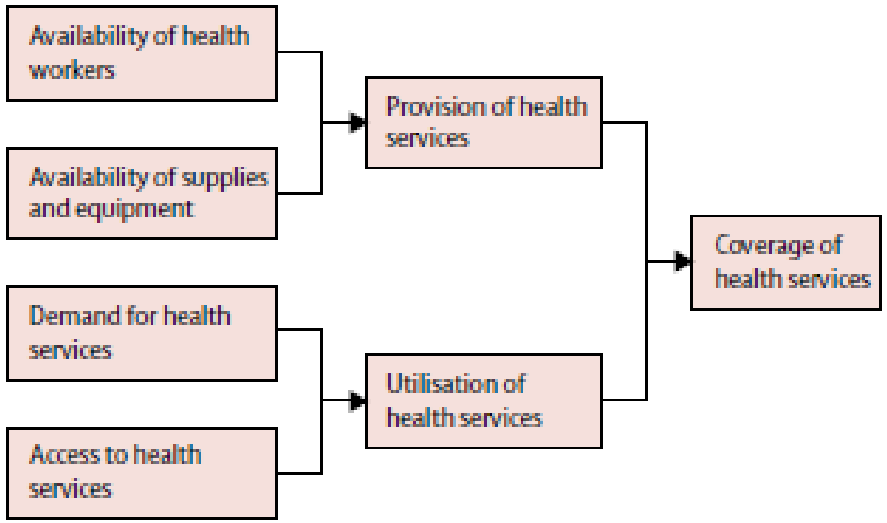
# Impact of Covid-19 on schooling.

Figure 9: Percentage of respondents who kept children away from school once they were allowed to return, by population group and income. Data source: GCRO QoL 6 (2020/21).

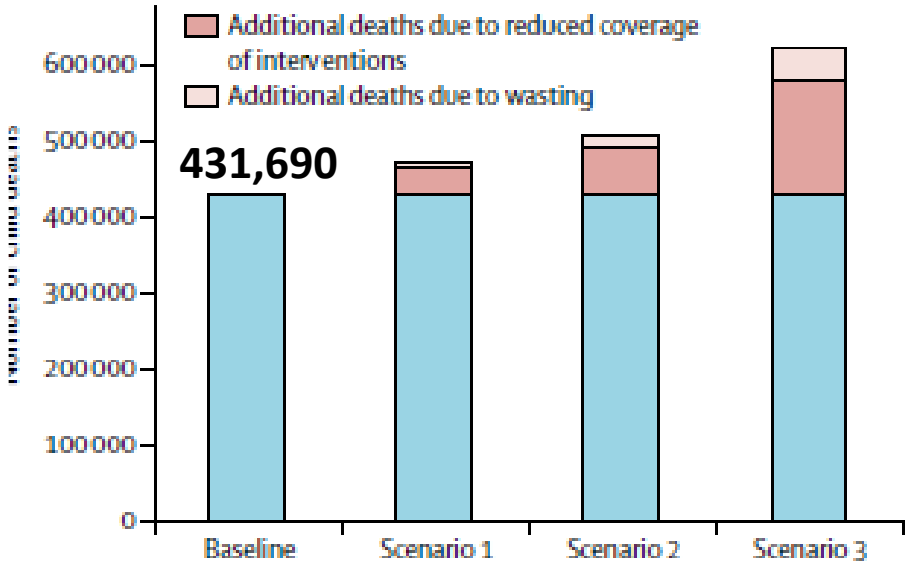


# Modelled excess child deaths under different scenarios with reductions in maternal, newborn and child health and nutritional services in 118 LMIC.

**Framework for effects of health systems Components on coverage of health services.**




**Child deaths per month**




| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| # additional deaths /mnt | 42,240 | 74,680 | 192,830 |
| (% increase) | 8.3% | 17.3% | 44.7% |

9.8-18.5% coverage reduction
10% increase in wasting

39.3-51.9% coverage reduction
50% increase in wasting

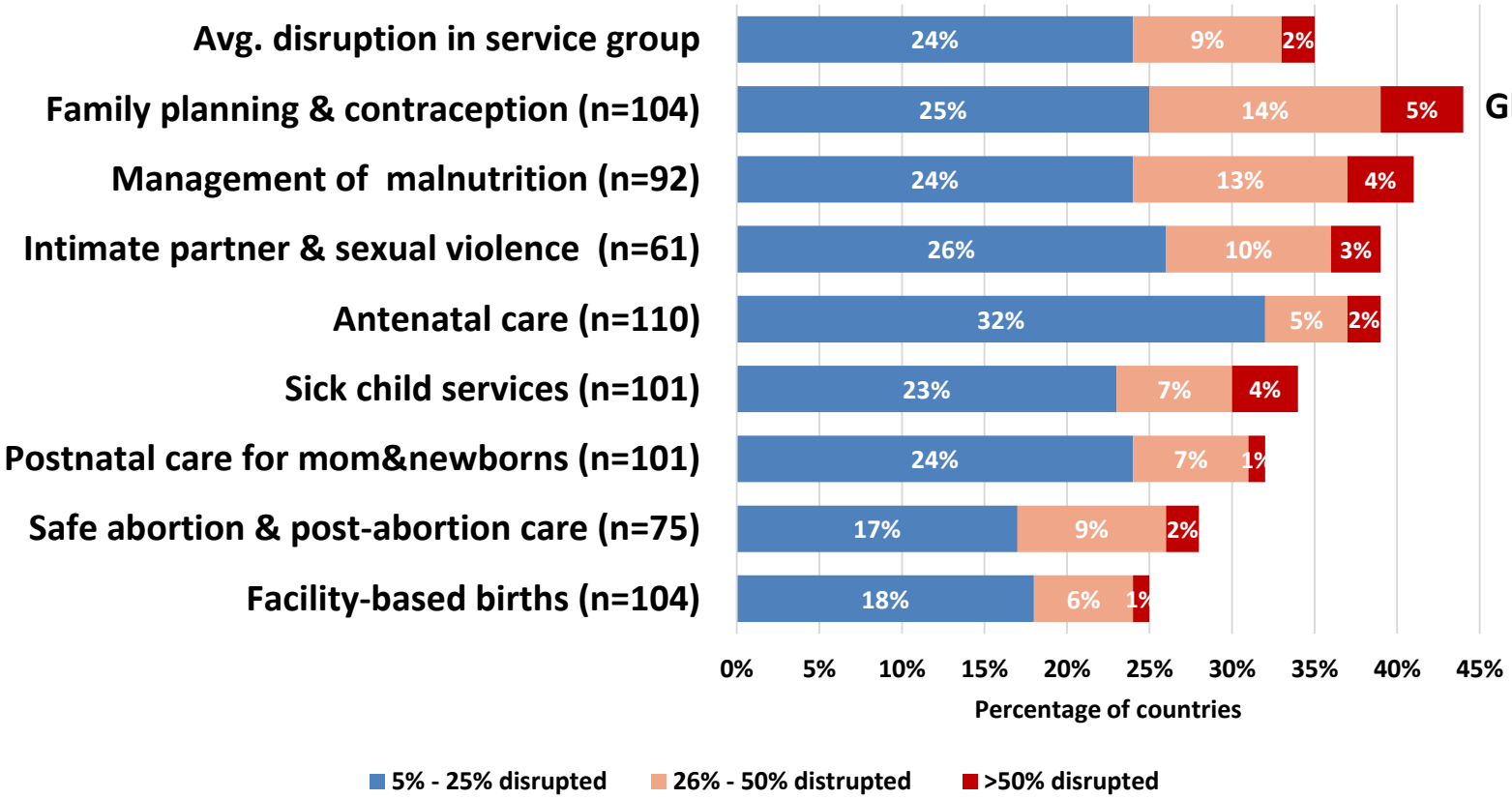
- **Increase in wasting prevalence would account for 18–23% of additional child deaths.**
- **Reduced coverage antibiotics for pneumonia and neonatal sepsis and ORS for diarrhoea account for around 41% additional child deaths.**

WITS VIDA

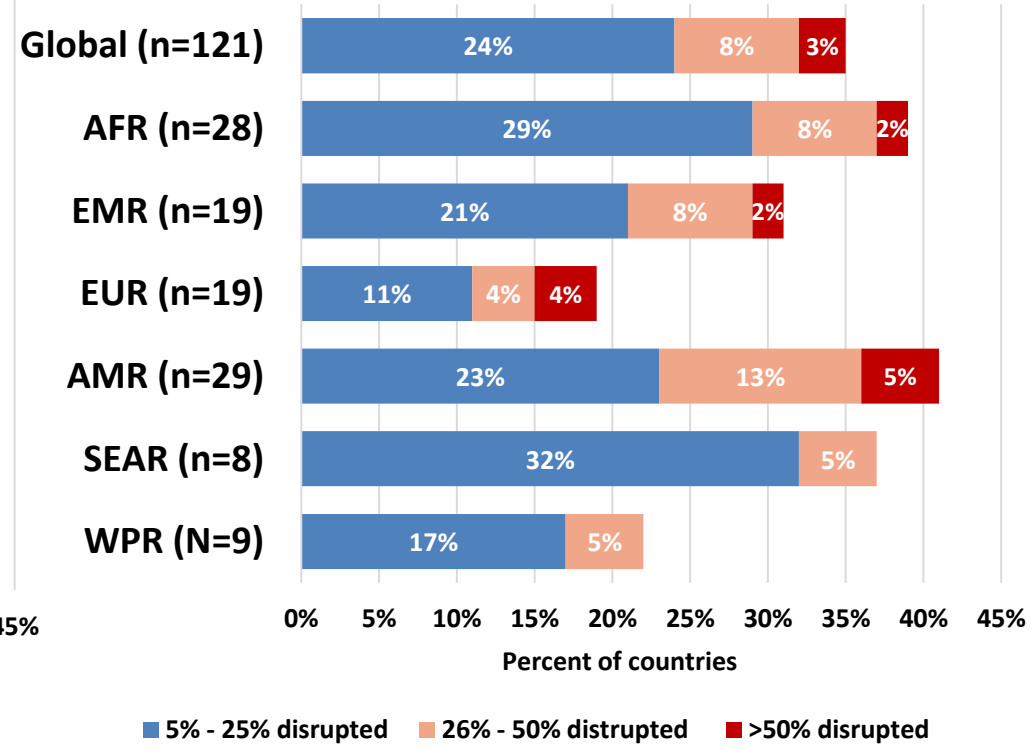
Roberton T et al. Lancet Glob Health 2020; 8: e901–08, May 2020

