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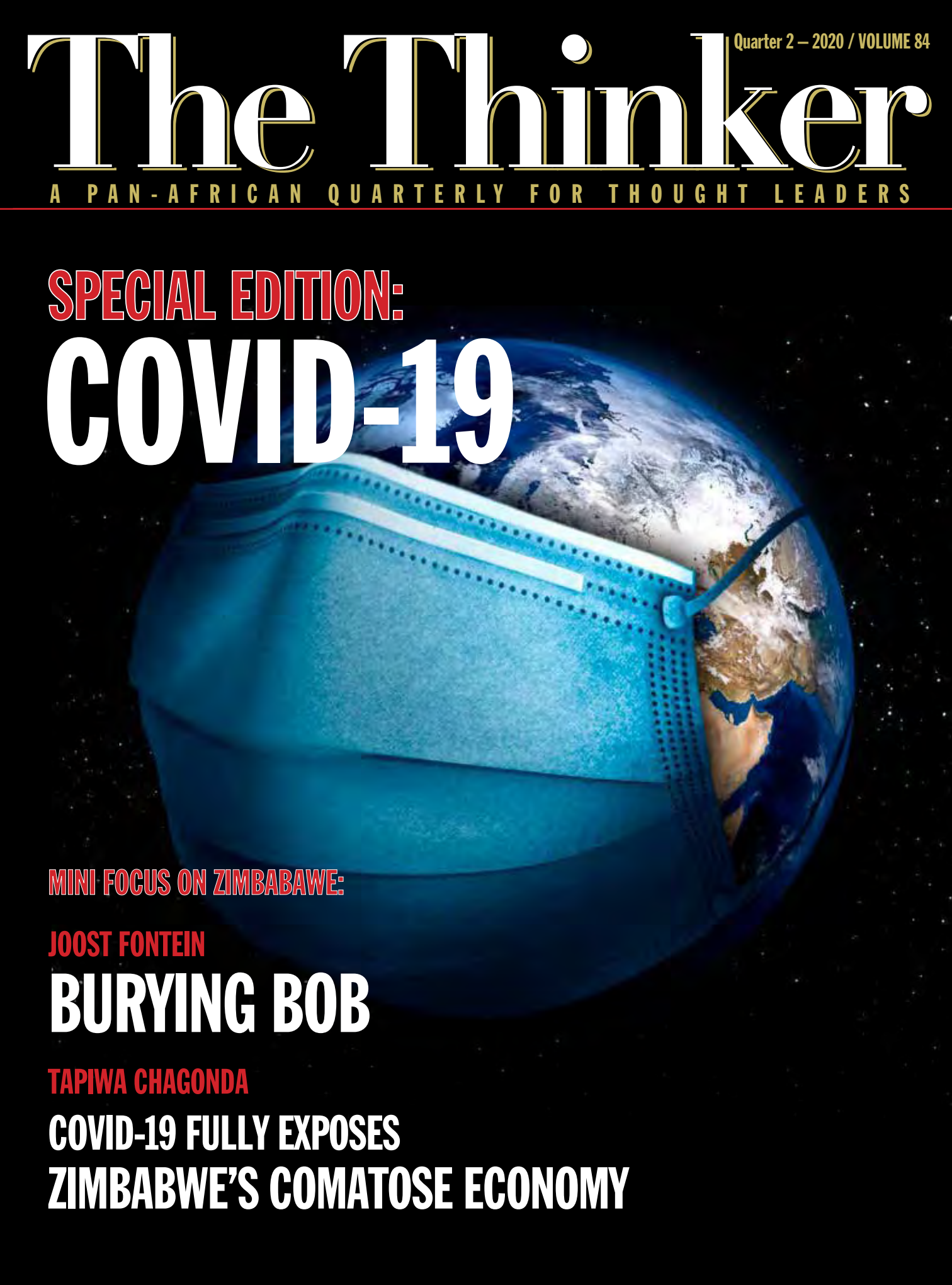
The Thinker

A PAN-AFRICAN QUARTERLY FOR THOUGHT LEADERS

SPECIAL EDITION:

COVID-19



MINI FOCUS ON ZIMBABAWE:

JOOST FONTEIN

BURYING BOB

TAPIWA CHAGONDA

COVID-19 FULLY EXPOSES ZIMBABWE'S COMATOSE ECONOMY

The Thinker

A PAN-AFRICAN QUARTERLY FOR THOUGHT LEADERS

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In This Issue

In memory of our beloved colleague Liesel Van Der Schyf who died suddenly on Sunday 7 June 2020. Hamba Kahle Liesel.

NOTE FROM THE EDITOR

The University of Johannesburg acquired *The Thinker* in April 2019 from Dr Essop Pahad. Over the last decade, *The Thinker* has gained a reputation as a journal that

Prof Ronit Frenkel

Frenkel, as the incoming editor, plans on maintaining the pan-African scope of the journal while increasing its coverage

The Thinker is a 'hybrid' journal, publishing both journalistic pieces with more academic articles and contributors can now opt to have their submissions peer reviewed. We welcome Africa-centred articles from diverse perspectives, in order to enrich both knowledge of the continent and of issues impacting the continent.

CONTRIBUTORS TO THIS EDITION – All contributing analysts write in their personal capacity

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Burying Bob

By Joost Fontein

The death of Robert Mugabe, or 'Bob' as he was irreverently known by many Zimbabweans, was always likely to be something of an event. Having ruled Zimbabwe for 37 years, and as nearly the last of a whole generation of African liberation leaders in the region, Bob was in equal measures revered, feared, respected and despised across his country and beyond. For many across the wider region, he remained a respected figurehead of anti-colonial struggle, perceived as a welcome thorn in the side of 'Western' and global interests, and an icon of widely-resonating struggles for land and economic re-distribution. On the other hand, many ordinary Zimbabweans (those living in Zimbabwe and the millions etching out precarious lives in its diaspora) held a different opinion. After two decades of relentless economic crisis, political polarisation and numerous failed attempts to replace him electorally – often at enormous cost in terms of the violence unleashed against any perceived political opposition – Bob's death in office had long been anticipated as the only way that things were ever going to change, the only way that Zimbabwe's social, political and economic problems could ever be resolved.

Meanwhile, for a hard core of ZANU PF loyalists, across different sides of its complex and fiery internal factionalism, Bob remained very much the 'hallowed' father of Zimbabwean independence, as indeed those responsible for 'Operation Restore Legacy' – the 'soft' coup that unexpectedly pushed him out in November 2017 – have been at pains to maintain since taking over the presidency. For all these reasons, his death was always going

to be significant, albeit in different ways for different people. It was also long-anticipated: he was 95 and, until 2017, one of the world's oldest serving presidents. Since the early 2000s, when I began fieldwork in Zimbabwe, people had been expecting, and maybe hoping, that he would kick the bucket soon. There were endless recurring rumours about his ill health, and his many expensive trips to see doctors in Singapore. Yet he often seemed to rebound, fist waving and strong, still masterly manipulating ZANU PF's rivalries and factions, so that Zimbabweans grimly joked that maybe he would never die. It only became harder to conceal his evident frailty in his latter years.

In many ways, Bob himself was responsible for much of the anticipated significance of his death. Ever the ideologue, Bob had – since independence – constituted, politicised and instrumentalised the national commemoration of Zimbabwe's liberation struggle through a system of district and provincial 'heroes' acres' across the country, with its zenith at the National Heroes' Acre in Harare (Werbner, 1998). A deeply partisan and much-contested process – long criticised for its narrow version of liberation history and for its marginalisation of so many other contributions to Zimbabwean independence – the 'national heroes' system had become increasingly central to what some called 'Mugabeism' (Ndlovu-Gatsheni, 2015), or ZANU PF's 'chimurenga politics' (Chigumadzi, 2018). The historian Terence Ranger called the system 'patriotic history', especially in the wake of land reform and deepening political and economic crises in the 2000s. ZANU PF's controversial control of commemoration and the selection of its 'national heroes' is a key part of what I think of as Zimbabwe's 'politics of the dead' (Fontein, 2009). Every year, Bob would lead annual 'heroes' day' celebrations and an increasing number of state funerals at Harare's National Heroes' Acre (as more and more of the liberation generation passed away). These were opportunities he apparently relished a great deal, as he rambled and ranted at tedious length, endlessly recanting his own revised versions of history, over the deceased bodies of ZANU PF's designated heroes, to bored bussed-in audiences or on national television broadcasts. Among the many hundreds of other graves, some Great Zimbabwe-style walling, and some fairly garish North Korean sculpted monuments, Bob's supposed burial spot had already long been marked out: on a top terrace next to Sally, his late first wife.

Given all of this anticipation, and indeed preparation, it is therefore notable that the first announcements of his death in Singapore, on 6th September 2019, were met with notable ambivalence among many Zimbabweans. Some of this ambivalence was predictable for a leader as controversial and polarising as Mugabe. A seemingly endless stream of obituaries, statements and commentaries by politicians, journalists, commentators and scholars quickly emerged. These could be categorised into three groups. Firstly, there were those who continued to valorise Bob's liberation past, including respected international figures like Graca Machel, spouse to Samora Machel and, later, to Nelson Mandela. Secondly, there were those who, for very good reasons, continued to vilify him, both for the economic mess Zimbabwe has endured for almost two decades, but even more so for the political violence of that period, including the atrocious, unresolved crimes of the *gukurahundi* massacres in the 1980s, when an estimated 20,000 civilians in Matabeleland and the Midlands were killed by the North Korean trained Fifth Brigade. Thirdly, there were those who sought to construct a middle path between Mugabe's 'heroic' liberation past fighting against extreme Rhodesian belligerence in the 1960s and 1970s, and his markedly mixed postcolonial record. Some of these accounts point to the positive, enduring legacies of Bob's expansion of free education and health care in the 1980s, whilst others frame his complex past in a familiar narrative of 'hero turned villain' under the global pressures of neo-liberalism, or in the context of a wider disillusionment with the postcolonial dispensation across the region. Sometimes,

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“These ambivalences about Mugabe’s complex legacy were to be expected. What struck me, however, in speaking to Zimbabweans – and in reading the newspaper reports, blogs, commentaries, and twitter feeds that circulated immediately after his death – was a different kind of ambivalence, bordering on resigned indifference, or even disinterest.”

such commentaries appealed to the necessity of ‘not speaking ill of the dead’ to euphemise their biographies and obituaries. While the injunction to not speak ill of the dead has particular, and powerful, cultural connotations in a Zimbabwean context (which I return to below), others – such as Ruth Murambadoro (2019) – countered that there is no such thing as an injunction against speaking of the dastardly deeds of someone like Bob.

These ambivalences about Mugabe’s complex legacy were to be expected. What struck me, however, in speaking to Zimbabweans – and in reading the newspaper reports, blogs, commentaries, and twitter feeds that circulated immediately after his death – was a different kind of ambivalence, bordering on resigned indifference, or even disinterest. Quoted in *The Guardian*, for instance, was the following comment from a young woman – Esther Moyo – who attended Mugabe’s funeral primarily because it was an opportunity to sell more peanuts: ‘Mugabe is the reason we are in this mess…I just came here to sell my snacks to make a living…and to make sure the old man was really dead’ (Burke, 2019). For the many Zimbabweans scratching out a meagre living in its informal sector, or forced abroad to work low-level jobs in the face of xenophobic violence in South Africa, or increasingly vitriolic anti-immigration policies in the UK and elsewhere, Bob’s death was just too far away, too inconsequential to their daily lives, and maybe far too late to really matter. This kind of ambivalence and indifference seemed to suggest that Mugabe’s death was just a big anti-climax.

Given how long Mugabe had been expected to die in office, as he (and those around him) had often implied, and for how long it had been assumed that this would be the moment of long-awaited political change, perhaps it was his unexpected removal from office two years earlier – and his demise into political irrelevance soon afterwards – that led to his death not being as big a deal as many had long expected. In a sense, he was already dead politically, regardless of the continuing activities of the so-called G40 faction ousted with him in November 2017, and the suggestions that Bob had switched his support to the Movement for Democratic Change (MDC) opposition in the 2018 elections. Moreover, as the new regime’s claims to offer a more tolerant ‘open for business’ kind of politics rapidly lost credibility with new outbreaks of state-sponsored violence and killings in August 2018 and January 2019, amidst a new wave of disappearances, and as the economy again faltered, any promise that Mugabe’s demise would offer meaningful change had already evaporated. Conversely, for some, perhaps only a few, Bob’s death could even be construed as meaningful only in so much as his successor has been shown to be even worse, with all of Bob’s violence and intolerance, and none of his eloquence. If this kind of ambivalence can be represented, then perhaps it was best expressed in satirical memes that circulated on social media in the weeks after Bob’s death, reflective of a particularly caustic political humour. My favourite is an image (entitled ‘Pastor Lukau has done it again’) of Bob photo-shopped onto a now famous photograph of a man sitting up in a coffin, surrounded by a church congregation, having allegedly been brought back to life.

This kind of ambivalence, bordering on resigned indifference, seemed to be confirmed by reports that suggested that Mugabe’s lying in state at two stadiums in the capital – and later at his rural home in Zvimba – were marked by poor attendance and a lack of public interest. It is therefore notable that other reports, particularly in the government press, were keen to emphasise the large numbers attendant at the airport to welcome his remains home and at various public vigils, as well as the number of international visitors who flew in to take part in the state funeral in September 2019. The actual numbers involved in these events were always likely to vary, and are hard to measure. There is a history of inflated figures for such events, and of people being bussed in by the ruling party, as well as of people gate-crashing funerals simply for the promise of food or drink. More intriguing is the possibility that Mugabe’s death being a non-event for a disinterested Zimbabwean public might not

have passed muster for those for whom his death presented political opportunities too good or too problematic to ignore.

But if that was the case, there was no need for concern. The shenanigans that quickly emerged after Mugabe's state funeral, about where and how to bury him, ensured that his death would, after all, become a memorable and controversial event, fitting of the 'politics of the dead' that Bob himself had done so much to foster. These burial controversies reflected what scholars working elsewhere have written about in terms of the 'political lives of dead bodies' (Verdery, 1999) or a reinvigorated 'carnal fetishism' across the region (Bernault, 2006; Cohen and Odhiambo, 1992). Mugabe's burial turned out to be far more intriguing and revealing than the initial sense of general ambivalence and disinterest had promised, suggesting indeed, as my favourite meme also implied, that it was Bob himself who had 'done it again' – ensuring that, in death as much as in life, Zimbabwean politics would continue to circulate around him.

It was always likely that the new political regime of Emmerson Mnangagwa – also known as ED or the *'ngwena'* ('crocodile') – would be keen to ensure that Mugabe was interred at the National Heroes' Acre, and appropriately enshrined as one of independent Zimbabwe's foundational heroes. Although Mnangagwa has been at pains to be seen to be creating distance from the previous regime (by seeking to re-engage the international community, by claiming to promoting fiscal discipline and political tolerance, and even by promising to deal with the unresolved legacies of the *gukurahundi*), the truth is that his politics do not radically rupture from Mugabeism. Even the 'soft coup' itself was carefully presented as an effort to preserve Bob's and ZANU PF's liberation legacy from the young miscreants gathered around him, including his deeply-disliked and vitriolic second wife, Grace. This was not just about needing regional legitimacy from the Southern African Development Community (SADC) and the African Union (AU), although that did matter. It was more because – as key lieutenants in forging the ideology and political stylistics of 'Mugabeism' – the new leadership has always been invested in ZANU PF's 'chimurenga politics': a politics that can be markedly gerontocratic and misogynistic, as clearly demonstrated in the vilification of the former vice-president Joice Mujuru by Grace Mugabe (leading to Joice's removal from office in 2014), and later of Grace Mugabe herself by the regime that ousted her husband. The new regime's determination to preserve its claim on the legacies of Mugabeism explains the great care that was taken to ensure that Mugabe, his wife and his family were well-cared-for and given a very generous 'retirement' package after his removal in November 2017. This is also why efforts were constantly made to publicly reconcile with Bob and Grace following his ouster, even if Bob himself was not so keen to play ball. In short, Mnangagwa's government were deeply invested in ensuring that Mugabe took his place at the National Heroes' Acre, in order to bestow his liberation legacy, ideology and legitimacy onto the new regime. Even as arrangements for Bob's funeral and burial were being discussed, Mnangagwa presided over the burial at the National Heroes' Acre of another senior ZANU PF and military commander – Major General Trust Mugoba, who had coincidently died on the same day as Mugabe – illustrating Mnangagwa's commitment to continuing the narrow politics of ZANU PF-controlled commemoration that his predecessor had forged.

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But it seems Bob had anticipated that his former ZANU PF underlings would try to make use of his death in this way. Bitter and resolute, Mugabe apparently indicated before his death that he did not want to be buried at the National Heroes' Acre, preferring instead to be buried at his rural home in Zvimba, as indeed is common among many who have rejected burial at the National Heroes' Acre. The ironies reverberate here. Mugabe himself had presided over the burials of many former ZANU PF stalwarts who, having fallen out with him in life, had publicly refused to be buried

at the National Heroes' Acre before their deaths, but were subsequently interred there anyway. This reflects, as I have discussed elsewhere, ZANU PF's tendency to instrumentalise and contain in death those who had defied them in life (Fontein, 2018). Through his will, and what he allegedly told his relatives in August before he died, Mugabe was doing the same. Understanding well how these politics worked, he was not prepared to allow his former comrades – who had so unceremoniously removed him from office less than two years before – to use his body to prop up their ideological cause, however much he himself had been an author of this style of politics in the first place.

Almost as soon as Mugabe's body touched down at Harare airport, if not before, reports began emerging of a dispute between the government and Bob's relatives, especially his wife Grace. The freneticism of the plans for the viewing of his body in two stadiums in Harare, and its journey to Zvimba for memorial services and body viewing there, seemed to reflect the unsure direction in which his burial would proceed. At first, the tension about where he should be buried appeared to be, rather simply, between the government who wanted him interred at the National Heroes' Acre, and the family – headed by Grace and supported by community and clan elders and chiefs in Zvimba – who wanted him buried according to his own wishes, and according to local traditions, amongst other 'chiefs' in a secret cave near his rural home. Many recognised Bob's wishes as a deliberate last snub to those who had ousted him, aware that ZANU PF would find it difficult to impose its will, having already publicly committed itself to respecting Mugabe's and his family's wishes. Evocative statements from some relatives – especially from Leo Mugabe (his nephew) – that Mugabe had been hounded to an early death by the way ZANU PF had treated him after the coup (later repeated by South Africa's fire-brand Economic Freedom Fighters (EFF) leader Julius Malema, when he visited to pay his respects) clearly upped the pressure on the ruling party.

It was therefore with some surprise that news was received a few days after his funeral that the family had, reluctantly, agreed to allow Mugabe to be buried at the National Heroes' Acre. The negotiations must have been tense and acrimonious, especially because the agreement

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arrived at was that Bob would not be interred in the long-vacant spot next to Sally, his first wife, but rather in a new, still-to-be-built 'mausoleum' to be hastily constructed at a spot on the summit of the small hill at Heroes' Acre, identified by some of his immediate relatives. This would take some weeks to build, and many began to wonder how long Bob's body would be lying in state, or ferried between Zvimba and the enormous, garish 'Blue Roof' mansion in Harare where he and Grace had lived.

