

Commentary

AIDS and COVID-19 in southern Africa

Arnau van Wyngaard^{1*}  & Alan Whiteside² ¹Shiselweni Home-Based Care, Department of Science of Religion and Missiology, University of Pretoria, Piet Retief, South Africa²Balsillie School of International Affairs, Waterloo, Canada*Correspondence: wyngaard@lando.co.za

By the end of the first year of the COVID-19 pandemic, in February 2021, the numbers of cases and deaths in southern Africa were low in absolute and relative numbers. The BBC ran a story (which was later retracted) headlined “Coronavirus in Africa: Could poverty explain mystery of low death rate?”. A heading in the *New York Post* said: “Scientists can’t explain puzzling lack of coronavirus outbreaks in Africa”. Journalist Karen Attiah concluded: “It’s almost as if they are disappointed that Africans aren’t dying en masse and countries are not collapsing”. We wondered if the knowledge that southern African countries have acquired in their struggle against AIDS has contributed to a more effective approach against COVID-19. The viral origins of the diseases through zoonotic events are similar; neither has a cure, yet. In both diseases, behaviour change is an important prevention tool, and there are specific groups that are more vulnerable to infection. Equally, there are important differences: most people with COVID-19 will recover relatively quickly, while people living with HIV will need lifelong treatment. COVID-19 is extremely infectious, while HIV is less easily transmitted.

Keywords: HIV, SARS-CoV-2, TB, co-infection

Death is here again. But Covid-19, like Aids, is not about death. It is about the future and about life. It is about the possibility and our lives together. It is about our capacity to care. To love. To live with compassion, empathy, humility and humanity. It is our chance to live with renewed kindness and truth. Aids asked us to think about these things. To become better versions of ourselves. Maybe this time, with Covid-19, we will get it right.¹

—James Lees & Joachim Jacobs, *Daily Maverick*, 31 March 2020

Background*

Coronaviruses, identified in the mid-1960s, cause respiratory infections (Krouse, 2020). Two coronaviruses in particular have since caught the attention of health professionals: (1) SARS-CoV, which causes severe acute respiratory syndrome (SARS), was first seen in China in 2002 and caused 774 deaths (CDC, 2017); and (2) MERS-CoV, the Middle East respiratory syndrome (MERS), which appeared in 2012 and resulted in 858 deaths (WHO, 2019a).

The current SARS-CoV-2 that causes COVID-19 (WebMD, 2020) was first identified in late 2019 in Wuhan in China’s Hubei province. By mid-April 2021, there had been 140 million cases and more than 3 million deaths worldwide (Johns Hopkins, 2021).

*This article was written before the third wave struck South Africa towards the end of May 2021.

The World Health Organization (WHO) declared SARS-CoV-2 a global public health emergency on 30 January 2020 (Worldometer, 2021). It became apparent that the risk of morbidity and mortality increased with age, in people with comorbidities, and among those who are immunocompromised (CDC, 2020).

In April 2020, Emily Wong of the Africa Health Research Institute at the University of KwaZulu-Natal in South Africa warned that “HIV infection may also affect SARS-CoV-2 infection and COVID-19 severity” (*Medical Brief*, 2020). Kinfu et al. (2020) specifically mentioned the prevalence of HIV as one of eleven primary causes associated with a rise in COVID-19 numbers in Africa. About 7.7 million people in South Africa are HIV-positive, and 60% of those also have tuberculosis (TB) (Wild, 2020). At this stage, it is still unclear what the interactions between COVID-19 and HIV and TB are but, with growing evidence and knowledge, it is evident that the interrelations are complex. People with TB are at higher risk of contracting more severe forms of COVID-19 if they are infected with SARS-CoV-2, and co-infection of SARS-CoV-2, HIV and/or TB could be fatal. A further concern is that 30% of HIV-positive South Africans are still not on antiretroviral therapy (ART) (Avert, 2020a). There is little wonder therefore that the feared spread of SARS-CoV-2 was described as “a ticking time bomb” (Nordling, 2020).

Southern Africa² and HIV

The human immunodeficiency virus (HIV) weakens the

body's immune system and leads to acquired immune deficiency syndrome (AIDS). Antiretroviral therapy (ART) can prevent disease progression, keep infected people healthy, and reduce transmission. The recorded AIDS pandemic began in the USA in 1981 (Shilts, 1988), while the first South African case was reported in 1982 (South African History Online, 2019) and cases were soon identified around the world. By the end of 1997, 30.6 million people were living with HIV, of whom 21 million were in sub-Saharan Africa (UNAIDS, 1998).