# Global disruption in maternal, newborn, child-adolescent and nutritional services.

## Percentage of countries reporting disruptions in maternal, newborn, child and nutritional services.




## Average percentage of reporting countries With disruptions to maternal, newborn, child-adolescent and nutritional services.

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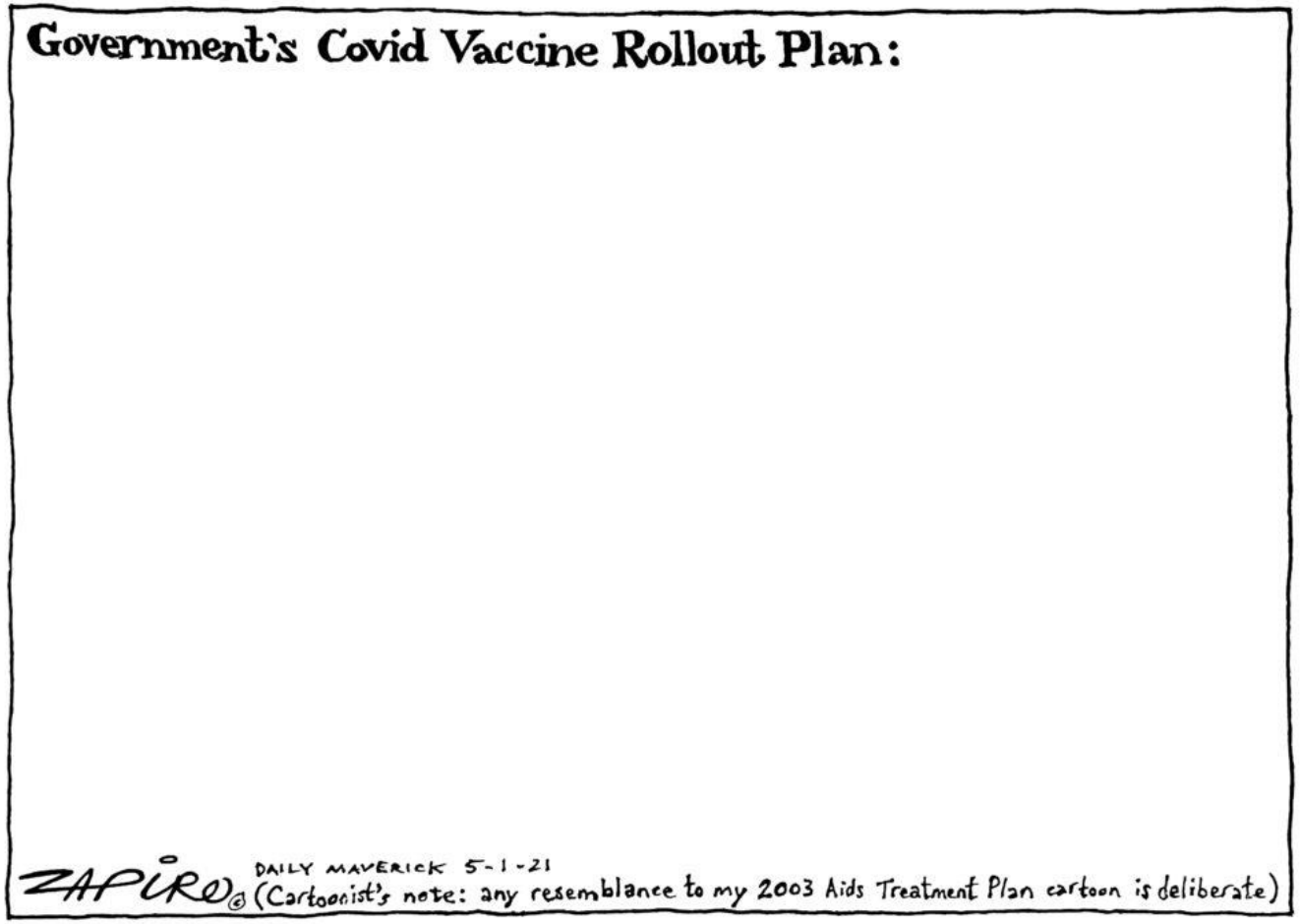
Second round of the national pulse survey on continuity of essential health services during the COVID-19 pandemic. Interim report WHO/2019-nCoV/EHS_continuity/survey/2021.

# Overview

- COVID-19 Government response in South Africa.
  - Burden of Covid-19 in South Africa.
  - Indirect consequences of Covid-19 in South Africa.
- Covid-19 vaccine rollout in South Africa.
- Where to next for South Africa.
  - Expectations of Covid-19 trajectory in South Africa


Government's Covid Vaccine Rollout Plan:
ZAPIRO
DAILY MAVERICK 5-1-21
(Cartoonist's note: any resemblance to my 2003 Aids Treatment Plan cartoon is deliberate)

# SA Covid-19 vaccine rollout saga.


"Astoninglishly, even now, in the full knowledge of what we face and with dozens of countries worldwide, including African countries, embarking on mass vaccination programmes against Covid-19, it is distressing to hear senior officials increasingly talking down the prospects for the availability and usefulness if Covid-19 vaccines in South Africa."

# Response to South Africa's Imminent Scientist letter.

Daily Maverick

## The Covid-19 vaccine and the danger of creating false expectations

Barry Schoub 8 months ago


We cannot afford to create false hopes and false expectations which, unfortunately, vaccine activism may be in danger of doing. Vaccines will not immediately allow us all to go back to our pre-Covid lives. Sustaining human behavioural dedication to fight an unseen enemy is challenging, uncomfortable and even irritating. But it depends critically on the support of all sections of the community. It is fragile and can be easily fractured by the seduction of a magic vaccine. It is equally easy to look for a scapegoat.

Arguably, there may well seem to be a lacuna in communicating adequate assurance to the public. But let me state that there are indeed very extensive behind-the-scenes efforts to acquire safe and effective vaccines as soon as possible, and also to develop a comprehensive vaccine strategy.

Finally, I would like to address an urgent and earnest appeal to civil society groups – please stop insinuating false hopes and expectations to the public for immediate solutions to the Covid-19 crisis. These only serve to compromise, and even jeopardise, the critical current imperative to maintain the, maybe

The delay for South Africa is, of course, deeply regrettable and unfortunate, especially for our vulnerable and indispensable healthcare workers. However, it does offer us a short breathing space, enabling us to even better assess and evaluate those vaccines being deployed in the field in the developed world. How are these completely novel vaccines faring in the field situation? How they perform in millions of recipients may not always be identical to their behaviour in the few thousands of volunteers within the structured environment of the clinical trial. (As one example, it has now been reported that severe allergic reaction, anaphylaxis, has been seen, albeit rarely, but 10 times more commonly with the Pfizer vaccine than with other vaccines, which is now necessitating a specific warning to allergy-prone individuals).

In addition, more vaccine manufacturers are now applying for licensing, thereby widening the choice for vaccines for our local conditions, rather than simply grabbing the first available licensed vaccines, as wealthy countries have done. Our vaccine selection and strategic planning could well be influenced by

# NDoH: "Covid-19 Coronavirus vaccine Strategy"

Access to COVID-19 vaccines is our highest priority.

- South Africa will receive 1 million doses of the COVID-19 vaccine in January and 500 000 doses in February of the Oxford University-AstraZeneca vaccine from the Serum Institute of India (SII).
- We will begin by vaccinating our country's estimated 1.25 million healthcare workers.
- Government is working closely with South African Health Products Regulatory Authority (SAHPRA) to ensure there is no delay approving the vaccine for use.
- The Oxford University-AstraZeneca vaccine has already been approved by various regulators around the world and is being rolled out in other countries.
- We have also reached an agreement with the COVAX Facility to secure vaccines to immunise 10 per cent of the population.
- These doses are expected at the beginning of second quarter of the year.
- We continue to work with various pharmaceuticals companies ensure we immunise 67 per cent of the population by the end 2021.