According to common cultural beliefs and practices related to death in Zimbabwe, the period between someone's death and their burial is often seen as a particularly anxious and unsettled period, because the spirit of the deceased is believed to hover around the body dangerously. Grace Mugabe spent much of this period under a heavy black veil, maintaining a vigil around her late husband's corpse. Many mused that Grace must have managed, in some way, to get her way by refusing to allow Bob to be buried next to his still-popular first wife. Others either applauded or strongly critiqued the decision to build a new separate and elevated mausoleum for Mugabe, as either befitting of his unique legacy, or as an obvious extenuation of ZANU PF's long-running politics of distorting Zimbabwe's liberation past by privileging some legacies and contributions, and denigrating others. Indications of the pressure that Mnangagwa's regime must have placed upon Grace and Bob's relatives became clearer when it emerged a few days later that the title deeds on the Blue Roof and another Harare house owned by the family were listed in ZANU PF's name, but would now, out of concern for the former first family's wellbeing, be transferred into their name. Suggestions that the threat of withholding these title deeds had been waved over the family's heads, in order to get their approval, revealed the extent

Harare,Zimbabwe,18 November 2017.Protesters showing a sleeping -Mugabe during anti-Mugabe rally in solidarity with the military intervention.

to which ZANU PF were invested in ensuring that Bob would be interred at Heroes' Acre.

Soon, however, the politics surrounding Bob's burial became even more complex, after it emerged that Grace had wanted Mugabe buried at the Blue Roof mansion in Harare, but the city authorities had refused permission, citing city by-laws. Not only is it likely that the city authorities could have succumbed to ZANU PF pressure to refuse this request, but this detail also suggested that Grace, Bob's children and the rest of Bob's family, let alone the chiefs and community elders in Zvimba, were not necessarily speaking with the same voice at all. This was later confirmed when it emerged that several Zvimba chiefs had fallen out with Grace, and were forcibly ejected from her ongoing vigil around the corpse, because they had sided with ZANU PF, and argued that Bob should in fact be interred at Heroes' Acre in Harare.

The controversies deepened further soon after. With building work on the mausoleum already proceeding, it was suddenly announced – on September 27th 2019 – that plans had changed again, and that Bob would now be buried in Zvimba after all. Robert Mugabe was then hastily buried one day later in a specially-designed casket and a cement-lined grave at the centre of his family homestead. The event was a private, guest-list-only affair, which Mnangagwa did not attend. The causes of the family's change of mind remain open to speculation, although the role of Julius Malema, and his outspoken critique of ZANU PF's pressure on Grace and her family, was quickly identified by some as a key factor. That Mugabe was buried in the centre of his homestead, and not in a special and secret burial location for Zvimba elders and chiefs, as had earlier been suggested, confirmed that Grace and the family had indeed likely fallen out with local community elders, as well as with the ruling party. It later emerged that

> “There have long been whiffs of the ‘occult’ to ZANU PF’s style of politics, and to its internal factionalism. This dimension of Zimbabwean political life is as broad and diverse as religious and spiritual life in Zimbabwe in general.”

Leo Mugabe – self-styled family spokesman – had also been excluded from the family burial, amid rumours that he and Grace had fallen out after Grace accused Leo of taking bribes from ZANU PF to ensure Bob’s burial in Harare. Whatever family intrigues were at play, however, the end result was a kind of double ‘fuck you’ to Mnangagwa and his new regime, with the half-built mausoleum at Heroes’ Acre affirming that Bob was not only better than any other ZANU PF hero, but that he had also managed to defy his ousters till the very end. It will be curious to see what the longer term fall-out will be, but it is likely that a furious Mnangagwa will find some appropriate way to respond.

As if all of this is not enough, there is yet another dimension to the controversies surrounding Bob’s burial that is worthy of comment. After the burial, reports and rumours soon began to emerge that throughout the troubled negotiations between Grace, the family and ZANU PF, great concern had been circulating about ensuring that Bob’s body was protected from any nefarious attempts to tamper with his corpse, or to remove his body parts. This, some suggested, was the reason for Grace’s apparent refusal to allow Bob’s body to be held at any city morgues or at One Commando barracks, where national heroes are usually kept preceding burial. And it was this concern which fuelled (rumours suggest) Grace’s exhausting (but well-performed) mourning vigil, and her insistence that Bob’s body could only be kept and displayed under careful guard at her home in Harare, and later in Zvimba. According to Leo Mugabe, Bob had himself been concerned that his enemies might want to steal and make use of his body parts for nefarious rituals to accrue ‘occult’ power. These suggestions fed rumours circulating in the press and on social media about the number of different coffins that Bob appeared to have been displayed in during the weeks since his death, as well as reports that a special ‘tamper-proof’ coffin had been constructed for him to be interred in. Reflecting the duplicity that is common to such rumours, Grace’s long and tortured vigil performance later sparked suggestions that it was she herself who had sought to make nefarious use of Bob’s potent corporeality.

There have long been whiffs of the ‘occult’ to ZANU PF’s style of politics, and to its internal factionalism. This dimension of Zimbabwean political life is as broad and diverse as religious and spiritual life in Zimbabwe in general. It ranges from the long-term association of some strands of African nationalism with spirit mediums, ancestral practices and so-called ‘traditional religion’ (which has been well-discussed in the literature), to increasingly spectacular overtures towards new charismatic Pentecostal movements in recent years. It extends to include both the ridiculous – such as the much-mocked involvement of Mugabe’s top ministers with the fraudulent ‘Diesel N’anga’, who claimed to procure refined diesel from rocks in Chinoyi, in 2007 – to the downright malicious, such as the accusations of witchcraft that Grace Mugabe levied at two previous vice-presidents (first Joice Mujuru, and then Mnangagwa who replaced her in 2014), as part of the intensifying factional politics of Mugabe’s latter years in office, which led to both losing their positions. Conversely, the statements, rumours and claims associating Mugabe’s rule with some kind of divine, ancestral, or even occult providence have often contributed to the aura of totalising, all-encompassing power and supremacy that was weaved around him. Although sometimes the cause of ridicule, these dimensions of ZANU PF politics are extraordinarily effective and affective. This derives from their uncertain duplicity: both their ability to cast any perceived opposition into an over-determined position of absolute malevolence and, conversely, in making Mugabe appear transcendental, omnipotent, and untouchable. Seen in this light, there is nothing particularly unusual or ‘exotic’ about this stylistics of power. It is with this in mind that we should seek to understand the corporeal politics of the dead that circulated around Bob’s cadaver, which Grace performed so magnificently.

There are deep cultural aspects of Zimbabwean beliefs and practices to do with bodies and the

dead, which cross over religious tensions and transformations between regional ancestral cults and different kinds of churches (older missionary and African Independent churches, and more recent Pentecostal movements). A central belief is that corpses are dangerous between death and burial, both for the often-unhappy spirits of the dead (who during this period are said to 'hover' around them), and for the troubling potential potencies of their corporeal substances. Indeed, a system of funerals, burials and memorial services, culminating in *kugadzira* (Shona) or *umbuyiso* (Ndebele) ceremonies a year or more after death (through which, in more 'traditional settings', it is understood that settled, benign sprits are 'returned' to the homestead from a period of 'exile' in the bush) can be understood as processes of managing the transformation of life into death, of dealing with and containing the dangerous corporeal substances that death involves, and of making people safely and benevolently dead. This is why an injunction against speaking 'ill of the dead' has particular potency in a Zimbabwean context, as dead people are considered dangerous before burial, and before this process is complete. Indeed, there are many cases of relatives of murdered people deliberately not burying their dead in order to force compensation or some kind of response from those deemed culpable, who might become haunted by the dangerous unsettled spirits known as *ngozi*. The fact that Mugabe himself was often rumoured to have been haunted – by the unsettled spirits of people whose death he was said to have orchestrated – illustrates how such cultural beliefs around death can be politically salient. It is also in this context that the long delays around Bob's burial were already politically affective and anxiety provoking. Similarly, it is also common in Zimbabwe for people to be anxious about protecting the graves of recently buried people, because witches and those who practice witchcraft are often believed to eat human flesh. Considered in some respects (and certainly morally) as 'anti-human', witches are understood to demonstrate and substantiate this through consuming the dangerous substances of decaying corpses. It is therefore very common for people to check graves for any signs of disturbance during the days after a funeral. Likewise, grandiose and cemented grave mountings – as have become increasingly common throughout the region – serve to function not only as a way of monumentalising the continuing memory of the dead, but also to keep them contained and secure. Indeed, these two things reinforce each other: a highly monumentalised grave covered in concrete reinforces the power of a dead person as someone not only to be remembered, but whose corporeal substances are themselves potent and dangerous, and in need of being contained and protected.

It is in this context that we can understand how the controversies surrounding where and how Bob was to be buried, which I have discussed above, were aligned with this other more corporeal kind of politics – that is, that the rumours that Grace's exhausting vigil, his tamper-proof coffin and the cement-lined grave, unusually placed in the middle of his rural homestead, were all a response to Bob's own fears that his body parts would be the target of nefarious interference by malevolent interests aligned against him and his family. These rumours and performances all served to reinforce Bob's (and perhaps Grace's) omnipotent salience and corporeal presence in Zimbabwean politics, just as the refusal, then acceptance and then refusal again, to bury Bob at the National Heroes' Acre had ensured that his death and burial would become as eventful and talked about as they were always supposed to be. Bob had indeed done it again. ■

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Joost Fontein joined the University of Johannesburg as Professor of Anthropology in September 2018. This article is an abridged extract from his forthcoming monograph The Politics of the Dead in Zimbabwe 2000 – 2015: Bones, Rumours & Spirits (James Currey 2021). Before joining UJ he was based in Nairobi as Director of the British Institute in Eastern African (2014-18), on secondment from the University of Edinburgh, where he taught social anthropology for seven years (2007-2014). His research explores the political and material imbrications of landscapes, things and human substances. He has done extended periods of ethnographic fieldwork in Zimbabwe since the late 1990s. His doctoral research (Edinburgh 2003), explored the politics of heritage and landscape around Great Zimbabwe National Monument in Southern Zimbabwe. It won the ASA UK Audrey Richards Prize in 2004, and was published as a monograph (UCL Press) in 2006. His second monograph Remaking Mutirikwi: Landscape, Water and Belonging (James Currey, June 2015) was shortlisted for the Melville Herskovitts prize by the ASA USA in 2016, and was reprinted a paperback in 2018. His more recent research has focused on emergence, materiality and becoming in urban contexts, as part of a large multi-authored, collaborative project between scholars and artists that he has co-initiated entitled Nairobi Becoming. For this project he has done ethnographic fieldwork across Nairobi looking at water supply and sanitation in Mathare, at the city's architectural salvage and the demolition industry, and at urban goat keeping and trading at Kiamiako, in Huruma. He is currently involved in two multi-authored, interdisciplinary book projects, one looking at Nairobi, and the other at Temporal frontiers and the excessivity of Time. Since joining the BIEA in 2014 he has also created films and installations for, and co-curated, various exhibitions in Nairobi (at the BIEA and at the National Museum), including Remains, Waste & Metonymy I (October 2015 & February 2016); Remains, Waste & Metonymy II: Sensing Nairobi (February 2017 & June 2017), and Remains, Waste & Metonymy III: Kikulacho Nairobi (February and September 2018). He is a founding member of the Bones Collective research group, a former editor of the Journal of Southern African Studies (2008-2014), and co-founder of Critical African Studies.

Covid-19 fully exposes Zimbabwe's comatose economy

By Tapiwa Chagonda

The Covid-19 pandemic has left Zimbabwe in an extremely difficult catch-22 situation. Given the nation's parlous health system, conventional wisdom would suggest that the country should go into a total lockdown in a bid to contain the spread of the virus. However, such a decision is not easy to implement in the Zimbabwean context. Why is this the case?

Zimbabwe's fragile economy

Zimbabwe has a broken economy which has been shrinking since 2000. In March 2020, the International Monetary Fund (IMF) gave a very bleak assessment of the country's economic performance when it reported that Zimbabwe's economy was thought to have contracted by 7.5% in 2019, the worst performance in Sub-Saharan Africa, with extreme poverty levels rising to 34%, which translates to around 5.7 million people in the country falling under this category (Smith, 2020). The implementation of a total nationwide lockdown – as was announced by President Emmerson Mnangagwa on 27 March 2020, in a bid to halt the spread of Covid-19 (Munhende, 2020) – will most likely inflict further damage to an already extremely fragile economy.

The absence of a stimulus financial package for businesses when the first lockdown was announced might leave some businesses facing total collapse. It is telling that a number of informal traders have continued to defy the lockdown regulations, as many Zimbabweans survive hand-to-mouth from their informal economic activities. Warning signals in the form of whistles are given in areas where informal traders operate, as a way of alerting them to the impending arrival of the police or the army (Mataranyika, 2020).

A full-blown lockdown was never going to work in a context such as the Zimbabwean one, where the economy is in a precarious state. The predicament, however, is that an explosion of Covid-19 cases would leave Zimbabwe's limping health system totally exposed because of its lack of preparedness to deal with the highly infectious virus. The country's main opposition leader, Nelson Chamisa, called for the immediate imposition of a nationwide lockdown in the wake of Zimbabwe's first recorded Covid-19 death on 23 March 2020 (Chibamu and Munhende, 2020). The Mnangagwa regime, however, dithered over making such a drastic call, confirming the government's fears over such a move on an already weakened economy.

The huge informal economy

An IMF working paper released in 2018 suggested that Zimbabwe's informal economy is the largest in Africa and second only to Bolivia's worldwide, as it accounts for at least 60% of all of Zimbabwe's economic activity (Medina and Schneider, 2018). With the imposition of an indefinite nationwide

lockdown on all informal businesses (barring those that sell food), one wonders how the millions of Zimbabweans who make a living through the informal economy will survive, when most of them are already mired in extreme forms of poverty. This may explain why President Mnangagwa exempted those who sell food (who account for a sizeable number of informal traders) from the lockdown regulations (Munhende, 2020). Zimbabwe's first total lockdown was therefore not a *de facto* one, as a sizeable chunk of the informal sector was permitted to continue trading in food. This then raises questions on whether the Covid-19 pandemic can be fully combatted, given the difficulty of exercising social distancing in people's interactions when buying and selling food, in a country that is facing its worst hunger crisis in more than a decade (Smith, 2020). Due to the shortage of essential food staples such as maize meal, one cannot discount the usual stampedes that have been witnessed in the past few months at food markets. President Mnangagwa's caveat of sending health officials and security services to ensure that food markets are operating in a hygienic way and exercising social distancing (Munhende, 2020) shall be tested in the coming weeks.

'Level 2' Lockdown Regulations

On 1 May 2020, President Mnangagwa announced a further two weeks of Zimbabwe's lockdown and, out of the blue, for the first time, started pronouncing Zimbabwe's lockdown levels, by announcing that the extended phase of the lockdown was going to be 'Level 2', which would entail most formal businesses opening between 8 am–3 pm. President Mnangagwa also promised a stimulus package of ZWD 18 billion (USD 720 million) to assist small to medium industries in the informal sector. However, the million-dollar question is where this money will come from. The Zimbabwean treasury's coffers are empty, as was revealed in a leaked letter to the Bretton-Woods institutions by Zimbabwe's Minister of Finance, Prof Mthuli Ncube (Dzirutwe, 2020). In the letter, dated 2 April 2020, Ncube pleaded with the Bretton-Woods institutions for a financial bailout, without which Zimbabwe's economy would totally implode in the wake of the Covid-19 pandemic, which requires a huge purse to combat. Zimbabwe's dire economic situation – compounded by Covid-19 – will probably force the government to print money, which might stoke the fires of hyperinflation which ravaged Zimbabwe in 2008 when the country's inflation rate peaked at an astronomical official rate of 231 million percent (Chagonda, 2016). The country's current rate of annual inflation is believed to be over 500% (Smith, 2020).

Fixing a health system that is in a parlous state

Given the challenges of enforcing total compliance with lockdown regulations in Zimbabwe, the Mnangagwa regime must speedily act on ensuring that the current Covid-19 referral health centres are fully equipped with ventilators and intensive care unit (ICU) facilities. The two designated centres – Wilkins Hospital and Thorngrove Hospital – are currently woefully unprepared for this enormous task (New Zimbabwe, 2020). The government also needs to urgently provide health personnel with the requisite personal protective gear. Hopefully, the fact that Covid-19 does not discriminate between elites and the poor – a point that has been made more stark by global travel restrictions which now make it impossible for the high-heeled in Zimbabwe to seek medical treatment internationally, as has been the case in the past – will hasten the Mnangagwa regime's actions on this very serious issue. ■

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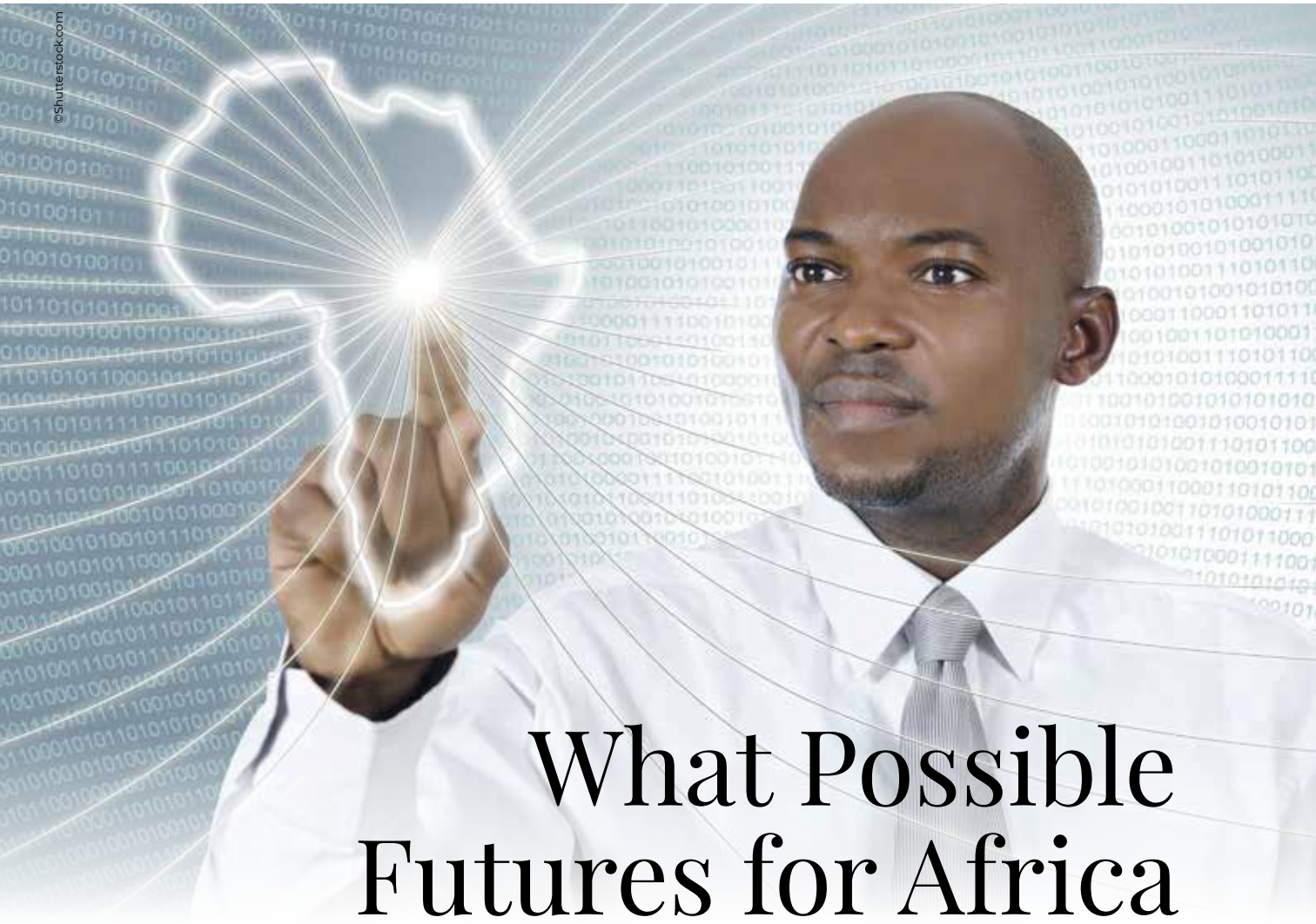

What Possible Futures for Africa Post-Covid-19?