By 2000, southern Africa was the epicentre of the global pandemic. In Botswana, up to 36% of adults and 43% of pregnant women were HIV-positive (UNAIDS, 2000). Eswatini (formerly Swaziland) had the world's highest HIV prevalence of 33.4% in 2004 (UNAIDS, 2006; Van Wyngaard, 2006). By the peak of the pandemic in 2006, 2.9 million people had died from AIDS globally, of which 2.1 million died in sub-Saharan Africa, while 1 million deaths occurred in southern Africa (UNAIDS, 2006). However, as ART was rolled out, death rates started falling (Roser & Ritchie, 2019). The 2019 statistics indicated that 38 million people were living with HIV, while 690 000 AIDS-related deaths occurred, of which 201 000 were in southern Africa (UNAIDS, 2020a).

In 2014, the United Nations General Assembly's *Political Declaration on Ending AIDS* set the 90–90–90 targets: by 2020, 90% of people living with HIV would know their status, 90% of those with diagnosed HIV would receive ART, and 90% of those on ART would have viral suppression (UNAIDS, 2014). Four southern African countries have reached these targets: Botswana, Eswatini, Namibia (UNAIDS, 2020b) and Zambia (Centre for Infectious Disease Research in Zambia, 2020). In August 2020, the former Prime Minister of Eswatini, Ambrose Dlamini,³ announced that it was the first African country to not only meet but to exceed these targets (Dlamini, 2020).

It was a bumpy ride from the beginning of the AIDS epidemic. Many governments initially went into denial about the severity of the problem (Van Wyngaard, 2004). The initial price tag of USD 10 000 per year for treatment made it inaccessible for most. Through ongoing pressure from the Treatment Action Campaign under the leadership of Zackie Achmat and Mark Heywood, as well as discussions with multinational partners, the first generic ARV, Aspen Stavudine, was launched in 2003 in South Africa. The annual price for ARVs dropped to USD 185. In 2004, ARVs were eventually rolled out in the public sector. Currently, 14.9 million people in southern Africa are living with HIV, with 10.6 million on ART. Life expectancy has increased from 53 years to 66 years (Beukes, 2019).

Southern Africa and TB

TB is caused by a bacterium, *Mycobacterium tuberculosis*. It is highly contagious and spreads through the air when an infected person coughs, sneezes or spits. Although it is preventable and curable, 1.5 million people die annually from TB, making it the world's main infectious killer; and 40% of deaths of people with HIV are due to TB. People living with HIV are nineteen times more likely to develop active tuberculosis (WHO, 2020a). South Africa is one of seven countries which together accounted for 64% of new TB

cases in 2016 (WHO, 2020b). During 2019, approximately 733 000 people in southern Africa were living with TB, of whom 128 000 died (WHO, 2019b).

TB and COVID-19 are both respiratory diseases which primarily attack the lungs. They have similar symptoms: cough, fever and difficulty breathing. It was anticipated that people co-infected with TB and COVID-19 would have poorer treatment outcomes (WHO, 2020c). In March 2020, Médecins Sans Frontières published on their website that, It's likely that people with lung damage, such as TB patients, or those with weak immune systems, including those with poorly controlled HIV, may suffer from more severe forms of COVID-19, if infected.

Research by Tamuzi et al. (2020, p. 16) on the significance of TB and COVID-19 co-infection, concluded:

HIV/TB co-infection or TB exposures increase the risk of severe/critical COVID-19 and the mortality... Additionally, the HIV/TB co-infected group has the highest risk in the COVID-19 mortality rate and poor recovery rate

HIV, TB and COVID-19 appeared to be the triad that could create the perfect storm within southern Africa, causing the fatal infection of hundreds of thousands of people. Initial models predicted that in South Africa anything between 95 000 and 240 000 people could die due to COVID-19. Although it is still uncertain how far the COVID-19 pandemic will spread, clear lessons are to be learned from TB about ways to limit COVID-19 infection, including the use of masks and contact tracing.