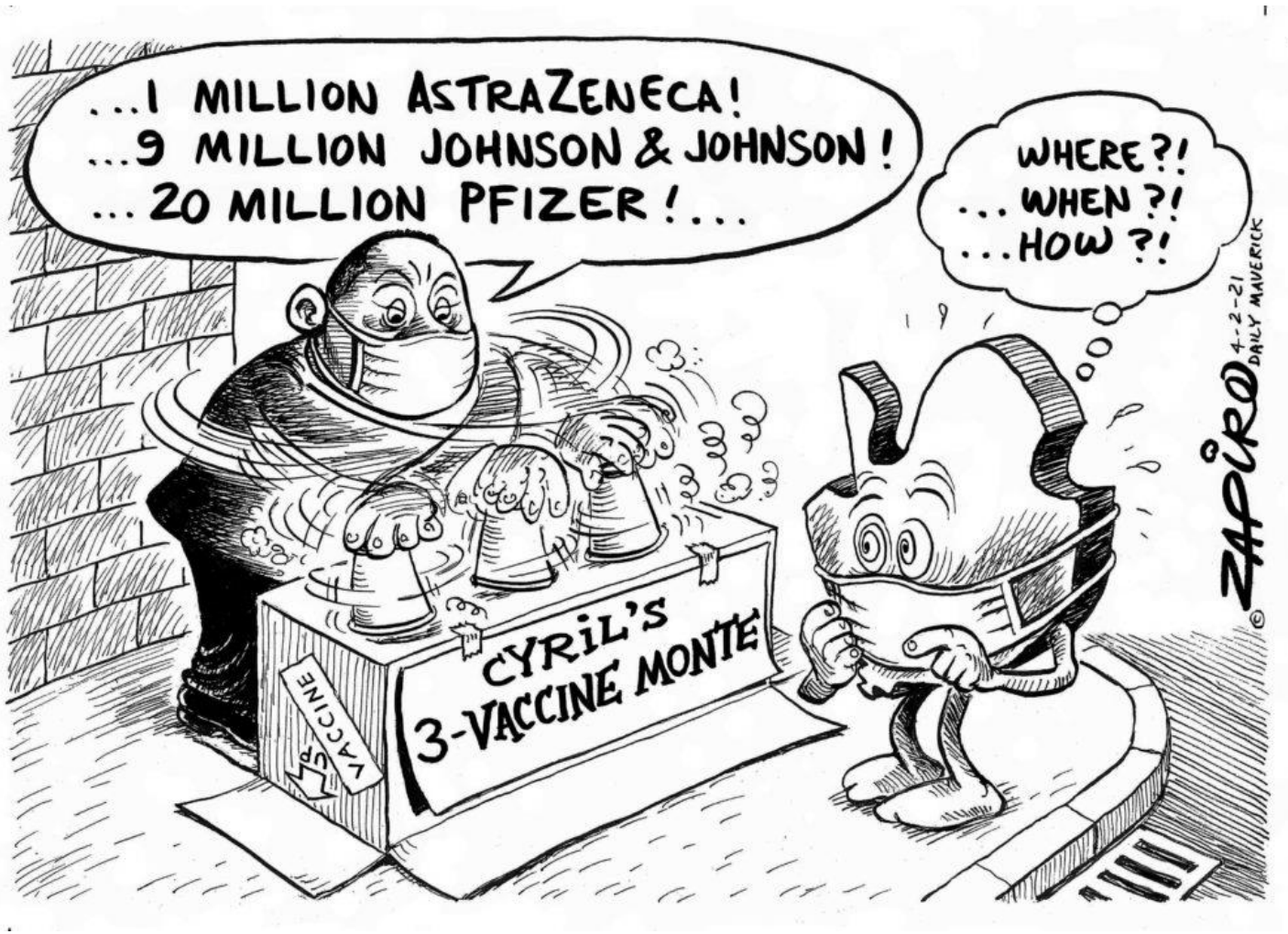
Government will source, distribute and oversee the rollout of the vaccine.

- Government as the sole purchaser of vaccines will distribute it to provincial governments and the private sector.
- We will procure available stocks from different manufacturers.
- There will therefore be multiple vaccines in our programme, but you cannot be vaccinated with two different vaccines.
- The vaccination system will be based on a pre-vaccination registration and appointment system.
- All those vaccinated will be placed on a national register and provided with a vaccination card.
- A national rollout committee will oversee the vaccine implementation in both the public and private sectors.

Vaccines save lives!

- There is overwhelming scientific evidence that vaccination is the best defence against serious infections.

# The belated race to procure Covid-19 vaccines.



# Arrival of AZD1222 in South Africa.

aljazeera.com

ALJAZEERA LIVE

News | Coronavirus pandemic

## First batch of coronavirus vaccines due to arrive in South Africa

*The first one million shots of the Oxford-AstraZeneca vaccine will be used to inoculate healthcare workers amid surge in infections.*

The new coronavirus strain, different from the one in the UK, appears to be more infectious than the original virus in South Africa [Jerome Delay/AP Photo]C

By Victoria Schneider

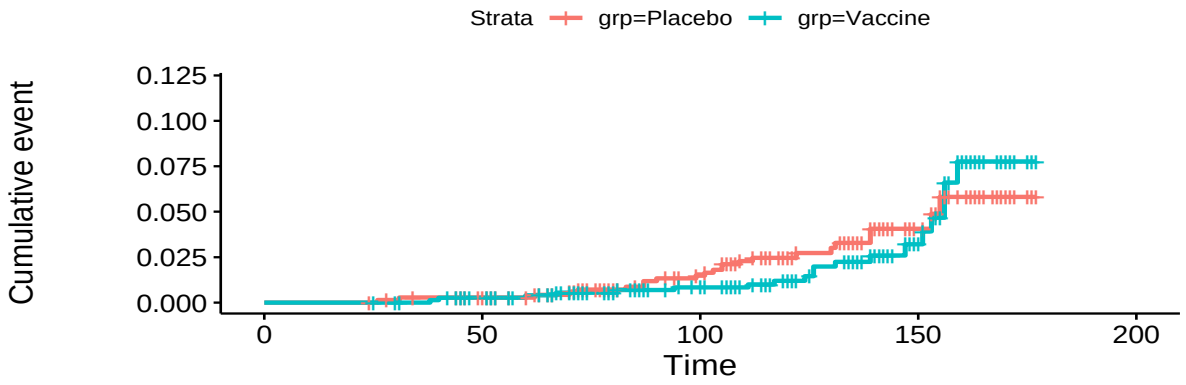
SABC News

SA's first batch of coronavirus vaccine received - SABC News ....

Visit

1st February 2021

# AZD1222 not efficacious in protecting against mild to moderate Covid-19 due to the Beta variant.




**No significant risk reduction in mild-moderate Covid-19 from Beta variant occurring at least 14 days after 2nd dose of AZ1222.**

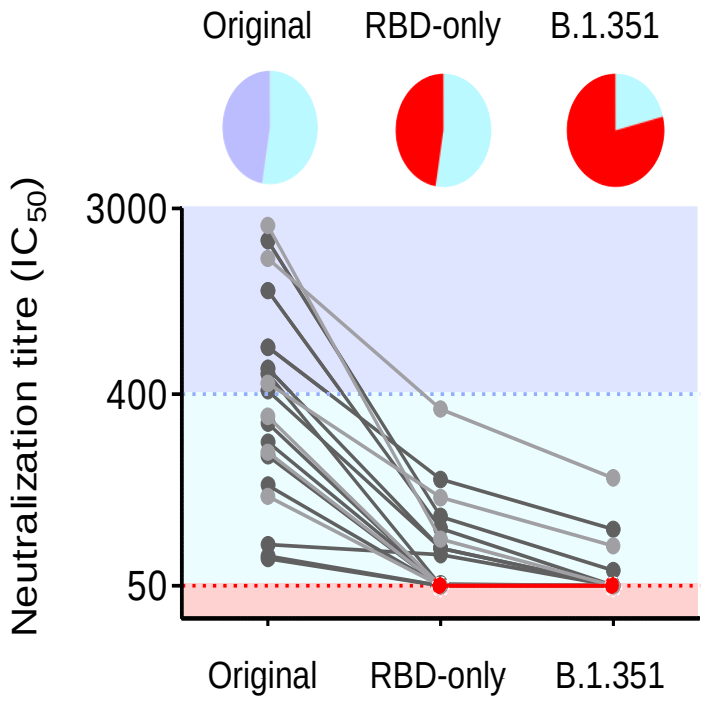
| Baseline N-protein IgG | Total number of cases | Placebo n/N (%) | Vaccine n/N (%) | Vaccine efficacy (95%CI) |
|---|---|---|---|---|
| **Primary endpoints: All severity COVID-19 clinical >14 days post-boost** | | | | |
| **Negative** | 42 | 23/717 (3.2%) | 19/750 (2.5%) | 21.9% (-49.9 to 59.8) |
| **Secondary endpoint: All severity COVID-19 clinical disease due to B1.351 variant >14 days post-boost** | | | | |
| **Negative** | 39 | 20/714 (2.3%) | 19/748 (2.5%) | 10.4% (-78.8 to 54.8) |

Madhi SA et al . NEJM May 2021

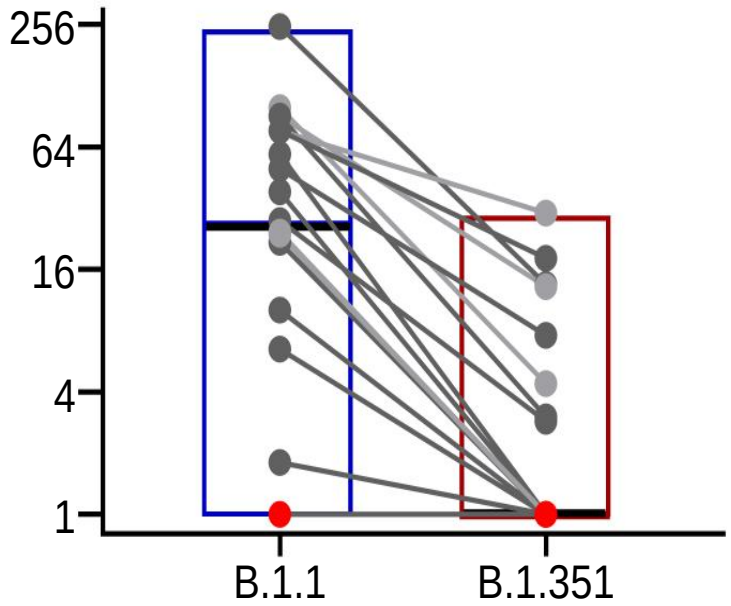
# Antibody activity induced by the ChAdOx1-nCoV19 has very low activity against the B.1351 variant circulating in South Africa.