By A.K. Segobye, A. Sall and E. Picard

In 1999, a ground-breaking project was initiated by the National Long-Term Perspective Studies (NLTPS) programme, with the financial support of UNDP, aimed at exploring the long-term development prospects of sub-Saharan Africa. The main outcome of the project was a book, published in 2003, titled *Africa 2025 – What Possible Futures for Sub-Saharan Africa?* (Sall, 2003). The book has been translated from French into English and Arabic, with a foreword by President Thabo Mbeki, then Chair of the African Union (AU). This project was able to mobilise some of the continent's most eminent thought leaders and has been pivotal to our understanding of the continent's development to date, in addition to contributing to shaping the AU's long-term vision, adopted in July 2004. Several key Pan-African projects launched post-2000 drew inspiration from the analyses and findings of the project. Whilst the African Futures project focused on sub-Saharan Africa, recent and contemporary studies of Africa have adopted a more holistic viewpoint, eschewing the idea that

the Sahara Desert is a divide between north and sub-Sahara. Scholars have argued that this binary only serves to polarise Africa, defeating efforts of African unity and erasing critical lessons of Pan-African solidarity and collaboration.

As at the start of May 2020, the global number of Covid-19 infections had surpassed three million, with over 26,000 cases on the African continent. South Africa's case load had surpassed the 5,500 mark, with over 100 recorded deaths. Infectious disease experts and global leaders have long warned of the dangers of a global pandemic of this nature and scale. As early as 2005, President George Bush made a clarion call that the world should not wait for a pandemic to appear before taking action, as by then it would be too late (ABC News, 2020). This sentiment was echoed by President Barack Obama in 2014 (NowThis News, 2020) and later by Bill Gates in 2015 (TED, 2015). The thread which ran through the three leaders' presentations was the subject of pandemic preparedness and the need for anticipatory systems to enable effective responses.

This article provides a reflection of Africa's engagement with future and prospective thinking, or lack thereof, in the context of Covid-19. Over the last two decades, African Futures research has garnered interest, led by the African Futures Institute, which has facilitated over twenty prospective studies across the continent. Academic and corporate business sectors have contributed to futures thinking, including the emergence of Africa's economies. The global economic meltdown of 2008 and Covid-19 paint a gloomy picture for the milestone of 2025. As the African Futures project straddled the commencement of the Millennium Development Goals (MDGs) through to the Sustainable Development Goals (SDGs), it provides for an interesting lens for a critical review of African and global human development.

The Covid-19 pandemic has exposed several critical fault lines in global governance systems at various levels. Firstly, it has exposed the significant deficits and yawning gaps in current scientific knowledge of these novel viruses. Knowledge production systems have proven to be faulty, with countries protecting their research know-how and high levels of secrecy surrounding research. The World Health Organisation (WHO) has had to evolve its global advisory systems with the evolution of the pandemic, as it has struggled to find answers to a whole host of questions – including the origin of the virus, the speed of its spread, its impact on various age groups, the relative merits of different drugs, and the roles played by climate and demographic structures in the development of the pandemic. The magnitude of the 'unknowns' pertaining to the pandemic is such that, in retrospect, only arrogance could have explained some statements made by leaders as to the naming of the virus or the drastic and at times contradictory measures taken by governments to 'flatten the curve' of infections.

Secondly, the pandemic has exposed the myth of a significant difference in capacities between the global North and the global South. Because of its colossal scale, the pandemic has unmasked previously-held beliefs of significant capabilities in the developed world, and lack thereof in the developing world. The impact of the pandemic on Italy and Spain highlighted fractures within the EU's response, and delayed action in the UK and the US highlighted discords between political and intellectual leadership. These were all in sharp contrast to China's response, where the outbreak was first reported. Pessimistic prognoses made in relation to Africa have so far been proven wrong, though it would be inappropriate for the continent to rest on its laurels.

Thirdly, the fragmentation of decision making indicated by the ghettoization of nations has highlighted the challenges of national governance systems. Across the world, governments have adopted authoritarian measures, starting with the declaration of a State of Emergency, which then became the Trojan Horse for strengthening the executive branch of State, if not the presidential powers. The militarisation of the pandemic has been at odds with the key messages of the WHO, which has highlighted the impending public health and humanitarian crises faced by millions of ordinary people. Federal governments' authority and ability to maintain control have been tested, as some states have defied central authority. The constitutional revolt against lockdown in Malawi and anti-lockdown lobbies by powerful Islamic clerics in countries like Mali have also highlighted the delicate balance of power in the era of Covid-19.

When China's lockdown of Wuhan province started, several countries clamoured to 'rescue'

their citizens from China. This was in sharp contrast to the abandonment of cruise liners, which were left stranded at sea with thousands of passengers as they were refused docking assistance. For many countries, the implementation of lockdowns began with the closure of national borders. Even countries with fragile health systems like the DRC announced border closures. Clearly, the priorities of managing a public health pandemic vis-à-vis the display of power by leaders were not carefully considered. South Africa's much-lauded rescue mission of a plane load of her citizens from Wuhan was a stark contrast to the grinding poverty and hardships experienced by many in the first three weeks of lockdown. The effects of decades of inadequate planning at various levels manifested themselves through the plight of South Africans who suddenly found themselves without even the most basic necessities, including clean water and food.

South Africa's handling of the pandemic has since received accolades. However, the media and other non-state actors have highlighted the adverse impact of lockdown on communities. The heavy handedness of law enforcement agencies and reports of escalating gender-based violence have unmasked the pervasive and deeply-seated challenges faced by communities, especially the urban poor. The decimation of jobs in various sectors impacted negatively on informal economic activities, including on the millions of workers who rely on casual labour jobs. Various governments attempted to mitigate the negative impact of lockdowns with economic stimulus packages and social protection services, including grants. However, historic inequalities have played a significant role in determining access. Those who had access to information, connections and proximity to metropoles fared far better than those at the margins. The state's capacity to deliver basic services under the emergency regimen was further exposed as pitiable.

One of the most critical fault lines has been the level of unpreparedness of the world's health systems to cope with a pandemic on the scale of Covid-19. Whilst recent outbreaks – such as MERS, SARS and Ebola – have been localised and contained, Covid-19 has not only unleashed unprecedented and still unforeseen trauma and chaos on the world, but has also exposed the deficiencies of global and regional health systems. The WHO has found itself under siege from its main financial contributor, the USA. The questioning of the credibility of the WHO has affected other UN agencies, which have remained in the background over the last few months. The inadequate responses of Unions such as the EU and the AU – and the deafening silence of others, such as BRICS and Regional Economic Communities (RECs) – have highlighted the fallacy of the notion of integration in the face of the insular needs and priorities of individual states.

What lessons can be learnt from these global and continental experiences? From the viewpoint of development planning, two lessons can be drawn. The first is that the use of State of Emergency powers as a response to Covid-19 has induced a firefighter mindset in the management of the pandemic. This is similar to the manner in which African states functioned during the 1980s at the height of Structural Adjustment Programmes (SAPs).

The main argument of the Bretton Woods Institutions, which sponsored if not imposed the SAPs, was that macro-economic balance is the prerequisite for development and should therefore be construed as a strategic priority for Africa. All other considerations were to be put on the backburner. That exclusivism, or the mono-focus on one variable of development to the exclusion of others, is coming back in force. Sanitary or public health considerations should prevail over all other considerations, be they economic, environmental or political.

The current calls by African states for debt cancellation or rescheduling are also to be noted. Such calls were common currency in the 1980s and the 1990s, which had witnessed increased levels of poverty on the continent following two decades of SAPs, leading the United Nations Economic Commission for Africa (UNECA) to characterise these as 'lost decades'. James Baker and Henry Kissinger, amongst others, sponsored various initiatives, spawning terminologies such as Highly Indebted Poor Countries. Such calls may have seemed outdated and unnecessary at a time when a number of African countries were boasting high rates of growth and gearing up for joining the group of emerging economies between 2020 and 2035. The Covid-19 pandemic,

however, has brought debt cancellation and rescheduling calls back to the forefront and such mechanisms are receiving support from the G20 countries. The one measure taken by the AU, under the chairmanship of President Cyril Ramaphosa, has been the establishment of a four-member team whose mission is to mobilise resources for African countries, including the rescheduling or cancellation of debt. Composed of former Ministers of Finance and CEOs of public and private financial institutions, the pitch of the AU's self-labelled 'dream team' is desperately conventional. There is no discernible difference – neither in content nor in tone – with the dominant discourses of the 1980s and 1990s that emphasised solidarity and empathy. Our current public health emergency has become the conduit for increased dependency, voluntary submission to an unequal world order and a stronger position for the Bretton Woods Institutions.

The prime victim of the resurgence of the firefighter mentality is the momentum that had been gained by advocates of alternative development paradigms, including greater attention to long-term development perspectives, and pro-active approaches to development planning and management processes. It should be recalled at this stage that Africa has been quite active in the search for alternative development paradigms. Institutions like the Dakar-based African Institute for Economic Development and Planning and CODESRIA, led by the late Samir Amin and Thandika Mkandawire respectively, are cases in point. As part of that movement, national long-term perspectives studies were carried out in 53 African countries between 1992 and 2020, with technical support provided to 37 of them by African Futures Institute experts. In addition to the national studies, several continental or regional studies were carried out during the same period.

"Our current public health emergency has become the conduit for increased dependency, voluntary submission to an unequal world order and a stronger position for the Bretton Woods Institutions."

Notwithstanding the diversity of the conceptual, methodological and analytical frameworks of these studies – as well as the magnitude and diversity of their sources of funding – a vast amount of information was collected on various economic, social, political, environmental, cultural and technological aspects of African systems. The dynamics and scenarios generated from these studies provide a wealth of knowledge from which African Covid-19 responses could have been generated.

To what extent has this wealth of information been used during the current crisis? This is a difficult question to answer, but it is very likely that only a tiny portion of it, if any, has been drawn upon for planning purposes. In the context of the pandemic, the main line of thinking is that there is no alternative to short-term solutions to bail out countries. In other words, long-term planning is seen as a luxury when the house is burning. Some would even add that when you need to put out a fire, you should not be overly concerned about the quality of the water coming from the hydrant – whether it is polluted or not is irrelevant.

This narrative is predominant in development agencies in African countries, as well as in G20 countries, but a closer look reveals that it lacks consistency. As a matter of fact, one can argue that, today more than ever, failing to plan for a post-Covid-19 world is tantamount to planning to fail in that world.

A case in point is the education sector, in which serious red flags need to be raised. Like the public health sector, African education systems have been corroded since the late 1980s when the impact of SAPs began to undermine and erode both infrastructure and human capital in the sector. Whilst many countries continue to commit a significant portion of their GDPs towards education, the lack of checks and balances in terms of policy implementation, quality assurance and accountability have resulted in fragmented and often incoherent, misaligned and multi-layered education systems across the continent. Countries have warmed to Science, Technology and Innovation (STI) and the Fourth Industrial Revolution (4IR) at the expense of the Social and Human Sciences. The pandemic has changed the face of education as we knew it. In the short time that lockdowns have been implemented across

the continent, leaders and policy makers have pronounced the opportunities presented by 4IR technologies to provide virtual E-learning solutions to educating during and beyond the pandemic. Whilst this could be a noble idea, recourse to the infrastructure of the continent even as at 2015 tells a different story. Save for South Africa and Egypt, very few countries have committed the R&D investment necessary to take STI and STEM education to the requisite levels to successfully harness virtual and E-learning. In South Africa, almost 1,000 schools had been vandalised a month into lockdown, with ICT facilities and food being the targeted resources (Mabuza, 2020). It goes without saying that, even with the most efficient of law enforcement systems, the ideal of migrating to a technology-based remote and/or virtual learning system to substitute the time lost during the Covid-19 lockdown would be fraught with challenges. A more fundamental challenge foreseen in this regard would be the impact on learners in the future.

Education has often been seen as the great leveller, providing an avenue for bridging inequalities. However, persistent disparities between public and private sector provisions have ensured that most counties have maintained a dual system which often reinforces colonial and post-colonial divides of elites and others. In whatever form conceived, a migration to E-learning at all levels of education would have the net effect of excluding millions out of the system, with very little prospect of ever catching up. Considering that the continent already has a history of exclusion from education, whether as a result of brutal policies such as the apartheid systems in South Africa and Namibia, or as the effects of conflicts and war, any Covid-19 policy response in the education sector which could potentially result in the exclusion of even a fraction of the learner population would be short-sighted. The continent hosts at least 40% of the world's internally displaced persons, including children who have missed opportunities for formal education in any meaningful way. With the continuation of conflicts and natural disasters, stabilisation or any return to normalcy in the near future is unlikely. In this regard, policy decisions post-Covid-19 must take a bold step away from the allure of short-term technology-based solutions. Instead, critical introspection is needed for long-term and sustainable solutions which will benefit all learners, educators and communities.

What scenarios can inform post-Covid-19 futures?

A lot is being said and written about the post-Covid-19 future, even as the crisis continues to unfold. Some analysts have speculated about the demise of the UN, arguing that the confrontation between the USA and China will bring the organisation to its knees, while others hold the less pessimistic view that the pandemic has brought to the fore the need for a people-centred approach to development that neo-liberal economists will find difficult not to rally around. Either way, the time seems ripe for grounding development on a new paradigm.

However, very few of the narratives being developed in regard to our post-Covid-19 future can be construed as scenarios *stricto sensu*, as they lack either a proper strategic assessment of the current situation – including a retrospective analysis of the factors, actors, strategies or lack thereof involved – or a clear description of the trajectory that would lead from the present to the future situation envisioned. Below, we sketch out several scenarios underpinned by contrasting hypotheses regarding the nature and quality of the interaction between state and society.

The authoritarian way: walking in opposite directions

Lockdowns as a means to 'flatten the curve' have been the strategic choice made by a great number of governments. This seems rational as neither a vaccine or cure for Covid-19 are available. The aim is to slow the spread of the virus and, concomitantly, to build public health capacities, to acquire equipment for frontline health workers, and to expedite treatment. These measures include a mandatory 'stay in shelter' lockdown, with those violating the order facing fines and prison sentences. Such strategies have quickly shown their limitations, as economic considerations come into play. Calculations conducted in different countries demonstrate that the provision of food, water and essential services to the poor is a costly exercise.

In this scenario, the idea of a global solidarity compact is undermined by the narrow fire-brigade-mindset responses of countries, including those of seemingly well-organised and resourced

blocs such as the EU. As countries dealt with their own national challenges, the business-as-usual approach to global traffic, especially air traffic, led to the rapid transmission of the virus across national borders. African countries began by dealing with imported cases, but soon had to contend with local transmissions. In the six weeks since the worst-affected African countries started to put in place measures to address Covid-19, cases have exploded and drawn attention to the underlying structural challenges of the continent. As countries moved to declare states of emergencies and lockdowns, the plight of citizens whose livelihoods depended on movement, informal procurement and other means of survival was amplified.

The lack of policy direction and/or presence of the RECs and the African Union Commission has exposed the fragility of the Pan-African integration project, which had been touted as the success of the AU. Efforts by other actors – such as the African Development Bank, the UNECA, and international development partners – have highlighted the dearth of adequate and long-term planning systems to cushion countries. Very few made reference to their long-term planning systems, even where standing National Planning institutions were in place. Very little mention was made of National Disaster Risk systems and/or institutions, whilst most bureaucracies had provided for such since the 1990s. The swift centralisation of power in countries' responses dispelled the notion that power and authority had been gradually decentralised for more inclusive and citizen-centric systems. Ironically, this had the effect of undermining many established community-based and alternative initiatives, some of which had formed and matured from the experiences of other public health epidemics, including TB, malaria and HIV/AIDS.

From a public health viewpoint, such a scenario means that African countries have learnt very limited lessons, and gained very limited return, if any, from the 20-year investment in initiatives aimed at strengthening HIV/AIDS-related health systems on the continent. Covid-19 seems to have come with its own new set of rules and protocols which have either ignored or not optimised the lessons learnt from tackling HIV/AIDS and TB. This may be due to the novelty of the virus, but in this scenario the continent would have missed the opportunity to

"The lack of policy direction and/or presence of the RECs and the African Union Commission has exposed the fragility of the Pan-African integration project, which had been touted as the success of the AU."

kickstart its established health systems, including its public health communication systems. Mimicry will be the dominant feature of this scenario, characterised by the almost total adoption of the language, etiquette and mannerisms used by China and Europe in combatting the pandemic. In that regard, the response to the WHO's call for Africa to 'wake up' appears, in retrospect, to have been too conventional. Whilst it can be appreciated that the WHO had the challenge of creating a 'one size fits all' response in terms of protocols, it is unfortunate that Africa did not seem to bring anything to the global menu. As a result, systems of prevention, care and support – as well as socio-cultural behaviours which could have been drawn from Africa's diverse and rich cultural landscapes – were not harnessed. What is often termed as 'resistance' and/or the failure of communities to adhere to lockdown regulations could have perhaps been addressed differently.

State and society walking and working together

In addition to committing part of their GDP to an economic and social relief package, governments will have to put a number of measures in place, including: the provision of financial relief to domestic workers and low-income earners, an Emergency Aid Program for employers, the postponement or reduction of taxes for small businesses, and the payment of monthly minimum wages to employees. Governments will also have to require banks to extend hundreds of millions of dollars in loans at reduced interest rates to keep the economy afloat. Finally, at least in some countries, administrations will have to suspend evictions and freeze all rent increases, besides absolving the lowest tax bracket of penalties. There is an opportunity for such a scenario, provided by the joint G20 statement of the World Bank and

the International Monetary Fund (IMF), proposing immediate debt relief for the poorest countries, while calling for a global humanitarian emergency fund to tackle Covid-19.