Understanding epidemics

Epidemics can grow exponentially, especially during the initial phase. The rate at which the growth takes place determines how severe an epidemic is (Ma, 2020). According to Bartlett (n.d.),⁴ “[t]he greatest shortcoming of the human race is our inability to understand the exponential function”. In 1990, the doubling time for HIV infections in South Africa was 8.5 months. The effect on HIV infections was clear:

By the end of 1989, the number of HIV-infected black South Africans aged 15–49 years was estimated to be between 45 000 and 63 000, and it is predicted that these numbers will rise to between 119 000 and 168 000 by the end of 1990, and to between 317 000 and 446 000 by the end of 1991 (Padayachee & Schall, 1990, p. 329).⁵

COVID-19's doubling time was initially calculated in days — eleven days from 100 000 cases (4 March 2020) to 200 000 cases (15 March 2020). Seven days later the number exceeded 400 000; another seven days later it was more than 800 000. As the global growth rate steadily decreased, the doubling time increased. On 6 January 2021, the growth rate for new cases stood at 0.77% or a doubling time of 91 days. On the same date, the daily mortality rate was 0.62%, which translates to a doubling time of 112 days (Worldometer, 2021).

In South Africa, initially there was exponential growth in cases — 10 000 to 20 000 in 12 days; to 40 000 in 13 days; to 80 000 in another 13 days; and then to 160 000 and 320 000 within 14 and 15 days respectively. Mortality

grew exponentially too — from 1 000 to 2 000 in 15 days, with subsequent growth to 4 000 and then 8 000 within 19 days each.

As of mid-July 2020, the rate at which new cases occurred in South Africa dropped significantly. Whereas the growth from 160 000 to 320 000 had taken 15 days, the next doubling took 53 days. South Africa had 8 000 deaths at the end of July, the doubling of which had happened over 19 days while the next doubling took 52 days. In the other southern African countries, the rates at which new infections as well as mortality grew (Table 1) were lower than expected considering the high incidence of comorbidities such as HIV, TB, diabetes and hypertension, as well as inadequate medical facilities in the region.

Why does the shape and scale of the epidemic matter? If the numbers rise rapidly, medical services are put under strain. This was evident with HIV, and the ability of ART to keep people healthy in the community was critical. This is why countries took strenuous action to reduce the number of SARS-CoV-2 infections and “flatten the curve”, described by WHO (2020d) as

a more gradual increase in the number of cases per day and a more gradual decrease. Over a long period of time, the number of people infected might be around the same, but the difference is the number of cases that occur each day.

This was essential to ensure that the capacity of the health care system — hospitals, nurses, doctors, and the availability of ICU beds and respirators — was not exceeded. The flatter the curve, the greater the probability that the health care system could continue to deliver care. Flattening the curve is done by slowing the transmission of the virus.

On a non-pharmaceutical basis, this is done by sanitising, respiratory hygiene, applying physical distancing measures and wearing facemasks. On a more formal basis, the recommendations by the WHO were, from the start of the pandemic, focussed primarily on testing, isolating and contact tracing (World Health Organization, 2020e).

Lockdowns

COVID-19 is a highly infectious, primarily respiratory disease. Most infections are through aerosols or droplets exhaled by infected people and inhaled by others nearby.

It was initially believed that significant infection took place through contaminated surfaces (fomites), which accounted for the frenzied response of wiping surfaces and spraying. However, it has since been shown that surface transmission is uncommon (Lewis, 2021).

To a large extent, initial responses to the epidemic in China, South Korea and Japan were viewed as best practice worth emulating. The key non-pharmaceutical interventions were to wear masks, reduce interpersonal contacts, maintain physical distancing, and to isolate and quarantine.

On 23 January 2020, Wuhan announced a lockdown (Bloomberg, 2020). With its population of 11 million, this decision was described as “unprecedented in public health history” (Reuters, 2020a). Measures included banning air and rail travel and restricting travel by car. Large gatherings were banned, and most people were confined to their homes. These measures were replicated across the world. Furthermore, countries set up “test and trace” systems through which people who tested positive for SARS-CoV-2 would provide details of people with whom they had had close contact who, in turn, would also be tested. Everyone found to be infected was then required to remain in quarantine for a specified time. These are all considered to be effective public health responses (WHO, 2020e).