Dilutional titers <50 50-500 >400

B) Pseudo-neutralization assay



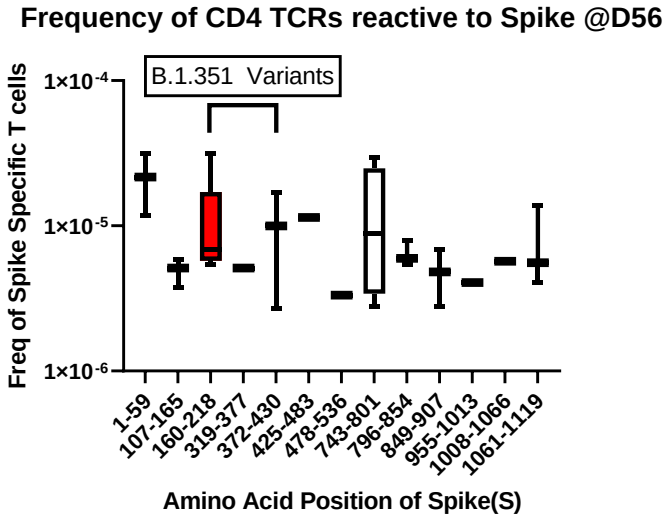

C) Live virus neutralization assay

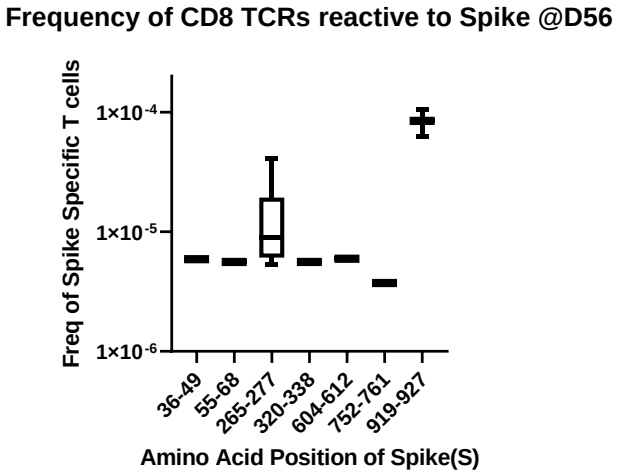



Madhi SA et al .NEJM May 2021

# ChAdOx1-nCoV19 (AZD1222) induced T-lymphocyte immunity.

76 of 87 T cell responses in AZD1222 recipients, including all CD8+ responses, unaffected by Beta-variant mutations

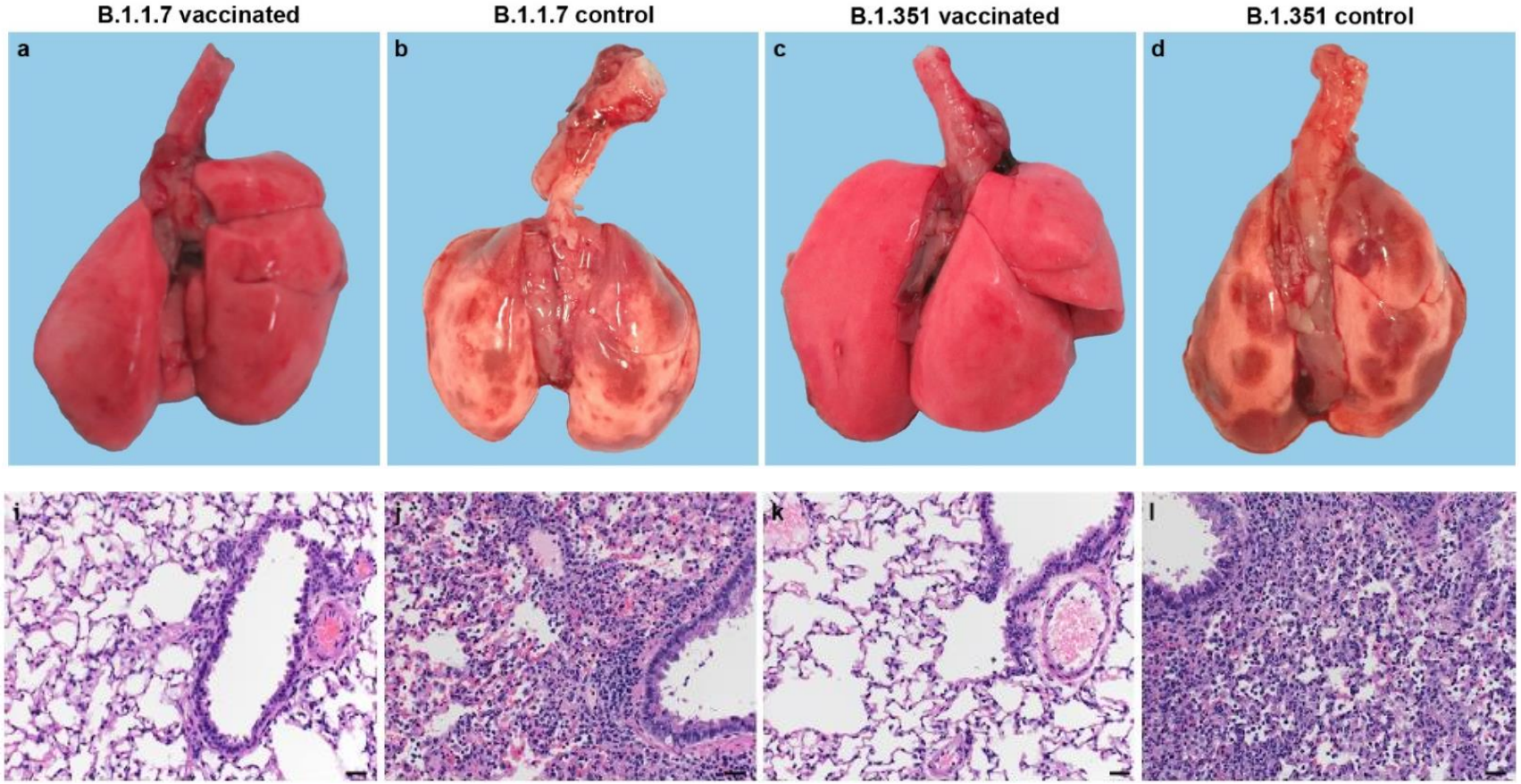



- **B.1.351 mutation sites (an AA change) are not the dominant Spike-specific T cell responses in AZD1222 vaccinees.**
- **87 spike specific antigens identified by T-cell receptor variable beta chain sequencing (24 for CD4 T cells and 63 for CD8 T cells).**
- **Based on the location of changes in the B.1.351 strain, 76 out of the 87 antigens not impacted by B.1.351 site mutations.**
- **T cell response that recognizes B.1.351 is likely to be present in AZD1222 recipients**

Madhi SA et al . NEJM May 21

# AZ Covid-19 vaccination and gross pathology of lungs following direct intranasal challenge with SARS-CoV-2 variants B.1.1.7 and B.1.351 in Syrian hamsters.




Fisher RJ et al; BioRxiv doi: https://doi.org/10.1101/2021.03.11.435000

# WHO SAGE Recommendation on use of AZD1222 and Beta variant.

## Interim recommendations for use of the AZD1222 (ChAdOx1-S [recombinant]) vaccine against COVID-19 developed by Oxford University and AstraZeneca

Interim guidance
10 February 2021

World Health Organization

Preliminary analyses have shown a slightly reduced vaccine effectiveness of AZD1222 against B1.1.1.7 in the V002 trial in the United Kingdom which is associated with only a limited reduction in neutralizing antibody. Preliminary analyses from the Phase 1/2a trial (COV005) in South Africa indicate marked reduction in vaccine effectiveness against mild and moderate disease due to B 1.351 based on a small sample size and substantial loss of neutralizing antibody activity. This study was designed to assess efficacy against disease of any severity, but the small sample size did not allow a specific assessment of vaccine efficacy against severe COVID-19. Indirect evidence is compatible with protection against severe COVID-19; however, this remains to be demonstrated in ongoing clinical trials and post-implementation evaluations.