The discourse on African Emergence has lost some of its splendour in the past few years, due not only to a drastic decreasing trend in international demand and in commodity prices, but also to the fact that economic potential linked to local markets seems to have encountered a limit. Insofar as the middle classes have expanded, their number have tended to stagnate. Despite this larger middle class, the vast majority of populations in African countries remain poor and live on subsistence economic activities.

In effect, African economies largely remain extractive in nature. However, efforts towards their diversification have gained momentum. This is not only motivated by the recognised need to manage the risks associated with demand and commodity price shocks, but also by concerns pertaining to job creation. These objectives have become, at the very least, part of the mandatory lip service and, at best, fall at the heart of medium- and long-term development strategies and plans. However, the effects of Covid-19 clearly show that resilience capabilities have not developed enough as depressed economic activity will surely increase poverty figures on a large scale. Hence the need for urgency in tackling long-identified issues, such as the improvement of agricultural yields in rural areas or other strategies to develop labour intensive activities. These were central to the resumption of growth dynamics that appeared to have run out of steam before the pandemic and are all the more key to mitigating the adverse consequences that will appear in its aftermath. This rehabilitates, among other things, the essentiality of voluntarist industrial development on one hand and the need to address the persistent shortcomings related to the formulation and implementation of viable industrial policies on the other.

In effect, minimal policy interventions centred around 'the promotion of an attractive environment for foreign direct investment', to the exclusion of all other measures, seem to have shown their limits. The fact remains that while such policy measures have contributed to rehabilitate the continent as a destination for direct investment, the basket of goods produced locally and likely to be exported remains essentially a basket of goods that are little or not at all processed**.**

If the need to diversify economies seems self-evident, defining the modalities, especially institutional, required for a diversification that is favourable to employment represents a major critical uncertainty. Indeed, the institutional logic associated with openness without an industrial policy worthy of the name have been shown to be limited in scope. With the stringent confinement measures required by this pandemic, and the associated depressed local and global consumption, the bloated importance of the informal sector, and the lack of socioeconomic safety nets beyond it, is once more laid bare.

The largest emerging countries, which revealed themselves as the continent's new investors and buyers of raw materials, offer African governments an enlarged strategic basket in terms of alliances. This diminishes the influence of Western powers and international aid institutions. While the general public policy objectives they promote – poverty alleviation, the development of primary education, or gender equality – form part of the consensus, choices relating to the way in which these objectives should be accomplished still need to be made. In particular, there is a trend – modelled after China – towards legitimising more assertive government interventionism in the economy, sometimes underpinned by resistance to full-blown liberal reforms promoted by Western partners.

The recent calls for sovereign debt cancellation in order to give breathing space to African governments during and after the pandemic have shown an unexpected detractor in their Chinese partner. This is a stark reminder that the continent remains a battlefield for hegemons pursing their own interests. One should always bear in mind that the Chinese Belt and Road Initiative is a vast long-term project to establish and secure a continuity of raw material supply channels and market access. It critically relies on the establishment of some form of financial interdependence: the infrastructures which underlie the Initiative are subject to Chinese funding in the form of debt, which in turn underpins political influence.

Concurrently, the pandemic has acted as an electroshock to Western economies regarding

the hyper-concentration of manufacturing capabilities in south-west Asia, and the associated risk of this. Global supply chains were drawn to a standstill when China enforced strict confinement measures. The extent to which such a realisation will revitalise cooperation ties between certain African countries and the West beyond market access and security considerations is of critical importance and bears the potential for significant changes over a ten-year horizon.

Significant political efforts are being made to promote formal economic integration, as evidenced by the 2018 agreement for the establishment of a continental free trade area, signed and ratified by 22 African countries. However, difficult technical negotiations are underway and the effective implementation of this agreement remains distant.

A certain degree of sluggishness seems to be at play and is increasingly difficult to interpret, other than as a reluctance to renounce state sovereignty beyond a rather low point to supranational entities. This difficult integration is felt just as much in the very minimal character of inter-African cooperation, including on issues where transnational responses are essential. Typically, timid transnational cooperation features in security related issues, as illustrated by the Lake Tchad Basin or the Great Lakes conflict systems. It is also readily apparent in the response to the pandemic.

Few transnational initiatives of importance have been observed, aside from the somewhat unified front shown in the negotiation of debt relief to mitigate the economic impact of Covid-19. Cooperation pertaining to health policies remains sparse, the most hyped example being the purchase of the Malagasy 'cure' by some African countries. Overall, one would hope that the shock induced by the pandemic will stimulate calls for regional integration at a deeper level, including a wide free-trade zone. Whether cooperation will develop beyond that point remains a critical uncertainty with far-reaching consequences in the medium to long term.

“ The ripple effects of sharp decreases in global demand and concomitant decreases in commodity exports and prices are bound to have significant consequences on Africa, the extent of which remain uncertain. This is related to structural issues that the continent has struggled with for decades. ”

Going forward, it is hoped that learning about Covid-19 will include African perspectives, as already seen in technological, biomedical, ethno-pharmacological and psychosocial research. At any rate, such research has presented opportunities to debunk several narratives which had been reified under the cloak of culture and/or tradition, presenting prospects of re-designing and levelling the playing field for those at the margins.

A novel scenario: a comprehensive and holistic approach to the post-Covid-19 era

Authorities in Amsterdam have developed a scenario named the 'doughnut model'. Theoretically, the inner ring of the doughnut sets out the minimum needed to lead a good life from the UN SDGs paradigm – including food and clean water, housing and sanitation, education and healthcare, gender equity, income and political voice. Those who do not attain such a minimum standard of living are in the doughnut's hole. The outer ring of the doughnut represents our ecological ceiling, the boundaries we should not cross in order to protect the natural world on which we depend. In between these two rings is 'the good stuff' – the soft dough – where every human's needs are met, within safe ecological limits. Covid-19 has forced us to rethink our treatment of the natural world, as well as the gaping inequalities in our societies, where the richest 1% is twice as wealthy as the poorest 50%, the result of the contemporary economic system of globalised capitalism. The 'doughnut model' proposes a new economic model that would allow us to overcome our intertwined ecological, social and political crises and to rebuild a more inclusive, sustainable and resilient world.

The ripple effects of sharp decreases in global demand and concomitant decreases in commodity exports and prices are bound to have significant consequences on Africa, the extent of which remain uncertain. This is related to structural issues that the continent has struggled with for decades, and critical uncertainties that may be influenced one way or another by Covid-19. One of these is the emphasis that has been placed in the past two decades on the processual aspects of political dynamics, which in many cases has led to the

adoption of strategies by ruling elites to maintain the formal nature of these processes, while emptying them of their substance. Thus, rather than increasingly sparse cases of blatant abuse of power, more discrete actions are taking place, such as those aimed at limiting the development of opposition political movements, at reinforcing the executive power's grip on the legislature and the judiciary, or at influencing the rules governing political processes in favour of the powers in place.

There are two essential prerequisites for a semblance of peace to be sustainable: firstly, sufficient leeway to allow for economic activity on the part of social groups *de facto* excluded from the political process, thus allowing people to support themselves. Secondly, the continued control of government over police, security and defence forces. These prerequisites form the main ingredients required to contain the expansion of socio-political movements independently from the rules in place within political power centres. This was illustrated in the past few weeks by the initial heavy-handedness with which police and defence forces were deployed to impose confinement rules in African countries, often in poorer areas which bear the most risk of violent reactions, be it organized or not, and ironically often followed by lax enforcement.

Insofar as the level of tension remains circumscribed, a *de facto* balance is struck between politically marginalized groups and the state: the terms of trade are that of a partial surrender of sovereignty over certain areas characterised by uncontrolled economic activity to a sufficient degree, in return for the renouncement of any expansionist desire into the formal political sphere. It goes without saying, however, that such balance is unstable, in particular when it develops on a social ferment, fed by increasing inequality, the political and socioeconomic roots of which run deep. If Covid-19 continues to exacerbate food insecurity issues, all hell may break loose. Seeds of this are already apparent.

Another uncertainty has to do with the capacity of the elites to overcome the structural weaknesses of the rent-seeking economy. If one tries to remain optimistic, the pandemic will yield a negative shock on the economy that will soon enough be absorbed. However, Covid-19 has highlighted the structural weaknesses that will continue to affect the continent's dynamic in the long run. If African governments are to emerge from the Covid-19 quagmire they must do more to build resilient and integrated economies, to form power blocks strong enough to navigate through the actions of hegemons, and to rekindle their relationship not only with the privileged classes, but with all citizenry.

Another major uncertainty pertains to the 4IR and African futures. In fact, if there is a common thread which has run through the narrations and evolution of the Covid-19 pandemic, it has been the tantalising possibilities of technological solutions. These include the expedited development of treatment facilities, the provision of medical technologies, the improvement of logistics and the answers to future employment challenges as workers succumb to Covid-19 infections. Throughout the frenzy, the treacherous waters of media practice have not been lost to the conversation, as the blame games and sanitizing of 'fake news' are thrown boomerang-style across the America-China air spaces.

Conclusion

This essay has highlighted some of the challenges in African leadership decision-making, where well-intended development planning (in this case the development of national prospective studies and vision projects) has been completely ignored in the race to contain the Covid-19 pandemic. The delicate balance of decisions related to public health and overall well-being seems to have been suspended in favour of short-termism to 'flatten the curve'. Africa's choices in the months of lockdowns and states of emergencies will be felt in varying degrees beyond Covid-19. As citizen capacity to shape the future is constrained in lockdown, exploring alternative futures is more urgent as the long-term view becomes the tool of liberation during and beyond Covid-19. ■

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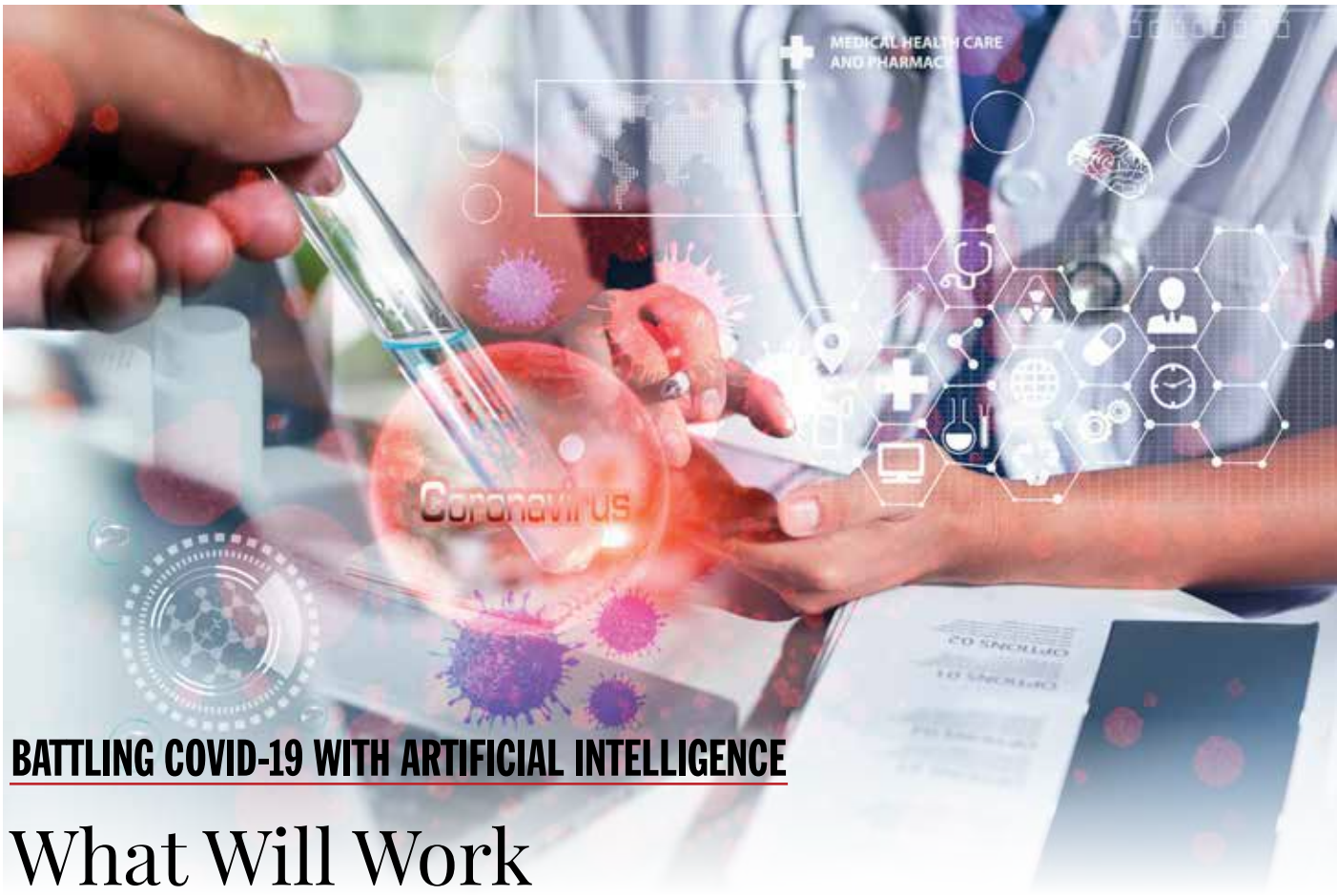

BATTLING COVID-19 WITH ARTIFICIAL INTELLIGENCE

What Will Work in Africa?

By Abejide Ade-Ibijola and Charis Harley

Can AI really help?

Many researchers and industry experts working in Artificial Intelligence (AI) have claimed that AI holds the answers to the past, present, and future difficulties faced by humankind. We form part of this group, and with the coming of Covid-19 – a pandemic which is raging through the world and has so far claimed over 300,00 lives – we argue that now is the time to combine human ingenuity with the capability of machines to support a world in crisis. It has been predicted that Covid-19 will result in a high death toll in Africa, as has been the case on other continents. Vaccines and/or a cure will take more than a year to be realised, hence the question: can we turn to technology, specifically AI, for a solution? In this article, we consider the context of Africa in particular, our specific difficulties, and how AI can help Africa in the fight against Covid-19. The goal is to curb its spread, help predict patterns of spread, support social distancing measures, help in contact tracing, and assist with reopening economies. A key point in this article is that not all AI technologies are feasible within the African context, not only because of affordability concerns, but also because of current policies and social contexts.

Mobilising AI against Covid-19

In an age where medical science has moved into the realm of what was once termed science fiction, on a continent which has long faced the ravages of disease, poverty, economic instability

and severe climate conditions, it may seem strange that another pandemic would cause such panic. After all, African medical experts have been at the forefront of medical advances for decades, and have contributed to many innovative technologies. In fact, this is South Africa's third major pandemic in only 100 years, and with a much younger population than Europe or China, African countries may in some ways be more resilient to Covid-19. The reality, however, is that Africa is vulnerable in many respects, with a constantly evolving climate, changing social constructs, and fragile economies. As such, we need new tools and methods to support our fight against Covid-19. In an age where data is gold, the use of data analytics, machine learning and AI have become prominent tools, as we will argue below.

3D printing

A simple yet extremely effective contribution to the fight against Covid-19 has been the mass production of masks. In such a manner, AI is being used to safeguard both the public and healthcare workers. The University of Johannesburg's Library Makerspace team has used 3D printing to produce surgical face shields to tackle the shortage of personal protective equipment (PPE) for healthcare workers. HP's 3D Digital Team and Digital Manufacturing Partner Network have taken 3D printing further, by designing, validating and producing essential parts for medical responders and hospitals. These include ventilator valves, breathing filters, face mask clasps, and plastic door handle adaptors that enable easy elbow opening to prevent further spread of the virus (Lores, 2020).

Budmen Industries are also at the forefront of producing 3D printed devices to support health care workers. They have developed the necessary files to print 3D Face Shields, easily downloadable from their website (Budmen Industries, 2020). A northern Italian hospital in Brescia, Italy, ran out of replacement valves for a reanimation device due to a supplier shortage. The Italian business Isinnova stepped in and printed replacement valves at short notice, saving many lives in the process. Building on this success, they then created a 3D-printed adapter that converts snorkelling masks into functional C-PAP masks for oxygen therapy, supporting the improved health of any who have severe symptoms of the virus (Sher, 2020).

> "A key point in this article is that not all AI technologies are feasible within the African context, not only because of affordability concerns, but also because of current policies and social contexts."

Curative AI

AI research has already shown itself to be at the forefront of the development of antibodies and vaccines for Covid-19, either entirely designed from scratch or through drug repurposing. For instance, the AI healthcare start-up Deargen, based in South Korea, published a paper on a deep learning-based model which assists in detecting which existing medications would work best (Marwala, 2020). Similarly, companies such as BenevolentAI, based in the United Kingdom, are using AI and available data to search through existing drugs that could be used to treat Covid-19 patients until a vaccine becomes available. Vir Biotechnology and Atomwise, start-ups in the United States, are using algorithms to identify a molecule that could serve as the basis of treatment, while the British start-up Exscienta has already been successful at presenting an AI-designed drug molecule that has gone to human trials (Obeidat, 2020).

The genetics of Covid-19 are also being investigated. Intel have teamed with Lenovo and BGI Genomics to accelerate the analysis of the genomic characteristics of Covid-19, with the aim of assisting scientists with investigating transmission patterns of the virus and creating better diagnostic methods (Swan, 2020). Using its AlphaFold system, Google's AI company DeepMind is creating structure models of proteins that have been linked with the virus in a bid to aid our understanding of it (Obeidat, 2020). Academic institutions have not been left behind when it comes to using AI to support curative research. Akara, a Trinity College spinout based in Dublin, has developed Violet, which is an ultraviolet light robot clinically proven to kill viruses, bacteria and harmful germs (Akara Robotics, 2020). OxyGEN, a device developed by the company Protofy.xyz, with the scientific support of the Hospital Clínic, Hospital Germans Trias i Pujol

and the UB of Barcelona, automates the process of manual ventilation for patients in emergency situations where not enough ventilators are available (OxyGEN Project, 2020).

Diagnostics with AI

Immediate diagnosis means that response measures such as quarantine can be employed quickly to curb further spread of the infection. An impediment to rapid diagnosis is the relative shortage of clinical expertise required to interpret diagnostic results due to the volume of cases. Markforged, in partnership with Neurophotometrics, produced Fiberflex Rayon, a 3D-printed nasopharyngeal (NP) swab for use in diagnostic testing for Covid-19. Aside from only taking minutes to make, they successfully detected the virus in all test patients, while the commercial swabs reported false negatives (Markforged, 2020). BillionToOne has developed a novel, highly accurate and cost-effective Covid-19 test protocol which, through the use of different sets of instruments and chemicals from existing Covid-19 tests, has unlocked the capacity to test more than one million patients per day in the United States alone (Newswire, 2020). Improved diagnostic time has been the aim of many innovators during the Covid-19 crisis. LinkingMed, a Beijing-based oncology data platform and medical data analysis company, employed AI to do so. Pneumonia, a common complication of Covid-19, can now be diagnosed from analysis of a CT scan in less than sixty seconds with an accuracy rate as high as 92% and a recall rate of 97% on test data sets (Obeidat, 2020).