Some governments opted for partial or national lockdowns to contain SARS-CoV-2. By the time South Africa’s president Cyril Ramaphosa announced that a national lockdown would commence at midnight on 26 March, at least a fifth of the global population was sequestered, including India (24 March), China (23 January), France (17 March), Italy (10 March), New Zealand (26 March), Poland (13 March) and the UK on 23 March (Cuthbertson, 2020; Kaplan, 2020; Jones, 2020; Wade, 2020). Apart from restricting the movement of citizens internally, many countries closed their borders and cancelled international travel (Merrick, 2020). In southern Africa, lockdowns of varying stringency and length were implemented, starting with Zambia on 20 March (Nkomesha, 2020) and ending with Malawi on 18 April (Reuters, 2020b).⁶ Two days after South Africa’s lockdown started, Professor Francois Venter, a director at Wits University’s Ezintsha research unit remarked: “We cannot behave like the US and stick our heads in the sand. We need to support the lockdown and case finding urgently” (Geffen, 2020).

Table 1: COVID-19 data for southern African countries as of 6 April 2021 (*Worldometer*, 2021)

Country	Positive cases		Mortalities	
	Number	Growth rate	Number	Growth rate
Angola	22 717	0.37%	543	0.24%
Botswana	41 710	0.66%	616	1.18%
Eswatini	17 354	0.02%	669	0.04%
Lesotho	10 707	0.03%	315	0.01%
Malawi	33 673	0.07%	1 124	0.13%
Mozambique	68 227	0.22%	782	0.33%
Namibia	44 886	0.31%	538	0.68%
South Africa	1 552 416	0.06%	52 995	0.08%
Zambia	89 009	0.16%	1 222	0.26%
Zimbabwe	36 934	0.04%	1 525	0.05%
Total	1 917 633		60 329	

Perspectives on the low infection and mortality rates in southern Africa

In common with much of the world, South Africa has seen two waves of COVID-19 cases. The first peaked in mid-July 2020 at about 12 600 new cases per day; the second peaked in mid-January 2021 at about 19 000 new cases. Deaths followed a similar pattern: 304 on 10 August 2020 and 578 on 18 January 2021 (Worldometer, 2021)⁷. Over the duration of the pandemic to date, the death rates per million have been about 893 in South Africa, 573 in Eswatini, and 65 in Zambia, compared with 1 738 in the USA, 1 865 in the UK and 2 622 in Czechia (Worldometer, 2021).

The relatively low infection and mortality rates in southern Africa were met with curiosity and speculation about possible explanations, including by us. One argument is that a lack of testing and vital registration means numbers are undercounted (*The Economist*, 2020a), although we are not convinced that this is necessarily the case in most of southern Africa.

One of the main indicators for morbidity is the age structure of a population because age plays a significant role in how deadly SARS-CoV-2 can be.

On the basis of British figures, David Spiegelhalter, who studies the public understanding of risk at Cambridge University, has calculated that the risk of death from covid increases by about 13% for every year of age, which means a 65-year-old is 100 times more likely to die than a 25-year-old (*The Economist*, 2020b).

Italy, with an infection fatality rate of 3% (one of the highest in the world), also has one of the oldest populations. The median age in the country is 47.9 years and 23% of the population is over 65. Of the COVID-19-related deaths, 85.4% occurred in people older than 70 (Statista, 2020). In southern Africa, median ages vary from 16.8 years (Angola) and 27.3 years (South Africa). Africa's much younger population is an important contributing factor to the lower mortality rates there (Dowd et al., 2020). In South Africa, 94.7% of the population is aged below 65 years; in Angola it is 97.6%, while other countries in the region fall between these two extremes (*Our world in data*, 2020).⁸

Other reasons for variations in infection levels have been considered, from higher temperatures and humidity (Kifer et al., 2020), to the Bacille Calmette–Guérin (BCG) vaccine, which is universally dispensed in southern Africa (Zwerling et al., 2011; BCG World Atlas, 2020). Research has indicated that “a national BCG vaccination program seems to be associated with reduced mortality of COVID-19” (Urashima et al., 2020, p. 1). Finally, there have been suggestions that previous coronavirus outbreaks (less serious than SARS, MERS or SARS-CoV-2) may have led to some form of immunity among populations (Ellis, 2020), especially where people live close together (Harding, 2020).

HIV and SARS-CoV-2: Limited lessons

Responses to COVID-19 have benefitted from southern Africa's experiences with AIDS.

Identifying at-risk groups

The at-risk groups for HIV infection vary. In Eastern Europe, HIV was predominantly among people who inject drugs (Avert, 2019a). In Western and Central Europe as well as North America, HIV was first identified among men who have sex with men (MSM) (Avert, 2019b). In southern Africa, the virus is transmitted mostly sexually through heterosexual contact, although there is a significantly higher prevalence rate among sex workers and MSM. Identifying these groups most at-risk made it possible to focus on them. The early discovery of mother-to-child transmission meant that effective interventions could be put in place. The number of HIV infections among 0 to 14-year-olds fell from 1.1 million in 2010 to 84 000 in 2018 (Avert, 2020b).