In view of this, WHO currently recommends the use of AZD1222 vaccine according to the Prioritization Roadmap (4) even if variants are present in a country. Countries should conduct a benefit-risk assessment according to the local epidemiological situation including the extent of circulating virus variants.

## South Africa in shock after AstraZeneca vaccine rollout halted

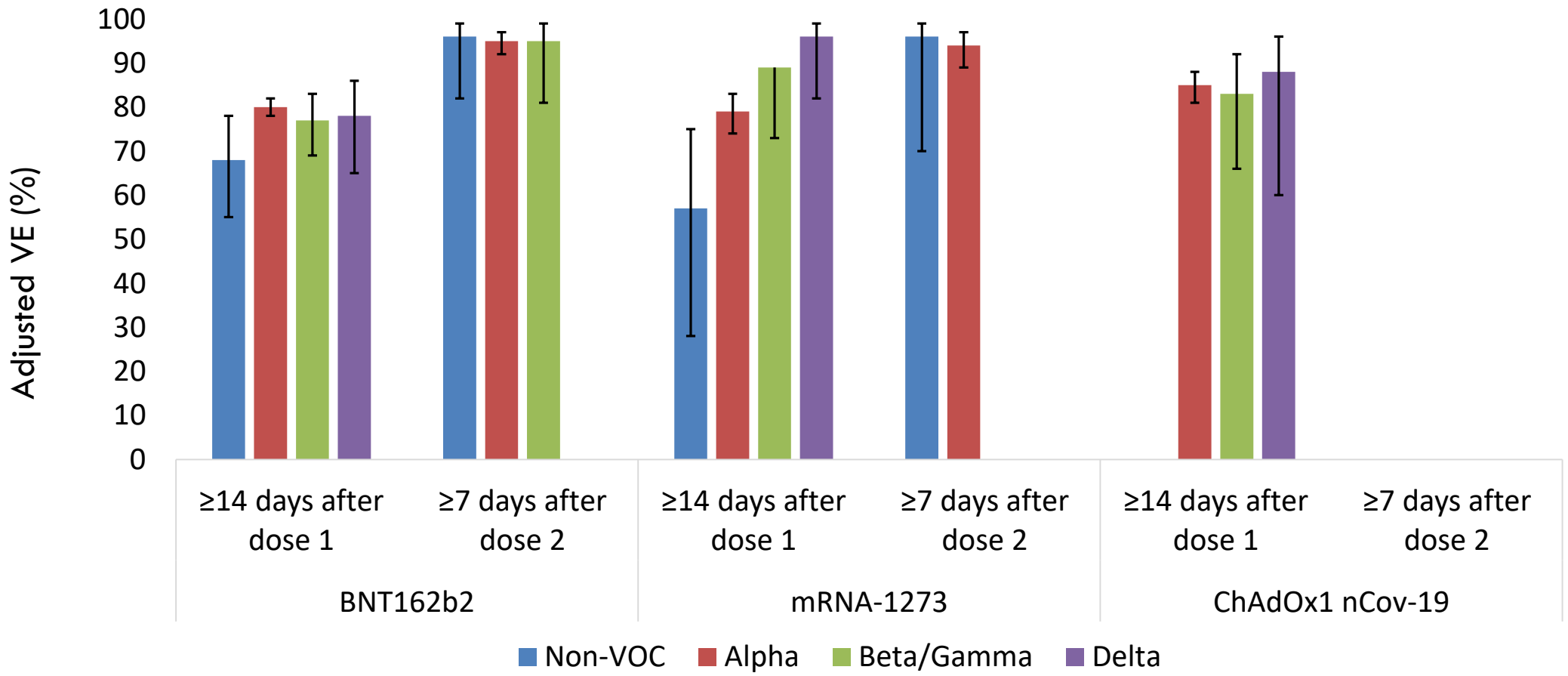
By Pumza Fihlani
BBC News, Johannesburg

9 February 2021


Experts are still hopeful that the AstraZeneca vaccine will still be effective at preventing severe cases

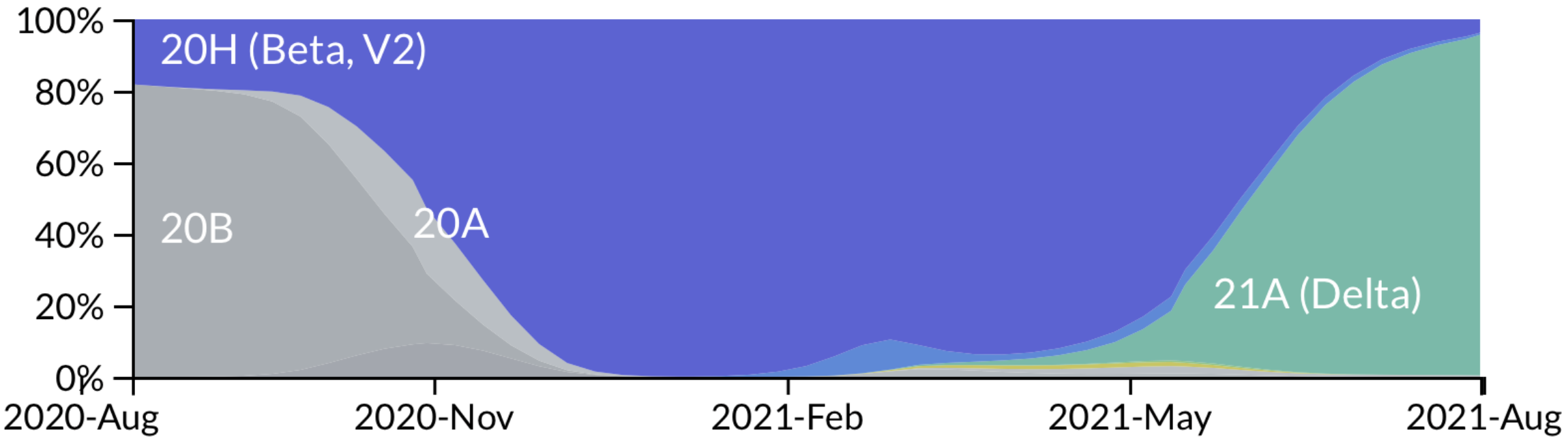
**South Africa's decision to halt its rollout of the Oxford-AstraZeneca vaccine after a study showed "disappointing" results against its new Covid-19 variant may have left the nation in shock, but it also shows how scientists are at the forefront of the battle against coronavirus.**

# Vaccine effectiveness against Alpha (B.1.1.7), Beta (B.1.351)/Gamma (P.1), and Delta (B.1.617.2) variants of concern hospitalisation or death by vaccine product, and number of doses received in Ontario, Canada