Intelligent robots and drones

The public deployment of drones and robots for a myriad of purposes has been of great assistance, given the strict social distancing measures implemented in many countries. Simple tasks, such as room cleaning and the sterilisation of isolation wards, are now being done by robots. Pudu Technology have extended their reach to the healthcare sector by deploying their robots in over 40 hospitals for these purposes (Obeidat, 2020). DJI, a Chinese-based company, have furthered sanitation by using drones to spray a chlorine or ethyl alcohol-based disinfectant from the air (DJI Hub, 2020).

Drones are also being used for effective communication in China. Loudspeakers have been mounted on drones to help disperse public gatherings in crowded places, AI voice assistants advise people to adhere to quarantines, and drones flying banners give instructions on necessary precautions. The AI voice robot is further capable of obtaining personal information to produce daily reports which have helped to monitor the spread of the virus in China. Thermal cameras on drones have assisted in a similar fashion by monitoring body temperature so that medical staff can identify new potential cases (DJI Hub, 2020).

Intel has had similar success, providing robots to assist medical professionals by transporting medical supplies and surgical equipment to reduce human-to-human interactions (Swan, 2020). Autonomous delivery is being extensively used in more than one country by companies such as Antwork, JD Logistics, MicroMultiCopter and Zipline (Obeidat, 2020).

Communication and misinformation

The panic and uncertainty which has engulfed the world has naturally led to the dissemination of false information, leading to myths on many social media and news platforms. Several organisations have started combatting concerns surrounding misinformation, such as Kaleyra who have launched a program aimed at facilitating communication with populations affected by Covid-19. They assist organisations to communicate through their application programming interfaces (APIs), whether via SMS, voice or WhatsApp services. In South Africa, a digital platform called GovChat acts as a notification service which connects citizens to government services through mobile phones (Marwala, 2020). It also serves to alert healthcare authorities of possibly infected individuals and to direct people to suitable medical facilities. In a similar vein, a Ghanaian e-health medical diagnostics distributor, Redbird, has launched a Covid-19 Daily Check-in App and Symptom Tracker which allows users to report symptoms and enables pharmacists to track the results of their customers (Jackson, 2020). In this manner, they are not only supporting effective communication between the public and healthcare practitioners, but are also ensuring social distancing.

A tide of phishing, misinformation and

malware has also hit platforms such as Google and Facebook, who have developed a method where a search for coronavirus/Covid-19 yields an alert sign coupled with links to verified sources of information. YouTube directly links users to the World Health Organisation (WHO) and similar credible organisations, while removing inaccurate or untrustworthy videos. In an attempt to obtain more accurate data, certain companies are trying to leverage different means of surveillance. Canadian-based BlueDot have employed machine learning and natural language processing to track, recognise, and report the spread of the virus, and have been able to do so faster than the WHO or the US Centre for Disease Control and Prevention (CDC) (Obeidat, 2020).

Challenges in Africa

While the outbreak of a communicable disease is not foreign to many in Africa, Covid-19 is still novel in many respects. With an eye on the rest of the world, Africa has had to assess an ever-evolving situation with a keen awareness of the fact that an outbreak on this continent will look different to other parts of the world.

Aside from our specific economic, geographical and societal contexts, we must also take into account our demographics. To date, the pandemic has consistently targeted the elderly, with people over the age of 60 accounting for 81% of all infection-related deaths, according to the WHO. With a relatively young population, such individuals make up approximately 5% of our population, in comparison to 16% in China (Dupoux et al, 2020).

While this should alleviate some concerns regarding the safety of our young adults and children, we still face the difficultly of having many vulnerable individuals in our society. A significant number of adults in Africa have compromised immune systems, mostly owing to the high prevalence of HIV infection and HIV-tuberculosis co-infection. Data on the fatality rate of immunocompromised Covid-19 patients is limited, but early data indicates that the rate for individuals with certain chronic medical conditions is up to five times higher than the overall case fatality rate (Dupoux et al, 2020).

Healthcare systems

It is well-known that the capacity of healthcare systems in most parts of Africa is limited. Recent data indicates that Ethiopia and Niger each have 0.3 beds per 1,000 people, and Tunisia has 2.3, compared to an average of 5.6 in Europe (Dupoux et al, 2020). Furthermore, we have constrained tertiary care capabilities, and limited critical care units and medical supplies. If healthcare systems in the region were to become overwhelmed, support for Covid-19 patients would falter, the deaths among patients with other illnesses could spike, and other types of public health measures would be under severe strain.

> “In fact, this is South Africa’s third major pandemic in only 100 years, and with a much younger population than Europe or China, African countries may in some ways be more resilient to Covid-19. The reality, however, is that Africa is vulnerable in many respects, with a constantly evolving climate, changing social constructs, and fragile economies.”

Another risk of fighting the Covid-19 outbreak is the possible distraction for healthcare systems which need to also be concerned with other diseases, including malaria and measles (Vaughan, 2020). The 2014–16 Ebola outbreak led to many thousands of deaths, not due to the outbreak itself, but rather as a consequence of resources being diverted away from other diseases. Should healthcare systems across Africa falter in a similar way, citizens are likely to develop distrust in these systems, which could contribute to the spread of the disease (Dupoux et al, 2020).

Economies

Covid-19 will undoubtedly have a negative impact on African economies. This will lead to revenue declines or possible closures for small businesses and even larger companies. Citizens will face job losses and reduced wages as companies lay off workers, with the most immediate impact visible for those in the informal economy.

Companies and governments are likely to face shortages of cash flow and working capital. This would have an immediate effect on governments’ liquidity, their ability to pay workers, to build infrastructure, to provide supplies needed by emergency response teams, and to initiate economic stimulus packages to mitigate serious

economic downturns. Several African countries have already implemented lockdowns, so these liquidity issues could surface quickly (Dupoux et al, 2020).

Society

Mitigating strategies that may have worked in other countries will not necessarily be effective in African cities, particularly in tightly packed informal settlements. Furthermore, even where people are relatively dispersed in rural areas, communicating information about social distancing and necessary sanitation measures will be challenging, if not impossible.

Such obvious social inequity is an immediate concern, effectively highlighting those that are more vulnerable than others. Many people in Africa survive on daily wages, which under lockdown conditions or enforced social distancing will lead to a loss of income (Dupoux et al, 2020). Reduced wages and an increase in unemployment, especially for those in the informal sector, will lead to increased levels of poverty, a lack of basic necessities, and malnutrition, which in turn will make people even more susceptible to Covid-19. The closing of schools contributes to this, since school-based nutrition programs for children will be disrupted.

While governments are trying to put measures in place to support the well-being of the public, these measures are also placing economic and emotional pressure on individuals. As the stresses and strains faced by the family unit increase, we will see a breakdown of community cohesiveness, especially with the banning of social events in many countries. At the same time, the spread of misinformation will inevitably lead to unrest and crime, as people grow more desperate and fearful.

> “While the outbreak of a communicable disease is not foreign to many in Africa, Covid-19 is still novel in many respects. With an eye on the rest of the world, Africa has had to assess an ever-evolving situation with a keen awareness of the fact that an outbreak on this continent will look different to other parts of the world.”

AI ingenuity in Africa

In this section, we explore how AI solutions can be implemented in the fight against Covid-19 in Africa. We begin by discussing AI solutions that are currently being deployed around the world and highlight the ones that can be ‘ported’, or replicated, in Africa. We also discuss a number of current efforts in African countries that suggest that AI is already being implemented in the fight against Covid-19 in Africa. Finally, we explore how new AI initiatives (or models) can be built to address Africa’s specific needs, and the challenges of such a pursuit (mainly related to data quality), despite the recorded successes of AI in Africa during this pandemic.

Existing solutions that can be ‘ported’ to Africa

Below, we present various solutions developed via AI which have assisted in combating Covid-19 around the world, as well as discussions on whether these same solutions can be ‘ported’ to Africa.

Case identification from surveys – Researchers at Cambridge University have proposed a machine learning technique that analyses surveys obtained from mobile and web apps, while cities and towns are under quarantine (Srinivasa and Vazquez, 2020). This solution can easily be developed and employed across African countries with the limitation of reaching only major metropolitan areas, as Africa has many remote and rural areas that will not be able to access such apps.

Case identification from X-ray images – In Australia, AI experts have built an AI model for the automatic detection of Covid-19 from X-ray images, using Deep Learning (a class of machine learning algorithm). This AI model took previous advancements in computer vision, and – using a smaller set of labelled X-ray images – was able to learn and tell (to a high degree of accuracy) whether a new X-ray image was that of a Covid-19 patient (Apostolopoulos and Mpesiana, 2020). A similar attempt to this, also based on Deep Learning, can be found in Wang et al (2020). In the case of this innovation, there is really no need to reinvent the wheel: a representative of an African country (from government, public, or private healthcare) interested in using this tool can just write to the inventors for a license to use the solution. Such tools are currently being shared for free across the world as solidarity gestures against this pandemic.

> “We also discuss a number of current efforts in African countries that suggest that AI is already being implemented in the fight against Covid-19 in Africa. Finally, we explore how new AI initiatives (or models) can be built to address Africa’s specific needs, and the challenges of such a pursuit (mainly related to data quality), despite the recorded successes of AI in Africa during this pandemic.”

a) *Case identification and outbreak risk analysis* – A tool called BlueDot uses machine learning (cluster analysis) for case identification and to predict the spread of diseases. This tool uses a dashboard to present users with a global tracking of risks and contexts of the disease. BlueDot is a commercial tool, hence within the context of Africa it has limited use: an entity may buy a license, or write to the inventors to use this tool for social good. It is unknown whether the analytics provided by this tool are based on data collected on the African continent – were this not the case it may significantly skew the tool’s predictions, or at the very least skew them slightly, due to the inaccuracy of African datasets.

b) *Management of critical patients* – In the United States, AI (Deep Learning and Expert Systems) has been employed to support decision making concerning Covid-19 patients in ICU. This AI has shown good results in offering diagnosis, treatment risk stratification, prognosis and management (Alimadadi et al, 2020). Implementing a similar solution in Africa will require large, quality datasets from the continent. The challenges of getting these types of datasets is discussed below.

c) *Drug synthesis* – Evidence has shown that machine learning and Natural Language Processing techniques have found applications in drug synthesis by learning the structural comparison of protein binding (Simonovsky and Meyers, 2020). This technology is currently being used in the quest to find treatment for Covid-19. African researchers in related domains are most likely looking at similar works and using these as building blocks in the race for finding a cure to this virus.

d) *Tracking of social distancing and face masks* – Reuters News Agency recently reported that a number of companies in the USA are now using cameras (equipped with computer vision algorithms) to track people’s compliance with social distancing in their environment, including compliance with other regulations such as wearing face masks (Reuters, 2020). These solutions can be purchased ‘out of the box’ by the administration of interested African countries – there is no need to reinvent this.

e) *Enforcing social distancing with drones* – This solution uses drones to provide insights to law enforcement agencies on where people may currently be gathered. This helps with the optimal deployment of policing resources to enforce social distancing (Rivas, 2020). This may be in violation of privacy laws in some countries, but it is currently being used in Peru. Drones have shown their usefulness in rural areas of Africa, so this solution may be considered viable (as a complement to other efforts) by some countries in Africa.

f) *Drones for humanitarian aid distribution* – China has used drones for the distribution of humanitarian aid and medical supplies, as well as for aerial monitoring and the estimation of the magnitude of spread (Ruiz Estrada, 2020). Using drones to deliver supplies to remote areas in Africa is not new. One such innovation can be found in Rwanda’s Zipline drone program, in which blood supplies are delivered to remote areas.

g) *3D printing of protective equipment* – Many manufacturers across the globe are using 3D printing to manufacture protective equipment, such as masks, face shields, Covid-19 specimen collection kits, ventilator valves and medications (Ishack and Lipner, 2020). Some African countries have made similar efforts, as has been discussed earlier in this article.

h) *Community risk assessment* – The alpha satellite (-satellite) is an example of AI that is currently being used to assess the risk of communities in the USA in order to help with developing strategies for combating the pandemic (Ye et al, 2020).

Africa’s successes in fighting Covid-19 with AI

In this section, we discuss examples of how AI is being used in African countries to assist in combatting Covid-19. This is by no means an

exhaustive list, and there may be many more attempts that are not included here.

a) Ghana –

An app for comprehensive real-time tracking of Covid-19 cases across Africa was launched in Ghana. This app is based on AI4COVID-19 by Runmila AI Institutes and MinoHealth AI labs (Paul, 2020). Another work in progress reported in Ghana is the work of Amo-Boateng, which is a testing unit powered with a mobile phone, capable of producing a result in less than a minute. The AI community is keeping an eye on this development (Tsado, 2020; Paul, 2020).

b) Kenya –

Tambua Health, a Kenyan start-up, has reported a tool called T-sensem. This tool records sounds from the lungs and the heart and attempts to determine if there is a respiratory disease in the body. It is currently at an experimental stage (Paul, 2020).

c) Nigeria –

Beat Drone, a Nigerian start-up, has shown promising experiments in the spraying of disinfectants to fight Covid-19 using drones (Jackson, 2020). Wellvis Health Nigeria has also launched an app that allows users to evaluate their Covid-19 risk categories based on their symptoms and history of exposure. This is a rule-based type of AI system (Paul, 2020).

d) South Africa –

The University of Johannesburg's Library Makerspace is employing 3D printing for the creation of PPE, including face shields, which are donated to health workers in Johannesburg (Zama, 2020). Similarly, Natalie Raphil – founder of Robots Can Think – is using 3D printing to manufacture a hundred masks per day, which are then distributed to major hospitals in Johannesburg (Tsado, 2020). Drones have also proved helpful in spreading awareness messages about Covid-19 in rural areas of South Africa (De Klerk, 2020).

e) Uganda –

A noteworthy Ugandan innovation – even though it does not employ AI tools – is the Market Garden App. This app allows vendors to carry out commercial activities in a lockdown environment, while observing social distancing. The app is free, helping Ugandans to deal with the economic issues that arise from the lockdown, as some businesses are able to transact via the app, assisting entrepreneurs to keep afloat (Harrisberg, 2020).

“More can be done in Africa to build AI predictive models, as we have both the academic and technological expertise to do so. One major challenge, however, is the difficulty of obtaining the large and reliable datasets required to build such AI models.”

More can be done in Africa to build AI predictive models, as we have both the academic and technological expertise to do so. One major challenge, however, is the difficulty of obtaining the large and reliable datasets required to build such AI models. In the next section, we discuss the challenge of incomplete datasets, due to instances such as unreported cases of Covid-19 infections and deaths across African countries.

Building new AI models, and the challenges of skewed and incomplete African data

Given the rate of Covid-19 testing in African countries, it is evident that most of these countries do not have the ability to conduct extensive testing, which has led to skewed and incomplete data on the continent. According to Worldometer's statistics on Covid-19 – as at 2 May 2020 – out of 56 affected African countries and territories, only 38 have complete data fields for the number of tests completed and infected cases, while the rest do not (Worldometer, 2020). There is also a great discrepancy in the reported data for these countries, as is reflected below in Table 1.

Some countries appear to have done a lot of testing. However, if we compare the number of tests to the number of cases, we can see that not nearly enough testing is being performed. One way to assess this is to compute testing intensity. The question is: How rigorous is testing in a given country? If the number of tests completed is significantly higher than the number of infected cases, then we can say that a country is doing well

Table 1: Testing Intensity in African countries as at 2 May 2020

Country	Total Cases	Total Deaths	Total Tests	Testing Intensity (%)
Uganda	85.00	0.00	33,818.00	99.75
Botswana	23.00	1.00	7,675.00	99.70
Zimbabwe	34.00	4.00	7,642.00	99.56
Ethiopia	133.00	3.00	20,770.00	99.36
Mauritania	8.00	1.00	1,032.00	99.22
Togo	123.00	9.00	7,100.00	98.27
Kenya	411.00	21.00	21,702.00	98.11
Ghana	2,169.00	18.00	113,497.00	98.09
Mauritius	332.00	10.00	16,028.00	97.93
Zambia	119.00	3.00	5,284.00	97.75
Rwanda	249.00	0.00	10,969.00	97.73
Namibia	16.00	0.00	704.00	97.73
South Africa	5,951.00	116.00	217,522.00	97.26
Gambia	12.00	1.00	401.00	97.01
Libya	63.00	3.00	1,949.00	96.77
Mozambique	79.00	0.00	2,246.00	96.48
South Sudan	45.00	0.00	1,247.00	96.39
Burundi	11.00	1.00	284.00	96.13
Madagascar	135.00	0.00	3,393.00	96.02
Tunisia	998.00	41.00	23,526.00	95.76
Malawi	37.00	3.00	831.00	95.55
Angola	30.00	2.00	481.00	93.76
Egypt	5,895.00	406.00	90,000.00	93.45
Djibouti	1,112.00	2.00	13,856.00	91.97
Morocco	4,687.00	172.00	38,102.00	87.70
Ivory Coast	1,333.00	15.00	10,073.00	86.77
Nigeria	2,170.00	68.00	15,759.00	86.23
Niger	728.00	33.00	5,230.00	86.08
Eswatini	108.00	1.00	714.00	84.87
Cabo Verde	122.00	1.00	791.00	84.58
Guinea-Bissau	257.00	1.00	1,500.00	82.87
Mayotte	539.00	4.00	3,000.00	82.03
Mali	508.00	26.00	2,172.00	76.61
Equatorial Guinea	315.00	1.00	854.00	63.11
Gabon	276.00	3.00	724.00	61.88
Algeria	4,154.00	453.00	6,500.00	36.09
Sao Tome and Principe	16.00	1.00	19.00	15.79

in terms of testing. We compute testing intensity as follows: Testing Intensity = 1 – (Total Cases/Total Tests) x 100.

In Table 1, we present 38 African countries who have complete numbers for tests completed and infected cases, as published by Worldometer, as at 2 May 2020. We have sorted this table according to the computed testing intensity in these countries, from the most intense to the least. Countries such as Uganda, Botswana, Zimbabwe and Ethiopia have very high testing intensity rates and have carried out a significant number of tests in comparison to their number of confirmed cases. We can also observe countries that may consider performing more tests, such as Egypt, South Africa, Morocco, and Algeria.

As can be seen, creating a model via AI tools which is expected to predict the spread of Covid-19 in Africa is extremely challenging, simply because the current data from African countries is skewed and not a true representation of the situation on the ground. Most rural areas do not have access to testing kits, there is a huge backlog at testing facilities (i.e. new numbers are reports of old tests and not of new tests), and deaths are not reported in most communities, especially when the deceased have to be buried unceremoniously (Saba, 2020).

Given the circumstances, lockdowns have proven to help in curbing the spread of Covid-19. However, economies have to reopen and many experts have proposed stages so that this can be done gradually. In the next section, we discuss components of reopening plans from around the world, and propose how AI can assist in the reopening process in Africa.