Age plays a significant role in the mortality and morbidity of those infected with SARS-CoV-2 (Centers for Disease Control and Prevention, 2020), although the presence of other comorbidities further raises the risk of dying (Begley, 2020). There is a marked difference in the incidence of mortality in those older than 65 and those younger than 65:

The severity and outcome of coronavirus disease 2019 (COVID-19) largely depends on a patient's age. Adults over 65 years of age represent 80% of hospitalizations and have a 23-fold greater risk of death than those under 65 (Mueller et al., 2020, p. 1).

A targeted response, therefore, is to shield the elderly and prioritise them for vaccination.

Knowing your status

From early in the AIDS pandemic, emphasis was placed on “knowing your status” which, prior to ART, was essential for risk-reduction and behaviour change (Hatzold et al., 2018). In 2007, WHO suggested that voluntary counselling and testing programmes be supplemented with provider-initiated HIV-testing and counselling (PITC) services for testing all adults and adolescents seen in health facilities (WHO, 2007). Hence, a culture of being tested, knowing one's status, and adapting one's lifestyle accordingly, is already established in southern Africa.

On 16 March 2020, the Director-General of the WHO briefed the media about COVID-19 saying:

We have not seen an urgent enough escalation in testing, isolation and contact tracing — which is the backbone of the response...the most effective way to prevent infections and save lives is breaking the chains of transmission. And to do that, you must test and isolate. You cannot fight a fire blindfolded. And we cannot stop this pandemic if we don't know who is infected. We have a simple message for all countries: test, test, test. Test every suspected case. If they test positive, isolate them and find out who they have been in close contact with up to 2 days before they developed symptoms, and test those people too (WHO, 2020e).

The importance of testing, tracing and isolating has been confirmed (Griffin, 2020; Mamas, 2020; National Institute on Aging, 2020; Sanchez, 2020). Many countries in Africa had a “pandemic response infrastructure” in place, based on former experiences. For example, Liberia lost almost 5 000 people to Ebola and, based on this experience, the country started screening for COVID-19 at airports at the beginning

of 2020. Travellers from countries with more than 200 positive cases were quarantined (Attiah, 2020).

Infection control measures

Sub-Saharan Africa has, over the last ten years, coped with the emergence of infectious diseases such as cholera, Ebola, Lassa fever, monkeypox, and chikungunya fever (Tangwa & Munung, 2020). There was no doubt that SARS-CoV-2 would reach Africa and that the effects of the virus could be worse than elsewhere (Steinwehr, 2020).

Building on experience with past epidemics, African countries responded to WHO recommendations to make preparations even before it was declared a public health emergency of international concern (Tangwa & Munung, 2020, p. 3):

Lesotho launched a COVID-19 fund even before it recorded its first case; South Africa assembled its finest scientific minds to advise the government in its response; Sierra Leone, a country devastated by the 2014 Ebola epidemic, closed its borders even before recording a single case; and the Democratic Republic of the Congo (DRC), barely recovering from an Ebola outbreak and completion of Ebola vaccine trials, was not going to fold its arms and was ready, once more, to implement strict research and public health measures.

And,

[i]t has been reported that the experiences of sub-Saharan African countries in handling ongoing outbreaks and managing infectious diseases such as Ebola, tuberculosis, malaria and HIV came in handy in the fight of COVID-19. Pre-existing emergency plans on public health interventions, community engagement programs and the work force composed of emergency medical experts and trained health care workers were quickly redirected to ensure a fast response to COVID-19 (Umviligihozo et al., 2020, p. 4).

This preparedness was evident in precautions adopted by health care workers both in the formal and informal sectors. They are trained to protect themselves and others, especially when they have contact with TB patients. They are familiar with the correct use of gloves and masks as well as other protective attire (*The Economist*, 2020c).