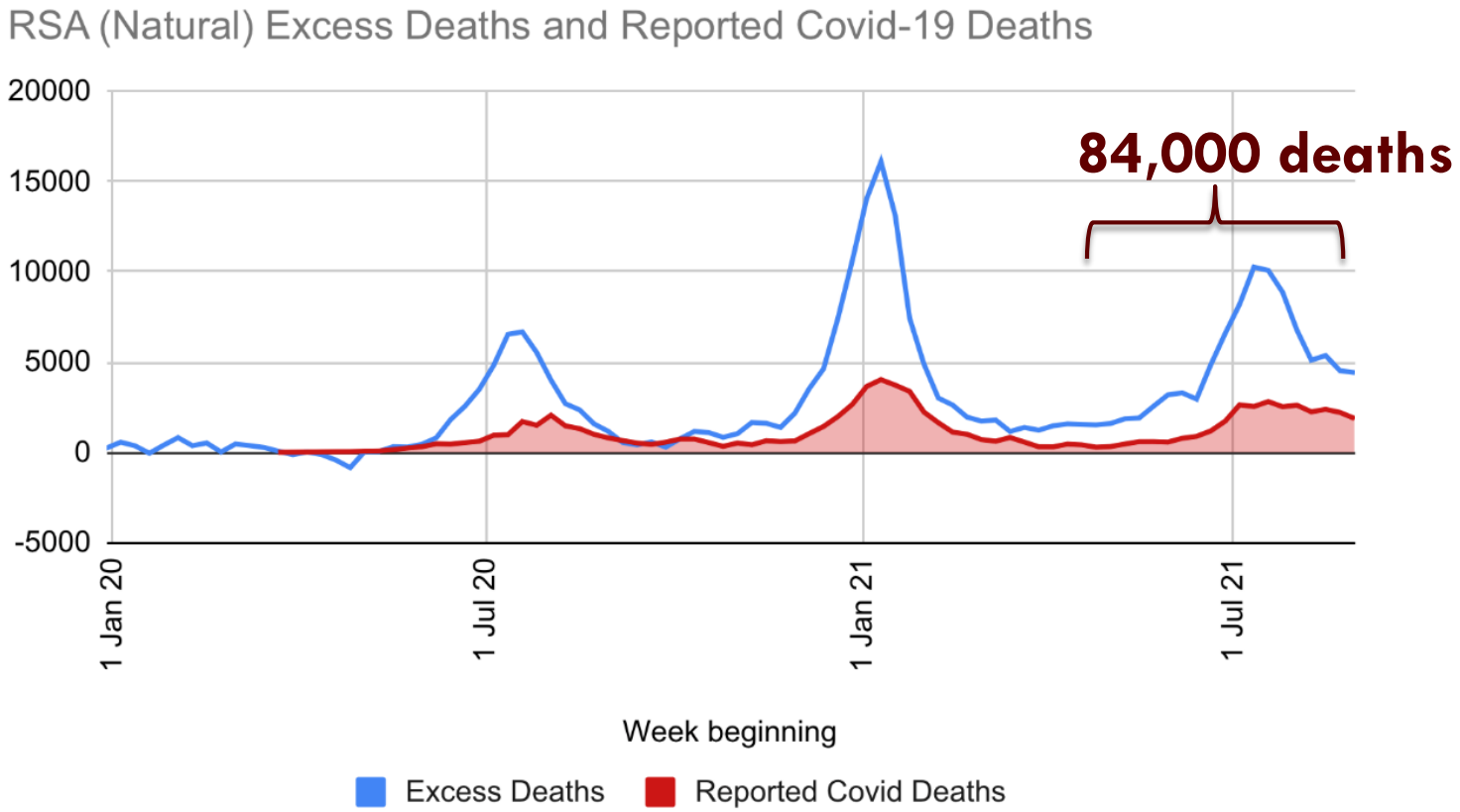


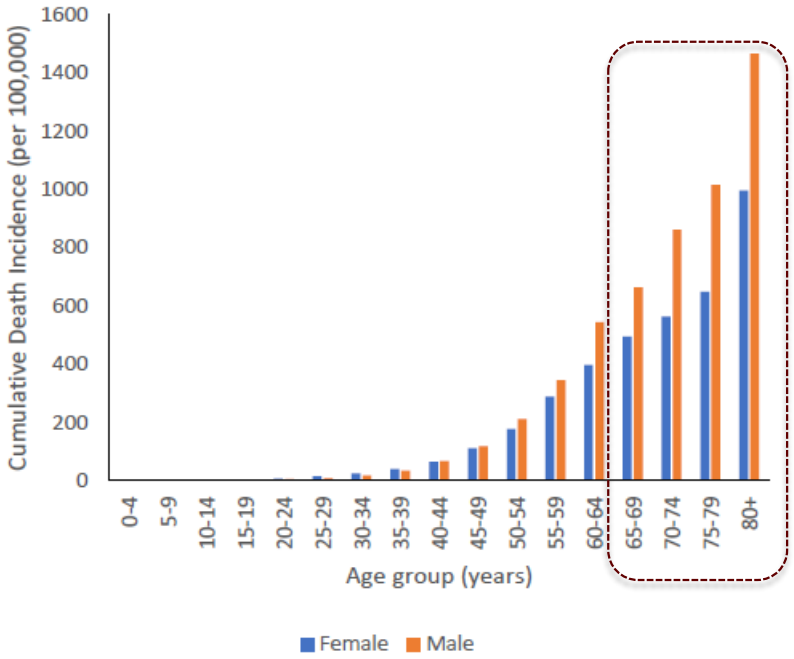

Nasreen S et al. medRxiv preprint doi: https://doi.org/10.1101/2021.06.28.21259420;

# Evolution of SARS-CoV-2 variants of concern in South Africa.



# The human cost of procrastination.



# Offloading of AZD1222 to other desperate African countries

health24

Why South Africa isn't using the AstraZeneca jabs it bought

29 Mar 2021


REUTERS

South Africa wants to return 1 million AstraZeneca vaccine doses to Serum Institute: report

RFI

South Africa gets rid of 1 million AstraZeneca vaccine doses, but why?

22 Mar 2021

REUTERS

South Africa sells AstraZeneca COVID-19 vaccines to other African countries

21 Mar 2021

news24

Covid-19: Sale of AstraZeneca vaccine to AU concluded - Health Minister Zweli Mkhize

21 Mar 2021

# Overview

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- COVID-19 Government response in South Africa.
  - Burden of Covid-19 in South Africa.
  - Indirect consequences of Covid-19 in South Africa.
- Covid-19 vaccine rollout in South Africa.
- Where to next for South Africa.

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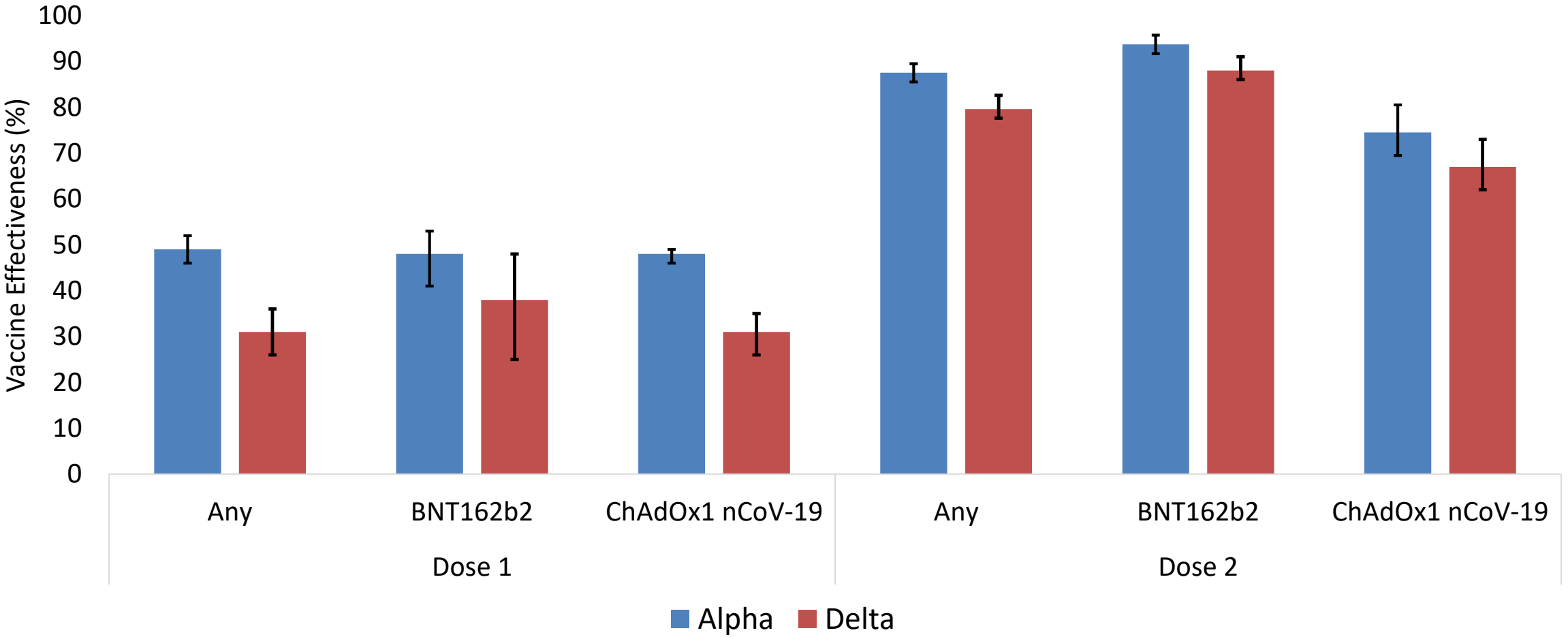
# Dealing with Covid-19 vaccine hesitancy and misinformation.