Reopening strategies with AI: what can Africa afford?

In this section, we recommend a reopening plan and present ways in which AI can assist African countries during this gradual process, especially in cases where there has been a lockdown. We also elaborate on various mitigation strategies, and areas where further efforts could be focused to support the effective reopening of African economies.

The reopening of economies is one of the most talked-about and controversial topics of the present moment, especially in countries with high Covid-19 infection rates. In the USA, the Governor of New York, Andrew Cuomo, has presented a four-stage plan that was crafted using a risk versus reward analysis. This analysis placed activities and businesses that have a low risk of spreading the virus, but greater economic impact, as the first to reopen during the first stage of the plan. Those

with a high infection risk, but with low economic impact, were placed at the tail end of the reopening plan, as seen below:

Phase 1 – Construction, Manufacturing and Wholesale Supply Chain
Phase 2 – Professional Services, Finance and Insurance, Retail, Administrative Support, Real Estate/Rental and Leasing
Phase 3 – Restaurants, Food Services, Hotels and Accommodations
Phase 4 – Arts, Entertainment/Recreation, Education

The mitigation strategies are: wearing of masks, washing of hands, weekly testing (where the resources exist), and social distancing. We have singled out this reopening plan, since it is well- thought-out, takes into account basic yet fundamental safety measures which each individual can employ, and can work in Africa. The following are ways that AI can assist with mitigation strategies:

Social distancing – As has been discussed, drones have been used successfully in other parts of the world for the monitoring of public spaces. This can be adopted in Africa, as these drones are mostly available 'in a box' or 'off the shelf'. Piloting them is relatively easy, and they can also be used as a means of supplying humanitarian aid to rural African villages and towns.

Face masks – South Africa is already using 3D printing to create face masks, shields and PPE. This idea can be replicated by other African countries. Face masks can also be made locally and affordably by using recommended fabrics.

Rapid testing – AI tools can be used to identify infected cases, which will assist in deploying testing resources to the sectors of the population who are most likely to be infected.

Predictive models – While it is important for researchers and industry experts to keep building machine learning models that can predict the spread of the virus, we must emphasise that these models are limited by the credibility of the data which can be obtained. Most models will be inaccurate, due to the issues discussed earlier in this article. Hence, we advise that these efforts be used to further more productive ventures.

Online learning – A fundamental consideration across the globe is how to manage the education of our youth during the current crisis. There exist a host of free online tools and applications available to support teacher engagement with students. Companies such as Intel are also working towards technological solutions for virtual learning (Swan, 2020). Plagiarism checkers are easily available, and facial recognition software (designed with machine learning tools) is able to assess the person's identity (via an uploaded ID document) and then repeatedly monitor their presence during assessments.

It is important to note that many software vendors around the world (including vendors of AI products and tools) are currently giving out free licenses to help in the fight against Covid-19. African countries can apply for these licenses, which will provide them with access to technologies that normally would have been inaccessible due to the associated costs.

What is the way forward for Africa?

African governments currently find themselves in a situation where they have to weigh the health of their people against safeguarding their countries' economies. The consequences of not seeing to the latter will be increased levels of poverty and worsening social conditions. One thing is certain: any assistance will be appreciated – even if it comes from machines.

In this article, we have discussed how AI efforts around the world are providing tools to mitigate the spread of Covid-19. More can be done, and on a much larger scale, and it is to this end that we have provided a list of AI technologies that can be 'ported' to Africa. We have also discussed the issue of skewed data on the continent, which will limit the effectiveness of AI models built for the sole purpose of predicting the spread of the virus in

“African governments currently find themselves in a situation where they have to weigh the health of their people against safeguarding their countries' economies. The consequences of not seeing to the latter will be increased levels of poverty and worsening social conditions. One thing is certain: any assistance will be appreciated – even if it comes from machines.”

Africa. This is not to say that one may not pursue such ventures, but there needs to be an awareness of the degree of error involved in basing models on incomplete data. Fundamentally, it would not be feasible to make decisions based on unreliable results.

The question which invariably lingers in our minds is: How will Africa pay for these suggested technologies? Most of the countries in question may not have the budget to invest in AI technologies and tools. Hence, we call on the private sector to use this crisis as an opportunity to make themselves known through investing in the public. The private technology sector is capable of funding drones and sponsoring research into solutions of the kind discussed here. Such efforts would not go unnoticed by a government and the people it would benefit. Rather, it would serve to highlight those organisations who acted to support their clients during a time that has left many in dire straits.

The governments of African countries should engage in discussions with experts regarding the pandemic we face, and the concerns which surround it. South Africa has a Presidential Commission on the Fourth Industrial Revolution, consisting of academics, industrial experts, and government officials who promote AI agendas. Many other countries on the continent could also benefit from such a panel, and as such should take South Africa's lead, if they have not already done so. ■

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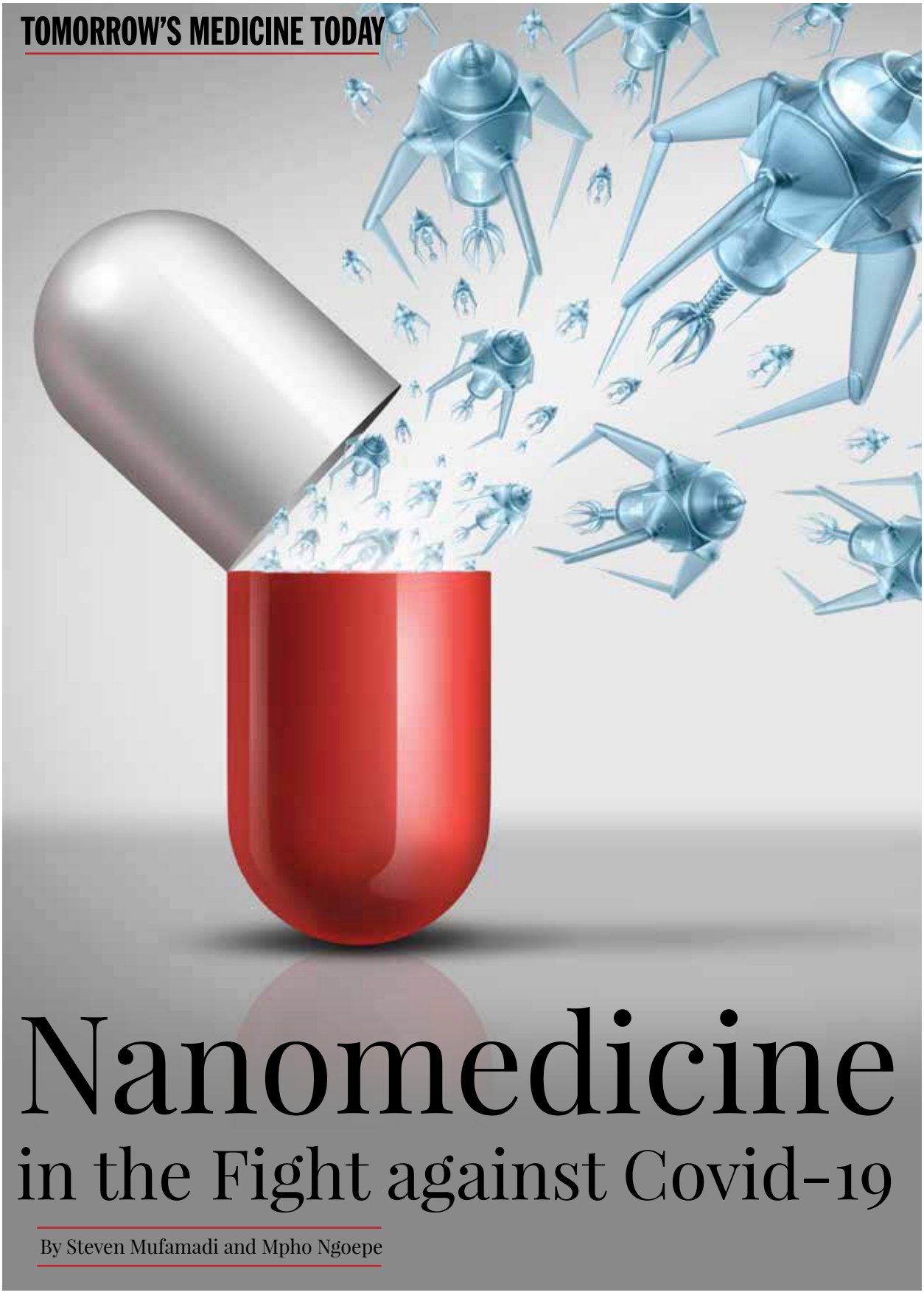
TOMORROW'S MEDICINE TODAY



Nanomedicine in the Fight against Covid-19

By Steven Mufamadi and Mpho Ngoepe

The coronavirus disease (Covid-19) caused by the SARS-CoV-2 virus has so far infected more than four million people worldwide, and the pandemic shows no signs of stopping. There is currently no known cure for Covid-19. According to the World Health Organization (WHO), the spread of Covid-19 can be controlled by a number of precautionary measures, including frequent handwashing, the spraying of surfaces or objects with disinfectants, and the wearing of face masks. The SARS-CoV-2 virus structure consists of spike proteins on the surface, membrane glycoproteins, small envelope proteins, nucleocapsid phosphoproteins and RNA. Many researchers and pharmaceutical companies around the world are focusing on this structure to develop a potential medical weapon to fight Covid-19. Nanomedicine – which refers to the application of nanotechnology to achieve innovation in healthcare – is proving important in this medical research. The use of nanomedicine in the fight against Covid-19 includes the design of nanotechnology-based masks, diagnostics devices, disinfectants, sanitisers, vaccines and drugs. According to Prof. Thomas Webster – a nanomedicine specialist at Northeastern University – the virus behind Covid-19 consists of a structure of a similar scale to nanoparticles, at a nanoscale of 1-100nm. Nanoparticles could attach to SARS-CoV-2 viruses and disrupt their structure, making it difficult for the virus to survive and reproduce in the body.

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Potential contributions of nanomedicine in the fight against Covid-19

There are four areas where nanomedicine is making significant contributions in the fight against Covid-19: i) prevention (disinfection/sanitisation and personal protective equipment (PPE)), ii) screening and rapid diagnosis, iii) vaccine, and iv) treatment.

Disinfection/sanitisation

Nanotechnology-based antiviral disinfectants are highly effective virucidal agents against contagious viruses such as SARS-CoV-2. They can kill 99.9% of viruses on contaminated surfaces or objects, such as stainless steel, plastic, cardboard, aluminium, and many more. In the Czech Republic, scientists have tested two different nanotechnology-based disinfectants, made up of nanopolymers, for their effectiveness in fighting Covid-19. Both disinfectant products were tested on public transport, such as trams and buses, for the capability of long-term antibacterial and antiviral effects for about 21 days after application. These products could reduce the daily spraying of disinfectant agents, ultimately reducing costs. In the USA, New Jersey Hospital (NJH) used NanoVapor (FDA-approved, NanoVapor BioTech) as a disinfectant agent. NanoVapor is capable of killing SARS-CoV-2 on surfaces and objects in the hospital, and is effective for up to 70 days after application. NJH used this product as an additional measure to protect its staff and patients. Many other countries around the world are currently testing their own nanotechnology-based antiviral disinfectants and sanitisers for hand washing or to protect homes, hospitals and shoppers. These countries include Malaysia (Mydin Virus Nano Spray Buster/booth for the whole body disinfection) and the United Kingdom (MVX Protex antimicrobial coat spray, MVX Prime Ltd, UK), amongst others.

Personal protective equipment (PPE)

Countries around the world are using face masks to prevent the spread of Covid-19. Surgical masks, N95 masks (fine dust masks) and/or other equivalent respirator-type masks are among those currently used by healthcare workers to protect themselves from coronavirus. However, these masks can only protect healthcare workers and/or individuals to a certain extent from respiratory secretions or viruses in the air. Nanotechnologies-based masks promise to offer unique solutions in the form of a new generation of face masks that are reusable, washable, recyclable, electrical and self-sterilised, while providing the wearer with the necessary protection against viruses. Nanotechnology-based masks have proved to

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be 99.9% efficient against coronavirus and other infection threats. Nanofiber masks are capable of trapping and killing viruses immediately upon contact. In a recent report, the Respilon Group – a Czech Republic nanofiber technology firm – claims to have developed a ReSpimask® face mask that is capable of trapping and killing viruses, including coronaviruses. ReSpimask® mask is made up of nanofiber technology with a three-layer membrane incorporated with copper dioxide (CuO) nanoparticles. In another report, the Hong Kong-based New World Development group claims to have developed self-sterilising nanodiamond-coated masks that are both affordable and highly effective against coronaviruses. Many other nanotechnology-based masks have been developed so far around the world, including electrical sterilisation breathing masks (Graphene mask, Guardian G-Volt™, Belgium), nanotechnology-enabled N95 masks (nanofiber mask, Fanavaran Nano-Meghyas, Iran) and many others that are still in the development stages.

Screening and rapid diagnosis

The screening and rapid diagnosis of Covid-19 is crucial in preventing the spread of the disease in a community. Currently, the diagnostics of coronavirus are done by real-time reverse transcription-polymerase chain reaction (rRT-PCR) and GeneXpert. Although rRT-PCR is the gold standard for diagnosing coronavirus, and GeneXpert can offer rapid results in a short period of time, both are very complex, expensive, and lengthy – it can take 24 hours from sample collection to laboratory analysis to obtain diagnostic results. Rapid test kits are the fastest and cheapest way to test for SARS-CoV-2 in a short period of time; these include antibody tests and nanotechnology-based Covid-19 test kits/sensors.

Nanotechnology-based Covid-19 sensors are able to give results in less than 20 minutes. Rapid diagnostic kits such as these could reduce the burden on our current shortage of laboratory machines. For example, gold nanoparticles have been used by researchers in diagnostic RNA assays to detect amounts of coronavirus RNA sequences in a matter of minutes. The World Nano Foundation (WNF) claims to have identified a second generation rapid Covid-19 IgM/IgG antibody assay kit that consists of gold nanoparticles in the testing strip. This colloidal gold method has the capability of separating readings for IgM and IgG, detecting Covid-19 with more accuracy, and delivering results within 3-15 minutes. A recent article published by Norwegian SciTech News reported that researchers at the Norwegian University of Science and Technology (NTNU), in collaboration with St. Olavs Hospital, have developed iron oxide nanoparticles coated with silica as the next generation of coronavirus diagnostic tests. The advantage of using magnetic nanoparticles coated with silica in the testing kits is that these have a strong affinity for the coronavirus RNA that is extracted from the patient sample. In addition, these testing kits allow medical practitioners to conduct more than 30-40,000 tests in a day, and an estimated 150,000 Covid-19 tests per week. Furthermore, nanotechnology-based diagnostic devices are capable of measuring and interacting with single biological events, which means they have the capability of diagnosing single cells or viruses within a patient sample with a very low viral titre, which is very difficult to do when using conventional methods such as rRT-PCR, GeneXpert or Covid-19 antibody test (ELISA).

Vaccine and cure

There is currently no vaccine or cure for Covid-19. Several Covid-19 vaccines and treatments are in development and clinical trial phases, including nanotechnology-based vaccines and therapies. Conventional vaccines and/or DNA vaccines show promise for a universal influenza vaccine, but they have several downfalls, including the failure to engage the immune system, and their high toxicity and low stability in vivo. It is very difficult to deliver them to target areas, and they are easily eliminated in the reticuloendothelial system (RES). Nanovaccines, which are a new generation

of vaccines that utilise nanoparticles (NPs), offer a safe delivery vehicle to a target site. Nanosized particles include liposomes, protein, polymeric nanoparticles and nanospheres. Nanovaccines can improve the efficiency of vaccine delivery, can offer prolonged protection, and can induce both humoral and cell-mediated immune responses. One example of this is self-assembling ferritin proteins that formed nanoparticles, which can promote the production of antibodies to neutralize viruses, including coronaviruses. Nanovaccines that are currently undergoing clinical trials include the mRNA-1273 vaccine (Phase 1 trial, Moderna, USA), NVX-CoV2373 (a nanovaccine that is a recombinant protein nanoparticle technology platform; Novavax Inc, USA), BNT162 DNA vaccine (Phase I/II trials) developed by Pfizer (New York City, USA), in collaboration with BioNTech (Mainz, Germany), INO-4800 DNA vaccine, in Phase I clinical trial (Inovio Pharmaceuticals, USA), Ad5-nCoV vaccine (a recombinant novel coronavirus vaccine; Cansino Biologics Inc, Tianjin, China), and INO-4800 DNA vaccine (Phase I/II trials) developed by Korea National Institute of Health (Osong, Republic of Korea), in collaboration with the International Vaccine Institute (Seoul, South Korea). N4 Pharma Plc (United Kingdom) recently announced Nuvec® technology, a silica nanoparticle with elongated silica spikes radiating from the core. On the other hand, Alnylam Pharmaceuticals has synthesized more than 350 siRNAs targeting all available genomes of coranoviruses in the USA, using RNA interference (RNAi) therapy. A collaborative study between Northwestern University and Massachusetts Institute of Technology claims to have discovered a peptide molecule that binds strongly and specifically to the spike proteins on the surface of SARS-CoV-2. The peptide molecule is encapsulated within the nanostructure to protect it from elimination in the RES, and is delivered into the target site where there are coronaviruses. Nanomedicine studies also provide insights into anti-malaria chloroquine's efficacy against Covid-19. Synthetic nanoparticles were allowed to interact with host cells in the presence of chloroquine, *in vitro*. The studies provide clues on chloroquine-induced alterations of Covid-19 cellular uptake. Although cell culture studies have proved that chloroquine might have antiviral activity against Covid-19, further studies or positive clinical trial results are still required.

> "However, extensive research is still required in order to declare the success of nanomedicine in the fight against the Covid-19 outbreak, as there still exist questions concerning the efficacy and side effects of nanotechnology-based vaccines and treatments."