Lessons learned from past mistakes

Leadership during the AIDS crisis was catastrophic. In 1999, then South African president Thabo Mbeki questioned the usefulness of ART and even whether HIV caused AIDS. This resulted in the loss of many lives (Chigwedere et al., 2008, p. 412):

More than 330 000 lives or about 2.2 million person-years were lost due to the failure to implement a feasible and timely ARV treatment programme in South Africa. Thirty-five thousand babies were born with HIV, resulting in 1.6 million person-years lost by not implementing a mother-to-child transmission prophylaxis programme using nevirapine. The total lost benefits of ARVs are at least 3.8 million person-years for the period 2000–2005.

WHO declared the global COVID-19 pandemic on 11

March 2020 (WHO, 2020f). On 15 March 2020, President Ramaphosa addressed the nation, declaring a national state of disaster and announcing immediate measures to try and stem the spread of the virus (Ramaphosa, 2020). A nationwide lockdown commenced at midnight on 26 March 2020, as advised by the National Coronavirus Command Council (NCCC). Professor Salim Abdool Karim, the chairperson of the MAC, noted that the leadership of the country was willing to listen to the medical experts and act decisively and quickly.⁹

Conclusion

The reasons for the relatively low incidence of COVID-19 as well as COVID-19-related mortalities in Africa are being researched and speculated over. The entire continent has recorded less than 4.5 million cases and 120 000 deaths, whereas North America and Europe have identified more than 37 million and 42 million cases respectively; North America has had 841 000 deaths, while Europe registered almost one million deaths. South Africa ranked twentieth for COVID-19 cases on the Worldometer website on 15 April 2021, followed by Morocco in 39th place. In terms of a rate per million, the highest-ranking African country is again South Africa at 86th in the world (Worldometer, 2020). While southern African data on COVID-19 might not be entirely accurate, the number of tests per million of the population in countries such as Botswana, South Africa, Eswatini, and Namibia is sufficient to suggest that there is not an attempt to present inaccurate data (Worldometer, 2021).

Currently, there are evident benefits from past experiences with AIDS and even more so where it is associated with the TB epidemic. However, correlation does not necessarily imply causality. We have previously noted that the legacy of the struggle against AIDS cannot be its usefulness in the fight against COVID-19 (Whiteside & Van Wyngaard, 2020).

COVID-19 will likely have a huge adverse impact on the health of South Africans, not only through morbidity and mortality, but also due to economic, social and related impacts of the pandemic. Following a worldwide trend, GDP growth has stalled, while unemployment and poverty have increased (Statista, 2021). One very real effect of COVID-19 has been a decrease in people seeking basic health care, including those who are HIV positive not collecting their medication due to fears of contracting COVID-19 and valid perceptions that health services are overwhelmed (Nyasulu & Pandya, 2020).

This story is still evolving but there is no doubt that COVID-19 presents the worst health crisis of the century. However, ironically, it may be due to southern Africa's experience with HIV and other related comorbidities that the region was better prepared for COVID-19 than many other countries with better health care systems.

Notes

¹ We follow the terminology and spelling used by the World Health Organization: SARS, MERS, SARS-CoV-2, COVID-19, HIV and AIDS.

- ² Southern Africa comprises Angola, Botswana, Eswatini (formerly Swaziland), Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.
- ³ On 13 December 2020, Ambrose Dlamini passed away due to COVID-19.
- ⁴ Albert Bartlett (1923–2013) was a professor of nuclear physics at the University of Colorado.
- ⁵ The classification of people by 'race' was a cornerstone of apartheid in South Africa. Statistics from that time bear this hallmark.
- ⁶ This intervention will be debated as the consequences have been significant as shown in a new series of articles by the Center for Global Development, one of which looks specifically at the direct and indirect health effects in South Africa (Smart et al., 2021). The article investigates the potential impact of lockdown measures on COVID-19 transmission, and other health and non-health indicators in a range of settings.
- ⁷ All are seven day moving averages.
- ⁸ New variants of the virus, such as B.1.1.7, seem to lead to younger people being affected (Morris & Mukherjee, 2021), although this still needs to be confirmed (Chow, 2021).
- ⁹ Unfortunately, this united stand wobbled in June 2020 when scientists on the Ministerial Advisory Council (MAC) criticised the mass testing programme because resources were constrained and argued for sharper focus (Evans et al., 2020). This resulted in the then Minister of Health, Dr Zweli Mkhize, first disbanding and then reconfiguring the committee with at least three senior scientists being dropped (Cowan & Karrim, 2020).

ORCID iDs

Arnaud van Wyngaard – <https://orcid.org/0000-0003-1193-1911>

Alan Whiteside – <https://orcid.org/0000-0003-1157-968X>

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