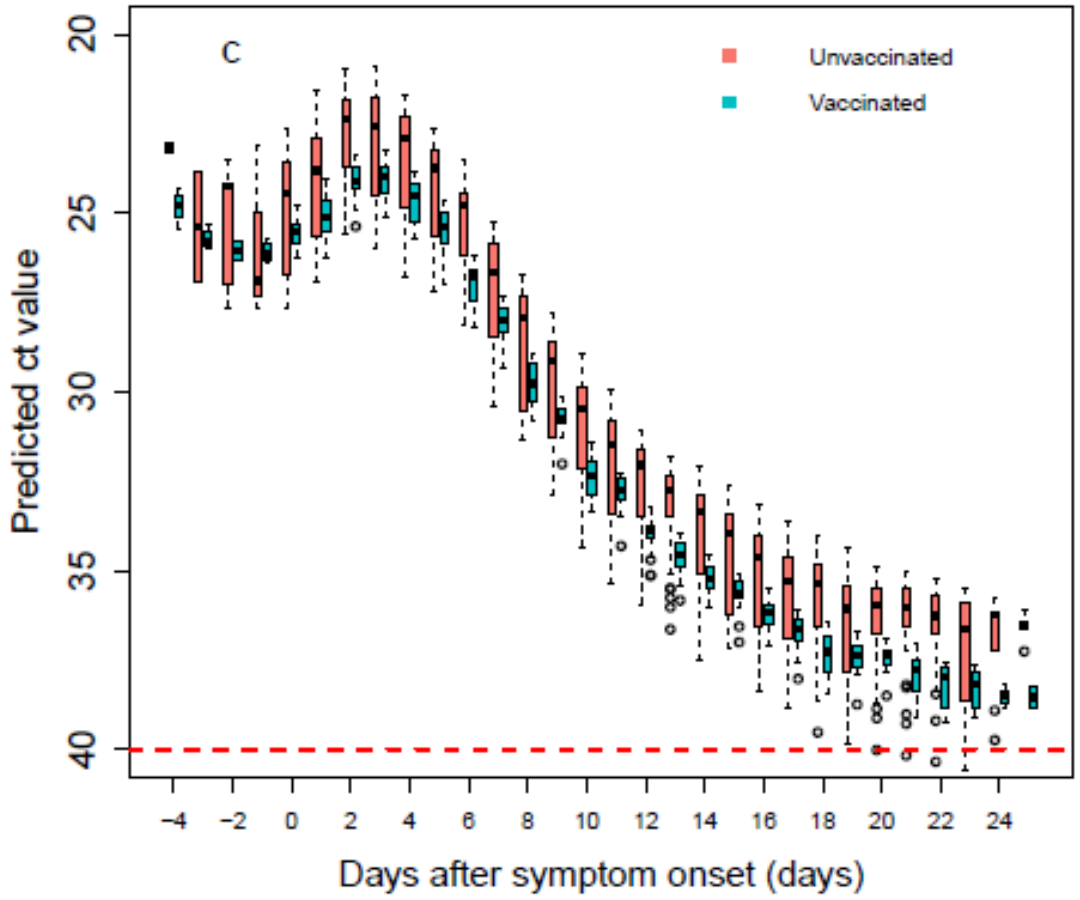

# Loss of focus on Covid-19 communication and advocacy

# Vaccine effectiveness against all severity Alpha and Delta variant according to dose and vaccine type; UK.




Bernal JL et al. NEJM; July 21, 2021

# Delta-variant viral load in inactivated Covid-19 vaccinated and unvaccinated cases.




- **73% of delta transmission occurred before index case became symptomatic.**

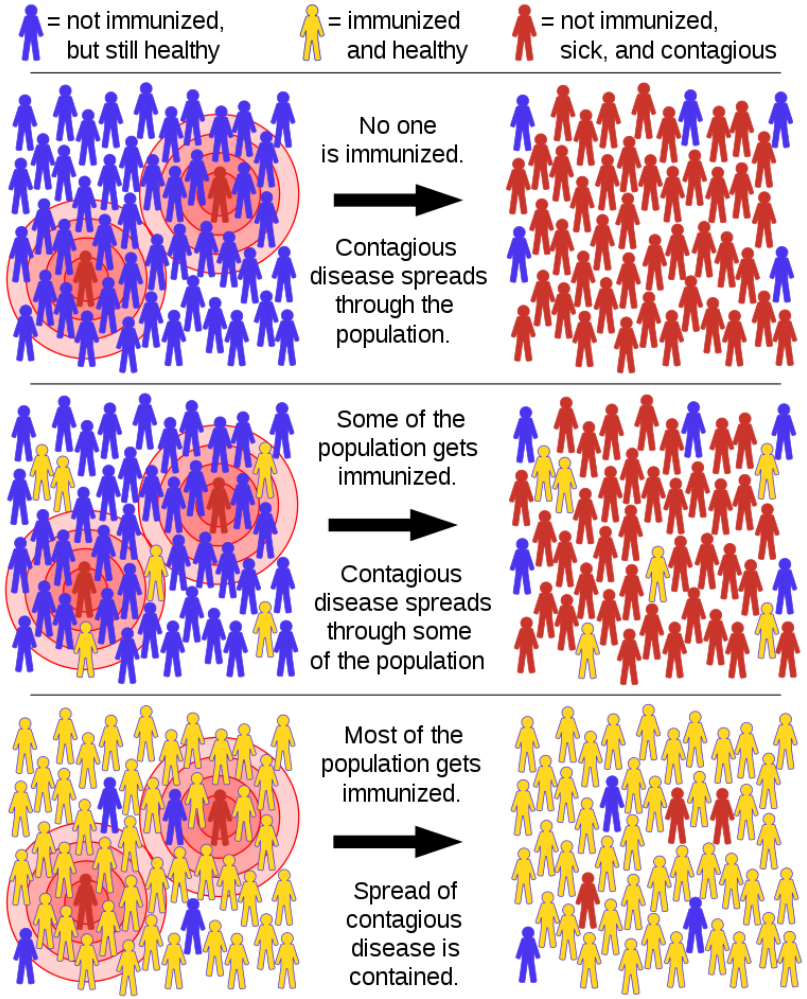
Kang M et al. https://doi.org/10.1101/2021.08.12.21261991. medRvix_pre-print

# Summary of "breakthrough infections"

- Vaccine protect against infection and mild Covid (50-90% depending on variant), but more modestly than against severe Covid-19.
- Breakthrough infections mainly mild disease and shorter duration of symptoms than infections in unvaccinated.[1]
- Breakthrough cases have similar viral load compared with infected unvaccinated people at start of illness/infection, but
  - Shed live virus for shorter duration[2]
  - Virus shedding compartmentalised to saliva.
- Breakthrough infections in fully vaccinated individuals less likely to result in transmission to close contacts (up to 2.84 fold for Delta)[3]

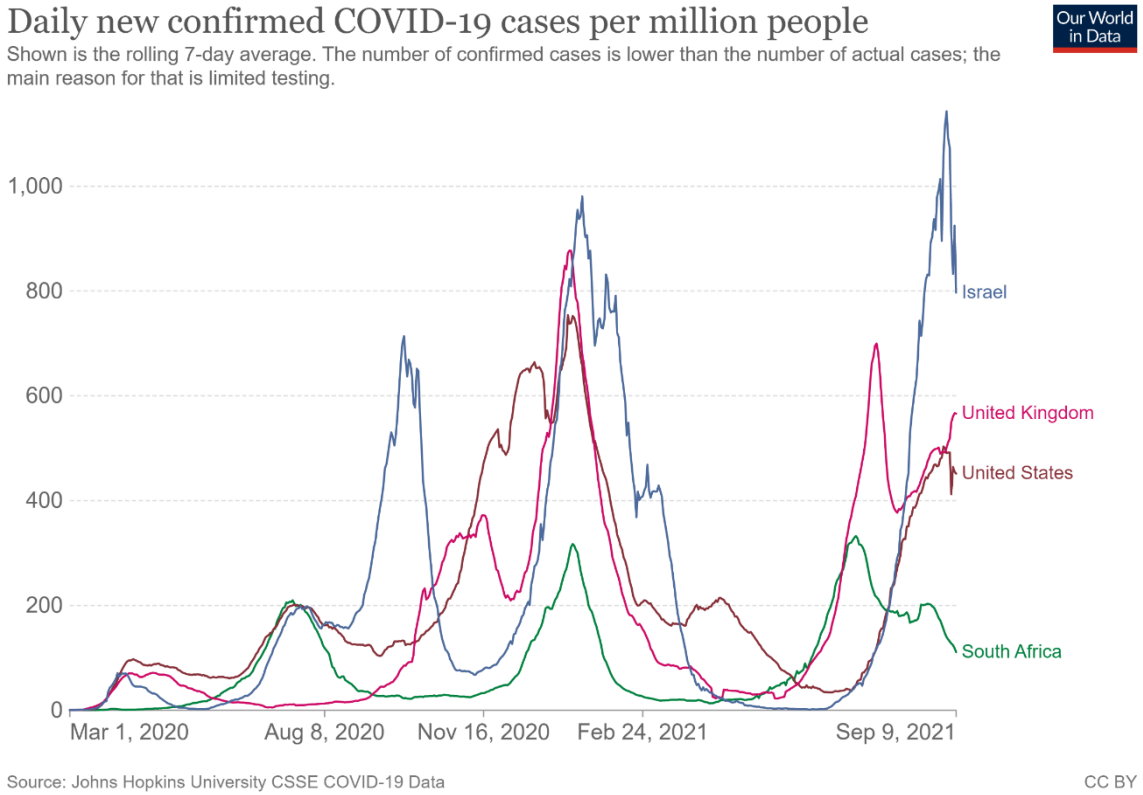
[1]Ke R et al. medRxiv preprint doi: https://doi.org/10.1101/2021.08.30.21262701; [2] Chia PA et al. medRxiv preprint doi: https://doi.org/10.1101/2021.07.28.2126129 ;
[3] Kang M et al. https://doi.org/10.1101/2021.08.12.21261991. medRvix_pre-print

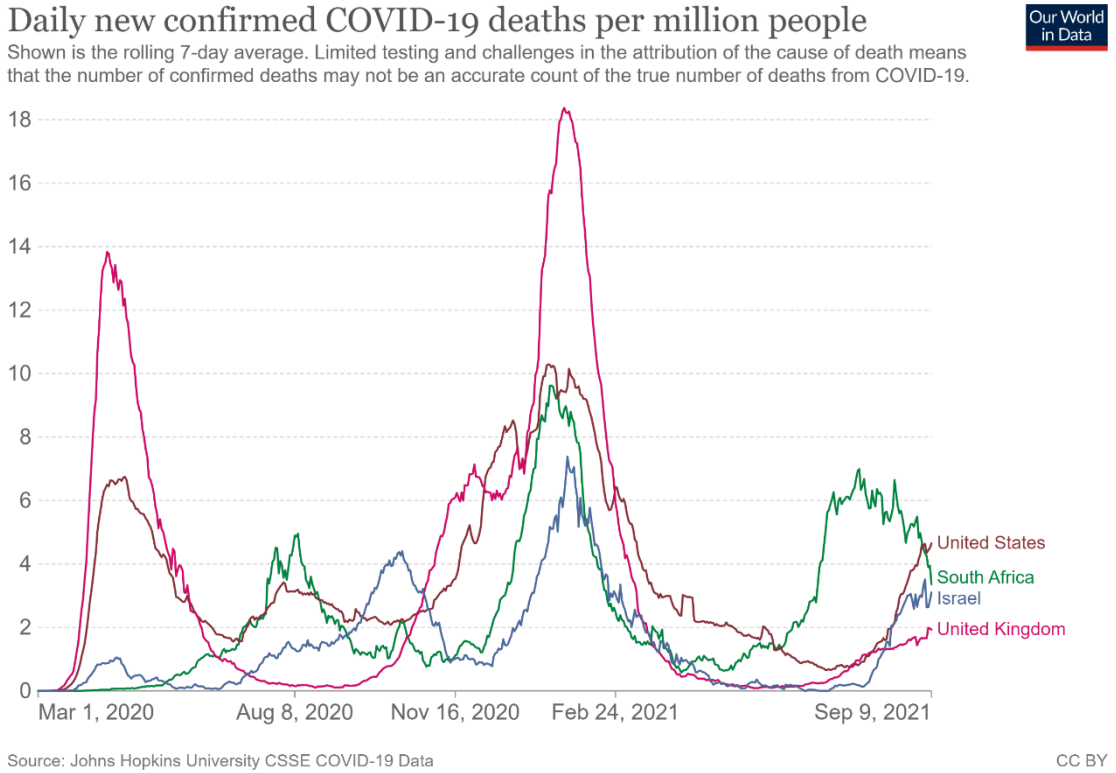
# Covid-19 vaccines unlikely to lead to “herd immunity”