Conclusion

Nanotechnology-based antiviral disinfectants are highly effective and could be used in South Africa for increased surface disinfection or sanitisation in public transport, hospitals, schools, supermarkets and homes. They could also be applied once a month instead of on a daily basis, which is the case with conventional disinfectant agents. In the case of PPE, nanotechnologies promise to offer a new generation of face masks that are reusable, washable, recyclable, and self-sterilised, as well as capable of killing the virus immediately upon contact. In the case of Covid-19 diagnostics, nanotechnology promises to offer cheap and quick Covid-19 tests that deliver accurate results in less than 20 minutes. When it comes to Covid-19 treatments and vaccine, nanomedicine promises to offer nano-enabled medicine products that are capable of neutralising viruses. There are currently many organisations around the world that are busy working on the development of nanovaccines and treatments, some of which are currently undergoing clinical trials. However, extensive research is still required in order to declare the success of nanomedicine in the fight against the Covid-19 outbreak, as there still exist questions concerning the efficacy and side effects of nanotechnology-based vaccines and treatments on humans, as well as the environmental impact of nanomaterials. ■

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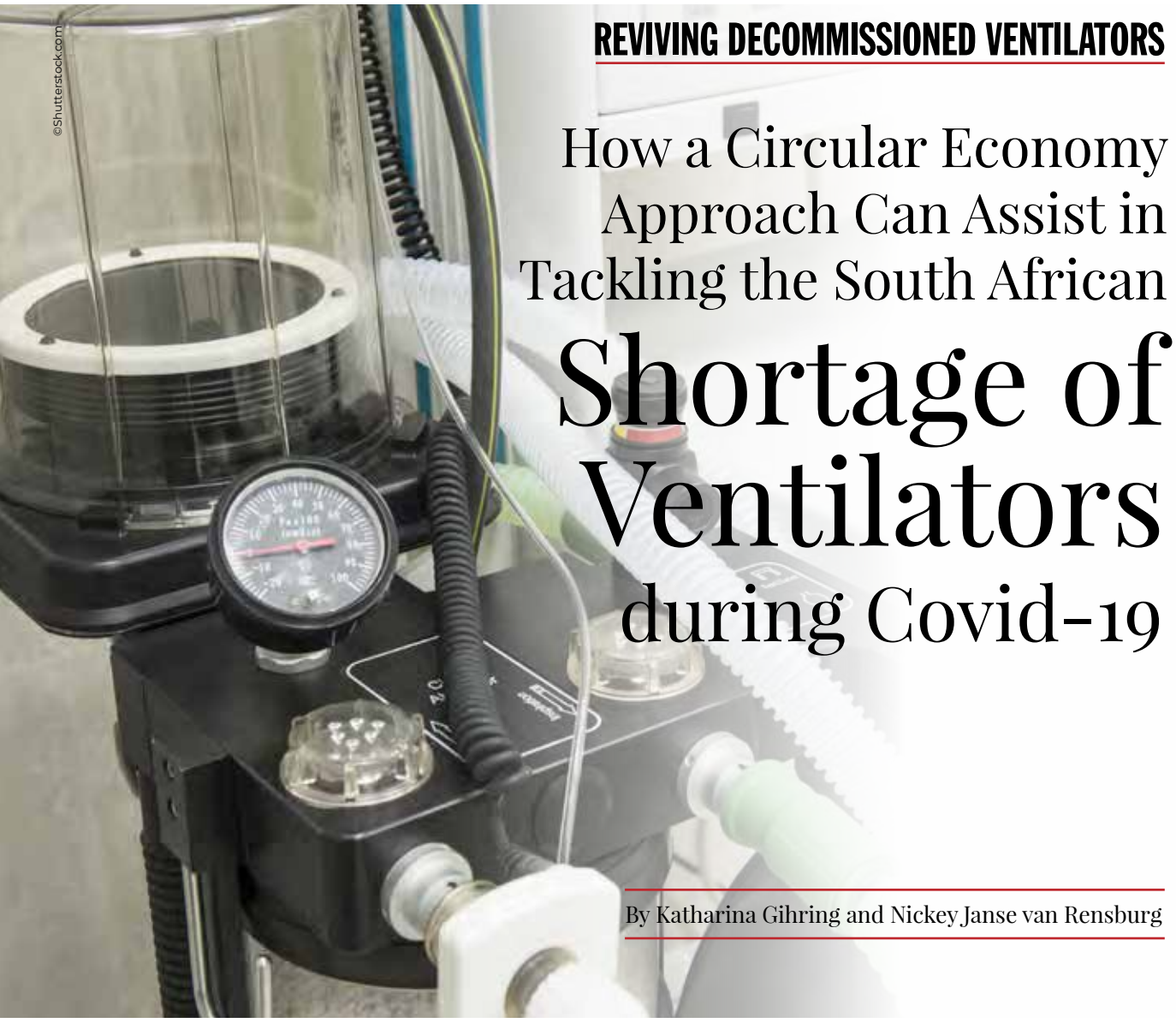

REVIVING DECOMMISSIONED VENTILATORS

How a Circular Economy Approach Can Assist in Tackling the South African Shortage of Ventilators during Covid-19

By Katharina Gihring and Nickey Janse van Rensburg

Sub-Saharan Africa bears the highest disease burden in human and economic costs, but commands less than one percent of global health expenditure (Aikins et al., 2010). Strong health systems are fundamental to maintaining good health. Difficult geography, a severe shortage of trained medical personnel, poor infrastructure, a lack of critical care equipment and accompanying technical skills make it difficult to deliver the healthcare services people in Africa need to achieve good health. These weaknesses in the healthcare system have been compounded by the Covid-19 pandemic. Equitable and efficient healthcare provision requires properly balanced and managed resource inputs. There is a strong argument to be made for circular business models to optimise healthcare technology management strategies, to eliminate medical e-waste, and to establish a new, open niche market in Africa.

Healthcare technologies (physical resources such as fixed assets, equipment, consumables and personal protective equipment (PPE)) form the basis for the provision of all health interventions. The novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) pandemic has overwhelmed some of the best healthcare systems in the world. While the global community races to slow down the spread of Covid-19, shortages of critical healthcare technologies have grabbed the headlines and are a sore point for world leaders

to answer to. Similarly, in Africa, the virus has spread to dozens of countries within weeks, with governments and health authorities across the continent struggling to limit widespread infections to protect the region's already fragile healthcare systems. South Africa's swift response has bought some time to prepare for peak infection and has been applauded by health authorities globally.

Patients who develop respiratory illness due to SARS-CoV-2 may need mechanical ventilation. As the world battles Covid-19, most countries are facing a shortage of life-saving ventilators, crucial in assisting the most critically ill patients with breathing. In South Africa, 3% of active cases need intensive care (Gerber, 2020), which is lower than the global average of 5% (WHO, 2020). The need for intensive care varies per country: while China reported 6.1% of all positive confirmed cases as critical, Italy reported 12% of cases in need of intensive care (Phua et al., 2020), buckling the healthcare system. The variation is caused by factors such as demographics, ICU admission criteria and management, and number of tests conducted (Cook et al., 2020).

Healthcare workers are faced with the challenge of an insufficient supply of ventilators and PPE while caring for the large influx of Covid-19 patients (Ranney et al., 2020). While wealthier countries can afford to considerably increase their intensive care beds – as done in Germany (OECD, 2020) – or mass-produce the required ventilators, African countries are faced with severe challenges to combat the spread of the virus without these resources (Baker, 2020). The response to Covid-19 – globally and in South Africa – has been to 'flatten the curve'. The goal is to not overwhelm the healthcare system to avoid unnecessary death. In South Africa there are an estimated 7,195 critical care beds available in private and public hospitals (Van den Heever, 2020).

Equitable and efficient healthcare provision during this pandemic boils down to the availability of healthcare technologies to treat critical care patients and PPE for healthcare workers, both of which are currently not in place in South Africa (Schütz, 2020). A combined 3,216 ventilators from the public and private sectors are available, which is half the estimated amount needed at peak infection, expected between July and September this year in South Africa (Du Toit & Kowan, 2020).

"In all likelihood, the Covid-19 pandemic will not be the last of its kind. Policy interventions and future healthcare technology management strategies should never fall short again. A multidisciplinary, circular approach is needed to support the critical care technology development that is central to responding to the Covid-19 crisis."

A national Emergency Ventilator Project has been formed – led by the South African Radio Astronomy Observatory (SARAO) – to assist in managing the development, production and procurement of ventilators (SARAO, 2020). The design and business model of this initiative will play a crucial part in how products are used, maintained, reused, refurbished, and recycled in the future. Therefore, ways and tools to implement eco-design with End of Life in mind are needed to ensure the transition to a circular economy and to establish a niche market in Africa.

In all likelihood, the Covid-19 pandemic will not be the last of its kind. Policy interventions and future healthcare technology management strategies should never fall short again. A multidisciplinary, circular approach is needed to support the critical care technology development that is central to responding to the Covid-19 crisis. Responding to initial reports that between 40–70% of South Africans could get infected with Covid-19, depending on the national response to the crisis, the UJ-Process Energy and Environmental Technology Station (UJ-PEETS) is coordinating efforts to further develop open-source ventilators, to make rapid prototyping facilities available to enable PPE and component manufacturing, and to support repair and maintenance efforts to bring out-of-warranty equipment into service. This is in line with the mandate to support small and medium-sized enterprises (SMEs) within the green and circular economy, which is proposed as a new business case for healthcare technologies that are in critical shortage on the continent.

Eliminating Medical E-Waste Through a Circular Approach

A circular economy is an industrial system that is restorative or regenerative by intention and design (Korhonen et al., 2018). It is a new economic

paradigm which replaces the current linear economy, defined by take, make and dispose, resulting in globally interlinked environmental problems. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals (which impair reuse and return to the biosphere), and aims for the elimination of waste through the superior design of materials, products, systems and business models (PACE & WEF, 2019; D'Amato et al., 2017). A circular economy is based on many different schools of thought (e.g. industrial ecology, cradle to cradle, blue economy), which look at resource usage through different lenses (Andersen, 2007; Braungart et al., 2007). A circular approach aims to keep products, materials and resources at their highest value for the longest duration, to eliminate waste (by, for instance, feeding products and resources back into the system), to redefine services, and to rely on renewable energy sources (Ellen MacArthur Foundation, 2013). This is proposed as a new paradigm to inform healthcare technology management strategies in Africa and the rest of the world.

Waste Electrical and Electronic Equipment (WEEE), or e-waste, is the fastest-growing domestic waste stream in the world, estimated at 44.7 Mt in 2016 and anticipated to tip the scales at 52.2 Mt in 2021 (Baldé et al., 2017). Insufficient infrastructure and waste management, as well as no legislative enforcement, lead to human health risks, environmental degradation, and the leakage of toxic and harmful substances into the environment. On the other hand, e-waste contains many valuable resources and can contribute to new decent and green jobs, unlocking an opportunity worth of over US $55 billion per year (PACE & WEF, 2019).

Within the paradigm of the circular economy and the waste hierarchy of integrated waste management, recycling is one of the last options, due to the down-cycling of valuable raw materials (Pires et al., 2019). In descending order of preferability, the top method is pollution prevention, followed by re-use, recycling, treatment and disposal, while a circular approach adds the refurbishment and remanufacturing step before recycling.

"A circular economy is based on many different schools of thought (e.g. industrial ecology, cradle to cradle, blue economy), which look at resource usage through different lenses to redefine services, and to rely on renewable energy sources. This is proposed as a new paradigm to inform healthcare technology management strategies in Africa and the rest of the world."

Healthcare technology management has become an increasingly visible policy issue. The growing medical sector contributes to increased e-waste globally (WHO, 2019), while low to middle-income countries face the challenge of acquiring medical devices, which is currently illustrated by the desperately low number of ventilators across the African continent (Maclean & Marks, 2020). The good news is that decommissioned ventilators can be refurbished and reused. The refurbishment of medical devices can be defined as a process to prolong the lifetime of devices which have nearly reached their end-of-life stage (Kane et al., 2018; Thierry et al., 1995). Importantly for medical technologies, refurbished devices need to be licenced to safely and effectively operate after refurbishment.

Compliance, Data and Future Strategies

Ventilators fall under class C (moderate to high risk) of medical devices (Act No. 101 of 1965, Department of Health; SAHPRA, 2019), which means that more steps, such as decontamination, cleaning, and testing (WHO, 2019), are involved to reinstate the medical device to its old functionality. In order to refurbish a medical device, a manufacturing licence from the South African Health Products Regulatory Authority (SAHPRA), which falls under the Department of Health, needs to be obtained (The Medicines and Related Substances Amendment Act 14 of 2015, Republic of South Africa; Saidi & Douglas, 2018). All the refurbishment steps taken need to also comply with the manufacturer specification for the model. South Africa imports 90% of its medical devices (Deloitte & DTI, 2014), which makes it dependant on other countries' industries. To establish a circular economy, the business model for medical healthcare equipment must change and a compliant refurbishment network is needed. Such a network would not only have the advantage of prolonging the life of decommissioned medical equipment, but would also contribute

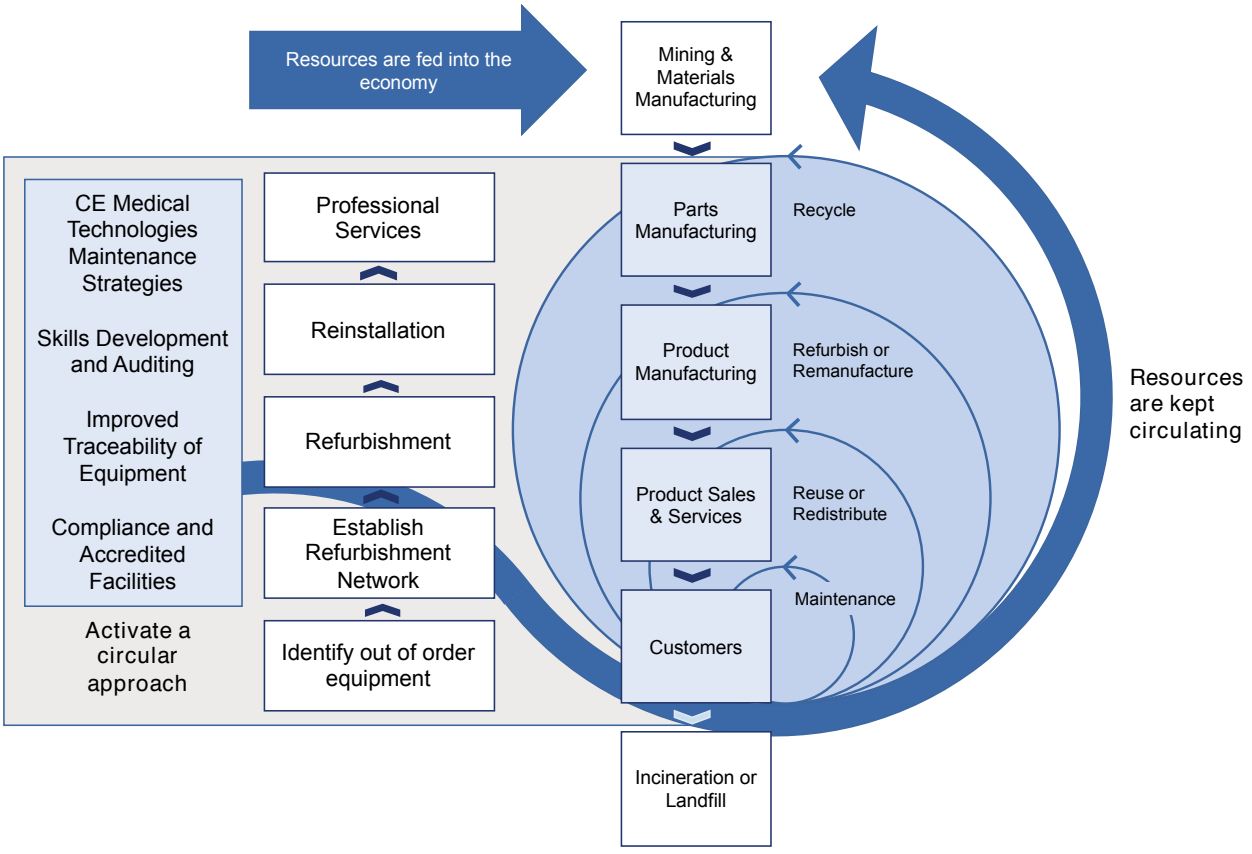

Figure 1 Activating a circular approach through refurbishment for ventilators (Adapted from the Ellen MacArthur Circular Economy Butterfly Model (2013) and Global Medical Imaging Industry (2016))

to safeguarding enough ventilators. Adding maintenance-related skills for refurbishment and repair within circular economy business models increases South Africa's professional technical service sector expertise. It also helps to close material loops by retaining functionality of critical medical technologies. At the same time, most current circular economy concepts concentrate on the products' end-of-life stage.

Data on the number of decommissioned ventilators, let alone on their location, is not readily available at a national level. Through a circular approach, a product is traceable through its entire life cycle, improving maintenance management and the eventual safe disposal of e-waste (see Figure 1). In order to refurbish medical equipment, the first step will be to identify decommissioned ventilators. Secondly, a refurbishment network needs to be created which allows for the technical feasibility and procurement of the right skillsets, such as medical engineers and technicians. It is critical that this network is established under the current national Emergency Ventilator Project, and that principles of circularity are incorporated in future product design. After refurbishment has taken place, equipment will need to be distributed. If circular business models are designed and informed by local policy, the decommissioning of medical e-waste can support a sustainable healthcare system in Africa. The proposed refurbishment network can unlock an economic niche, which allows for capacity building and job opportunities. These actions will further contribute

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> “Through a circular approach, a product is traceable through its entire life cycle, improving maintenance management and the eventual safe disposal of e-waste (see Figure 1).”

to the creation of circular medical technology management strategies.

The redesign and improvement of product design and business models for medical technologies need to take place, to extend product lifetime and support refurbishment and recycling in a more efficient manner (Ertz & Patrick, 2020). Take-back schemes by manufacturers such as Siemens, Philips and GE (Kane et al., 2018) can also curb e-waste production from medical devices, while contributing to better accessibility for required medical devices, creating an open niche market in Africa.

UJ-PEETS is in the process of establishing a refurbishment network to respond to the current pandemic. This network will feed back into the broader e-waste project to unlock the economic and entrepreneurial potential within the sector for South Africa. For more information or to support these efforts, contact peets@uj.ac.za ■

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EVIDENCE FOR DECISIONS IN THE TIME OF COVID-19

Eyes on Africa

By Nasreen Jessani, Laurenz Langer, Carina van Rooyen and Ruth Stewart

As Covid-19 sweeps across the globe, one of the biggest questions in many minds is 'how will this crisis affect Africa?' (Nyenswah, 2020; Pillay, 2020; Wood, 2020; World Bank, 2020a). Fears abound that the pandemic will multiply and deepen existing socio-economic issues, such as high levels of unemployment, poverty, and inequality. Some speculations are stoked by geopolitical relations and partnerships that underpin the role of foreign powers, such as China, in Africa (Tremann, 2020). Other predictions consider the socio-cultural dimensions unique to the continent that would likely hamper extrapolations from Western or Eastern examples to date (Broadbent and Smart, 2020; Kaseje, 2020). Often these speculations are characterised by a sense of risk and a pessimistic outlook on Africa's capacity to respond effectively to the threat posed by Covid-19 (Holmes et al., 2020).

In this article we argue that many African governments have so far responded more proactively and effectively to Covid-19 than some governments in High Income Countries (HICs), and that much of this capacity to respond effectively can be explained by an existing culture of using evidence to inform policy decision-making.

Decision-Making in the Time of Covid-19

A key challenge for many decision-makers in these uncertain times is the rapidly expanding and changing knowledge and information base on Covid-19. Response strategies to contain the pandemic require a sensitive design that is receptive to a constant flow of new data and evidence which forces decision-makers to adjust and review strategies and policies on an ongoing basis (Mbuvha and Marwala, 2020). The vast amount of evidence and misinformation can be paralysing for decision-makers and citizens alike. As the world grapples with an overwhelming number of unanswered questions in relation to this pandemic, and a rising tide of often highly-speculative new research, our leaders' decision-making is in the spotlight.