- High effectiveness against infection and/or reduction in viral load and shedding of virus.
- Increase transmissibility, higher percentage needing to be protected. Delta two-fold more transmissible than ancestry virus.
- Lower neutralizing antibody activity against variants of concern with select Spike protein mutations; e.g. Beta and Lambda variants.
- Variability between Covid-19 vaccines against infection and mild Covid-19.
- Persistence of memory B-cells, however, waning of neutralising antibody resulting in transient susceptibility for infection.

# Covid-19 pandemic in Israel, UK, USA an South Africa.

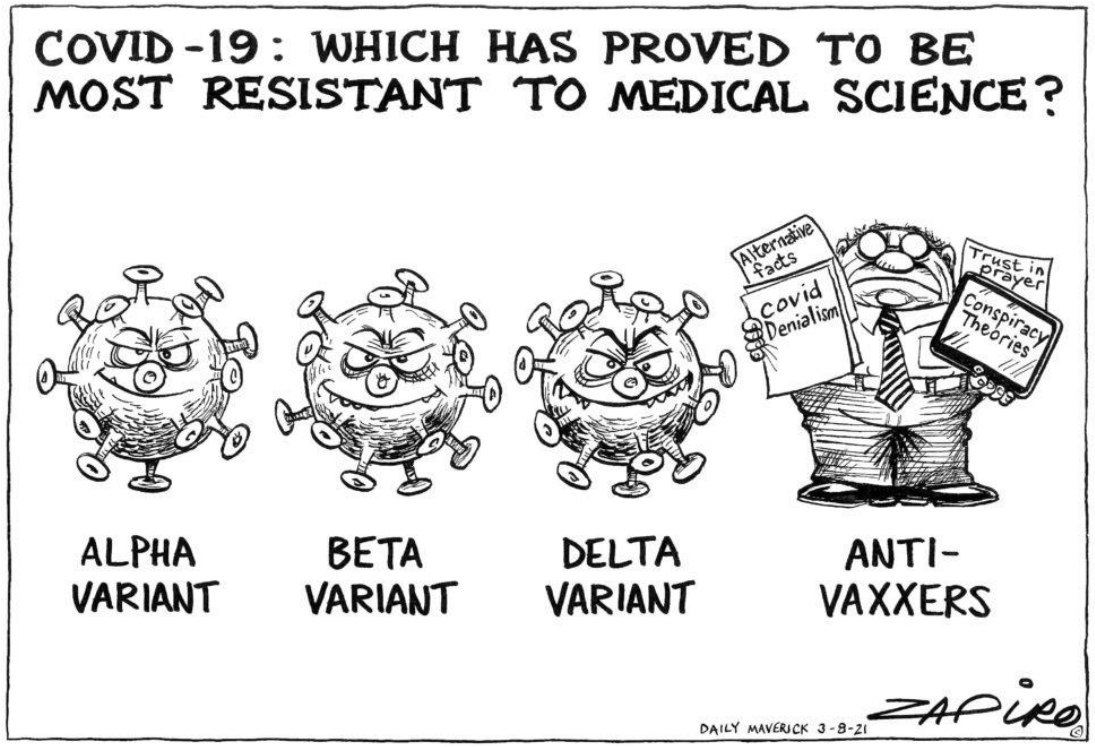



**Note: Rate of testing in SA lower than elsewhere, and recorded Covid-19 deaths is approximately one-third of likely deaths**

# Major threats to getting back to normalcy.

**Vaccine hesitancy and mis-information.**




**Politicisation of Covid-19 vaccines.**

# Conclusion

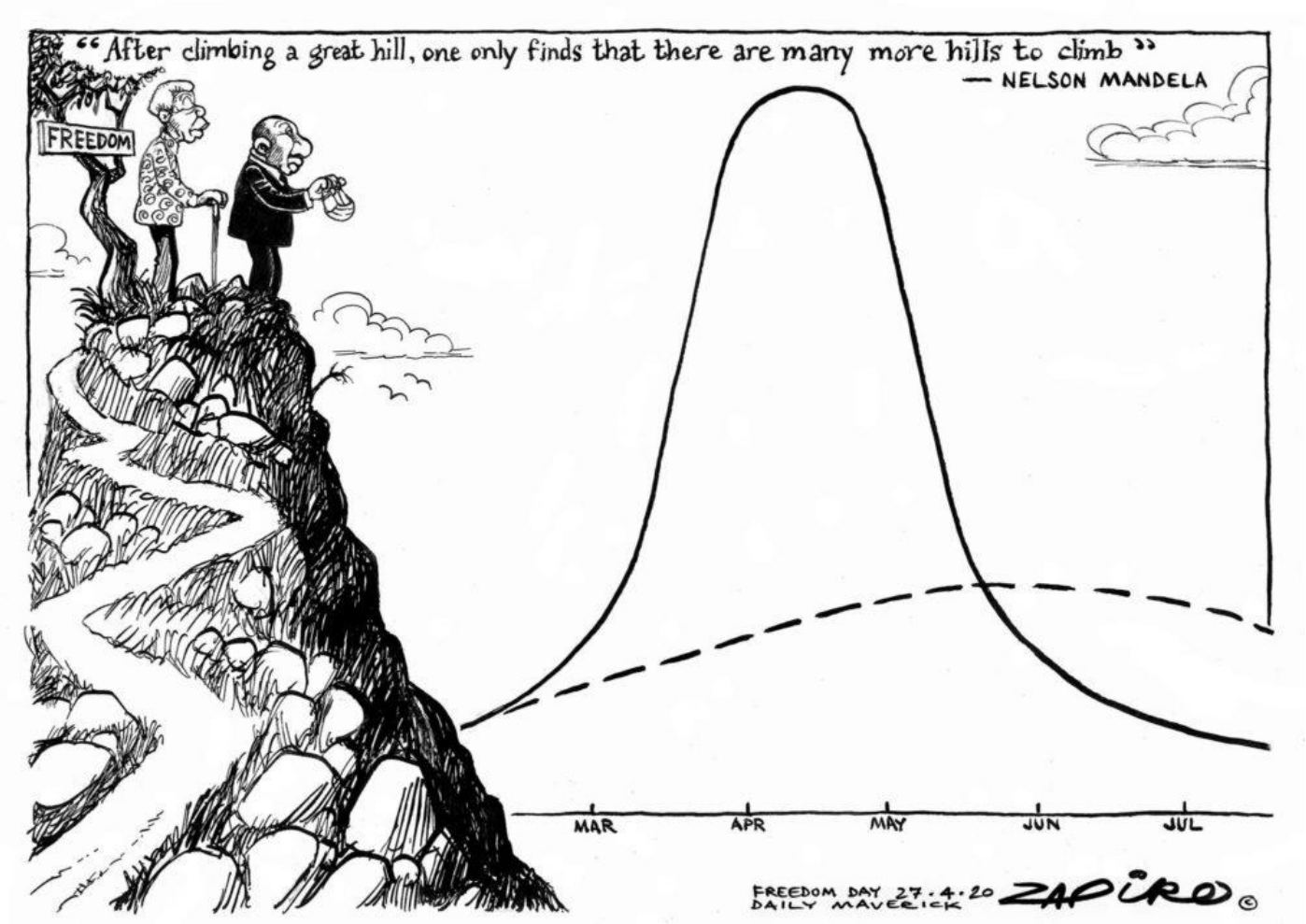
- Need for recalibration on how we respond to Covid-19 pandemic.
  - Limited value of restrictions in SA context, unless threat of health facilities being overwhelmed.
  - Impact on other health indices yet to fully materialise.
  - Addressing social devastation of restrictions on society, including child health and education.

- Current Covid-19 vaccines unlikely to lead to "herd immunity".

- Even though mild breakthrough Covid-19 expected in vaccinated individuals, these individuals are less infectious than unvaccinated individuals.

- Case for mandatory vaccination of HCW and in other work spaces, including Universities.
  - Restrictions on unvaccinated (vaccine passports) and penalties for choice to remain unvaccinated.

# When will South Africa be able to declare "Freedom day" from Covid-19?



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