Crucially, the different trajectories of Covid-19 in countries suggest that adopting evidence-informed response strategies contributes positively to controlling the pandemic. Politicians and leaders stress a need for 'following the science' and science advisors and governmental advisory committees are in a new, unfamiliar spotlight. Supporting such institutional mechanisms for evidence-informed decision-making is a wider community of global institutions, organisations,

and individuals that produce policy-relevant evidence and work to increase the use of the best available evidence in decision-making. They specialise in rigorous analysis of the full body of available evidence and help to sort fact from fiction, supporting decision-makers to navigate the evidence in almost real time. This evidence community is suddenly needed more than ever in national and global decision-making systems.

So, with our eyes turned to Africa, how is our African evidence community faring in the time of Covid-19, and how is its response helping to shape the impact of the pandemic across the continent?

Increased Demand for Evidence

Covid-19 is arriving on the continent and into health systems that are significantly different from those in the rest of the world. African health systems have both advantages and disadvantages compared to health systems in the wider international community. While the HIV/AIDS and Ebola pandemics have left many African countries with the experience and skills needed to manage large-scale health crises, many basic health system functions – such as vaccinations and supply of medicines – are often underfunded and heavily reliant on donor funding. With the world shifting its efforts and resources to Covid-19 responses (see the Gates Foundation's massive reallocation of funding), African health systems face a financial risk for essential basic services at the same time as they have to design an effective Covid-19 response.

While the world's – and Africa's – focus to date has largely been the pandemic's case growth and mortality rate, Africa is facing a pandemic for which our social and economic capacities arguably require greater attention than our health systems. Millions on the continent are already feeling the impact of unemployment, hunger, and social unrest magnified by the pandemic, while few have been affected by the clinical manifestation of the virus. Country-wide lockdowns have a far greater negative social and economic impact in economies with large informal sectors, much smaller social safety nets, and dense urban townships and informal settlements (World Bank, 2020b). The implications of these unique realities are that African decision-makers have a different demand for evidence and need to be able to design a more holistic Covid-19 response that, from day one, is more sensitive to the socio-economic risks presented by the pandemic, and builds on the existing expertise and experience of managing previous pandemics.

To this twin challenge, Africa's evidence community is responding with cross-sectoral research, monitoring, and evaluation to inform decision-making. For example, the South African government has explicitly requested research advice not only in relation to health, but also for education, economic and social policies (Africa Centre for Evidence, 2020). African researchers are also producing evidence on how to protect and prioritise already existing health interventions which can increase health system resilience and preparedness for Covid-19. For example, Ugandan researchers have produced a rapid evidence review on infection prevention control practices for district health services in Uganda (Centre for Rapid Evidence Synthesis, 2020a).

Evidence Generation and Use by Africans for Africa

We are seeing African nations take the lead in the generation and use of evidence for decision-making and in the solutions being sought out to tackle the pandemic. Almost immediately after the pandemic was declared, some African nations responded with explicit evidence-informed mitigation strategies. This is in stark contrast to the speed of the response in some other, much better-resourced health systems.

In general, some African states implemented strict lockdown policies much earlier than many European and American countries, often adopting such policies even before any deaths had been recorded. These decisions drew heavily on evidence-informed policy advice by the WHO and the Africa Centre for Disease Control, as well as observations of the emerging data on the effectiveness of lockdowns in other countries at different stages of the pandemic. Crucially, these decisions also drew on local reviews that assessed the transferability of the existing international evidence, such as a rapid review conducted in Uganda on the effectiveness of lockdowns (Centre for Rapid Evidence Synthesis, 2020b). In addition, individual countries such as South Africa led the world in introducing mass screening by community health workers very early in the manifestation of the pandemic. Universities and other producers of research across the continent

mobilised quickly to contribute to the generation of equipment, the development of affordable test kits, and the conducting of multi-arm vaccine trials. These advances have included, for example, the development and trialling of a rapid Covid-19 test in Senegal which can provide results in ten minutes (Haque, 2020), the contactless delivery of samples for testing using drones in Ghana, as well as virtual hackathons to find African digital solutions to combat Covid-19, facilitated by the WHO (Bright, 2020).

In response to multiple complex demands for evidence, we have seen a rise in locally relevant rapid production of evidence to inform Africa's Covid-19 response. This local supply from African academics and researchers of relevant evidence is multifaceted, including responsive evidence syntheses, rapid responses, surveys, advisories, and guideline documents for government decision-makers. The supply is driven by African research organisations and pre-established evidence broker organisations such as the African Centre for Rapid Evidence Synthesis, the Africa Evidence Network, Effective Basic Services, and the African Institute for Development Policy. For a full list of African organisations supporting the use of evidence, see the continent-wide GeoMap published by the Africa Evidence Network (2020a). These institutions are tapping into their already established relationships with government and civil society decision-makers to provide responsive evidence services to support national policy and practice. The supply is also informed by continental priority-setting exercises for research, driven by the African Academy of Sciences (2020), and by the participation of African researchers in contributing to global efforts to synthesise evidence through the COVID-END initiative (McMaster Health Forum, 2020).

The evidence-informed response across African states has been led by high-level and cross-governmental leadership. For example, President Cyril Ramaphosa of South Africa has repeatedly stressed that the country's response is based on the best available evidence, with a range of cross-governmental teams reviewing and analysing health and socio-economic evidence on an ongoing basis. President Nana Akufo-Addo of Ghana and Nasir El-Rufai, Governor of Kaduna State in Nigeria, both spoke publicly in a recent webinar, alongside some of the world's leading academics, about their policy responses to the Covid-19 pandemic, with frequent references to the evidence bases that guided their decision-making (Africa.com, 2020).

This use of evidence to guide decision-making in response to Covid-19 is in contrast to the approaches of national leaders in other countries – such as the United States, Sweden, and Brazil – who have downplayed the risk of the pandemic and promoted distinctively non-evidence-informed health advice.

"Whilst fears are mounting for those living in poverty across the continent, and manifestations of elements such as data-poverty and technology-poverty are being felt, African governments have taken stronger measures than their international peers to protect the most vulnerable sectors of their populations."

Leave No African Behind

Whilst fears are mounting for those living in poverty across the continent, and manifestations of elements such as data-poverty and technology-poverty are being felt, African governments have taken stronger measures than their international peers to protect the most vulnerable sectors of their populations. From the onset of the pandemic, governments were keenly aware of the risk Covid-19 posed to populations living in overcrowded conditions, with poor nutrition, and with pre-existing conditions such as HIV/AIDS. To protect these populations, governments have gone to great lengths to design tailored Covid-19 response strategies aimed at protecting the most vulnerable. This includes, for example, Ghana using historic pre-paid records and geo-location to deliver food parcels to those most in need, and South Africa setting up special isolation sites for individuals who test positive for Covid-19 but cannot self-isolate at home.

We have witnessed a flurry of activity from advocacy organisations in ensuring that the voices of ordinary citizens do not go unheard, and that their needs are met. In Cameroon, for example, the evidence community is mobilising to communicate evidence around Covid-19 at a community level by using local sign language and

Pidgin English for people living with disabilities within their communities (eBASE Africa, 2020). Again, this contrasts sharply with international examples – such as the United States and the United Kingdom – where more vulnerable and marginalised members of the population are experiencing significantly worse clinical outcomes during the pandemic.

African Evidence Solidarity

In response to the pandemic there is a general groundswell in calls for solidarity; so too with the evidence community in Africa. Partnerships to assist with evidence production, collation, and use of evidence are appearing nationally, regionally, and globally as the lynchpin for quick but measured evidence-informed decisions. Such partnerships have demonstrated the value of solidarity in times where collaboration amplifies and multiplies the abilities of the entire evidence community to respond effectively. Regional as well as global evidence networks – such as Cochrane Africa, the Network of Impact Evaluation Researchers in Africa, and the Africa Evidence Network – are working to find, appraise, and publicly share the best available evidence and in some cases recommendations for a wide range of Covid-19 relevant issues and decision implications. These efforts produce a multiplier effect, while reducing duplication and redundancy. It is thanks to the long-term commitment to partnerships from evidence leaders in Africa (see Africa Evidence Network, 2020b) that these networks were already in place prior to Covid-19, with established relationships and trust enabling African solidarity to translate into evidence solidarity for crisis response.

Local capacity to provide, share, and use relevant and timely evidence is contributing to evidence-informed solutions to the pandemic in Africa. While there are 54 countries on the continent, each with its own unique circumstances, there are values, histories, and traditions that connect us. These connections provide the perfect opportunity for leveraging Pan-African networks, capacities, and knowledge – and strengthening these as we prepare for a new future over the many years in which we will feel the continued impact of Covid-19.

As we progress through the various phases of the pandemic and its effects on this continent, we should continue to learn from each other, support one another, and serve as examples to the rest of the world. Let us draw on the best-available evidence to inform our decisions and monitor their impacts. Let us share our successes, our challenges, our wins, and our losses. African countries, and Africa's evidence community, are rising to the challenge of responding to Covid-19 in every way that they can. ■

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The Roles of New Technology and the Law in the Fight Against Covid-19

by Dawie de Villiers

The importance of South Africa adapting to the Fourth Industrial Revolution (4IR) has been high on the national agenda in recent years. However, the adoption of artificial intelligence (AI) and other forms of technology has been hampered to some extent by fears of job losses and privacy issues. The urgent need to address the challenges posed by the Covid-19 pandemic has forced a renewed interest and focus on the possible solutions that technology can provide in a time of enormous crisis. This article provides some preliminary observations on how new technology can assist in the fight against the pandemic, and some of the legal challenges that may arise.

Before discussing these issues further, it is worth acknowledging that the relationship between law and medicine has always been somewhat strained. Law is often seen as being in opposition to medicine, and hostility from doctors towards lawyers is not uncommon. Lawyers, for their part, are known to be sceptical about medical evidence when cross-examining medical experts in court. However, it is essential to point out that due to the distinct characteristics of medical practice, legal rules and regulations are created to protect both doctor and patient from potential harm. This is pertinent to the 4IR: when the need to regulate new technology arises, it is up to the law to determine if current legal instruments are sufficient or if there is a need to revisit them.

New Technology in the Fight Against Covid-19

The Covid-19 crisis has highlighted the centrality of internet access. However, the fact that more than half of the global population does not have internet access diminishes the potential of new and exciting technologies. If the solutions that new technologies present do not in themselves worsen this inequality gap, steps will need to be taken to expand stable and accessible internet services to remote areas, so that the most vulnerable in society

can also benefit from better healthcare supported by new technology (Guterres, 2020).

The lack of hospital capacity and resources has been a real concern since the beginning of the Covid-19 outbreak. Many hoped that new technology like AI would speed up patient screening, reducing the strain on medical personnel. A valid question that arose, however, was whether the results of tests conducted by IT experts in laboratories would be comparable to real situations. A study from Google Health revealed that this was not the case (Heaven, 2020). Other problems were noted, such as poor internet connections which caused delays. It was also pointed out that accuracy in labs is only the first step.

In response to these concerns, the speeding up of the rollout of 5G technology across Africa has inevitably been marked as a priority. While this priority may be justified, it should not overshadow the need to be mindful of the balance between the right to safety and security (including the right to health facilities) and the right to privacy.

Assistant Robots

Medical chatbots and other robots that can update algorithms in the initial screening of patients may be extremely valuable, particularly in assisting health personnel who are under tremendous pressure. An example of this is Quintin, a robot at Tygerberg Hospital in the Western Cape, who assists with virtual ward rounds – some of which are conducted in the absence of medical staff. Doctors can control Quintin remotely with a desktop, tablet or smartphone, and communication between the doctor and patient occurs through a microphone and Zoom. The obvious benefit of using robots in these circumstances is that medical personnel are not exposed to the virus unnecessarily.

Germ-Destroying Robots

It is crucial to control the spread of Covid-19 in hospitals and amongst health care workers. The latest technologies can play an essential role in this, as seen in the use of super germ-destroying robots. Netcare began acquiring these robots in late 2017, and currently uses two types. Dr Richard Friedland, Netcare Group's chief executive officer, explains: 'Both the Xenex pulsed ultraviolet (UV) robots and Yanex Pulsed-Xenon UV robots deployed in Netcare hospitals use high doses of UV light to destroy viruses, bacteria and fungal spores and disinfect hospital wards, theatres and other spaces within minutes' (Netcare, 2020). There are currently 28 of these robots in operation at 22 hospitals and, according to Friedland, another 13 will soon be deployed.

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The Russian-designed Yanex robot has proven to be effective against antibiotic-resistant bacteria and viruses such as Covid-19. It releases UV-C spectrum light, which destroys viruses and prevents replication. The robot can destroy a remarkable '99.90% of germs on high-touch surfaces and 99.99% of airborne germs', and is able to disinfect a room in just over a minute (Netcare, 2020). The robots are connected to a cloud, where all records are stored and are easily obtainable.

Screening Robots and Applications

The screening of large numbers of people, both for possible quarantine and for necessary treatment, is key to controlling the spread of Covid-19. However, our present pathogenic laboratory testing approach is time-consuming and carries the risk of a large number of false-negative results. AI may offer a solution to these issues, according to a recent study by eleven researchers from China (Wang et al, 2020). By using a deep learning technique, the researchers developed an AI screening application that reached a global 89.5% accuracy – far higher than the results obtained by two skilled radiologists. The researchers made use of a supercomputer system that obtained results in about 10 seconds per individual case. Testing can also be conducted remotely through a shared public platform. This is a work in progress, however, and the researchers admit that there are limitations to their study.

The Centers for Disease Control and Prevention (CDC) recently released a Covid-19 assessment robot that can swiftly assess signs of infection and risk factors. After assessment, the robot

offers a report and proposes that either a doctor be contacted or that the illness be managed at home. Powered by Microsoft Azure, this healthcare robot will be an important tool in helping currently overwhelmed hospitals, as it will allow doctors and other healthcare workers to pay attention to more urgent matters. Apart from its assessment function, the Bot can be linked to a chatbot, Grace, who can answer patients' questions online (Bitran and Gabarra, 2020). Although this tool was only launched in March 2020, an average of more than 1 million messages per day are submitted by people who are concerned about Covid-19.

Closer to home, Nigeria has developed a free online Covid-19 triage application that allows users to pre-screen themselves and assess their risk category, based on symptoms and travel and recent exposure history. Their answers determine if remote medical advice should be sufficient, or whether they should contact a doctor (Harrisberg, 2020). Since March 2020, more than 400,000 Africans have made use of this service. Here it is important to note that any new technology developed for use in African countries should be mobile friendly, given the growing use of smartphones in Africa. Acutely aware of how Covid-19 could affect the continent's most vulnerable, Africans across the spectrum are increasingly using and implementing available mobile technology options to prevent the spread of the virus. To quote Wale Adeosun, CEO of Nigerian-based Wellvis: 'A majority of Africa's problems require mostly African solutions or solutions designed with Africans in mind'.

In South Africa, WhatsApp users have reacted favourably to an interactive chatbot launched by the Department of Health – a solution that is less data intensive and more affordable than other web-based health sites. This chatbot answers general questions about symptoms, possible treatment, and myths in five different languages. Since its launch just over a month ago, it is now available globally and has already reached more than 3.5 million users (Harrisberg, 2020).

Another pre-screening symptom checker that is being used locally is an application recently released by Epione.net, available as a free download (Daniel, 2020). At present the app is linked to two hospitals in Soweto, with several doctors and other staff partaking in its pilot programme. It has also just been extended to Zimbabwe. The app allows users to monitor the progress or deterioration of their symptoms, thereby limiting the numbers of visitors to hospitals and clinics.

A leading radiologist at a hospital run by the UK's National Health Service saw the potential of an existing AI chest X-ray application called qXR, which was developed by a Mumbai-based company, Qure.ai. In order to distinguish Covid-19 from other pneumonia viruses, the company re-adjusted qXR to execute initial readings, as opposed to the older version that was used to double-check human diagnosis. One of the challenges encountered in doing this was the collection of enough data for training algorithm purposes, due to privacy concerns. Qure.ai has now expanded this rollout from the UK to the US, Italy, France, Mexico and Portugal (Hao, 2020). The qXR application is extremely valuable as it can deal with enormous workloads, reducing the burden on radiologists. The importance of aggressive and proactive screening in containing the spread of the virus has been demonstrated in countries like South Korea, Taiwan and Singapore (Tarun et al, 2020).

The new online version of Radify, developed by Envisionit Deep AI, is another example of assessment technology being used in the response to Covid-19. Radify can label 20 different X-ray pathologies at a speed of 2,000 X-rays per minute, which greatly reduces the workload of radiologists (Bizcommunity, 2020). It also assists hospitals by grading possible cases in order of high, intermediate and low probability.

Track and Trace Technology

Apple and Google have joined forces to launch application programming interfaces (APIs) and operation system-level technology that will enable contact tracing. These APIs work interchangeably

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between iOS and Android devices when customers use apps made available by health authorities. Apple and Google will also enable a common Bluetooth-based contact-tracing platform (Apple Newsroom, 2020). The use of this platform will, however, depend on how aspects like transparency, consent and protection of privacy are addressed.

Tracking and tracing Covid-19 patients and their contacts has become a key strategy in many countries, including South Africa. In his address to the nation on 30 March 2020, Ramaphosa announced the launch of an 'extensive tracing system' that would be used to 'trace those who have been in contact with confirmed coronavirus cases and to monitor the geographical location of new cases in real-time'. Within days, new regulations – in terms of Section 27(2) of the Disaster Management Act, 2002 – were passed that permitted the government to implement this tracing system, without needing a court order (Mahlangu, 2020). This method, however, will not be practical without the assistance of big IT companies and mobile service providers.

Revised regulations with more detailed location tracking procedures were published on 2 April 2020 in Government Gazette No 43199. In terms of these regulations, the Department of Health will keep a database of all those who are infected or reasonably suspected of being infected. This database can be shared with mobile service providers, who can then specify information about the location of those who have been infected, as well as people being traced who were in their immediate vicinity. Only identification is permitted under these regulations – the interception of any communication is not allowed.

It is worth noting that just months before these track-and-trace provisions were passed, surveillance laws (under the Regulation of Interception of Communications and Provision of Communication Related Information Act, 2002 (RICA)) were declared unconstitutional by the Gauteng (Pretoria) High Court. Sutherland J found no balance in the act between 'lawful surveillance' and respecting the individual's right to privacy.

With this case as background, it is understandable that much effort went into ensuring that many essential safeguards were put in place to protect the critical right to privacy, as guaranteed by our Constitution. These safeguards strike a fair balance between the need to limit Covid-19 infections and the right to privacy. Some of the safeguards are as follows:

- No content of any communication may be intercepted
- Location information or movements obtained from mobile service providers may only be from 5 March 2020 until the end of the national state of disaster
- The information may only be used to prevent or combat the Covid-19 virus
- The information may only be retained by the Director-General of Health for six weeks, after which it must be destroyed
- A designated judge must be appointed to oversee the protection of the right to privacy of citizens (Justice Kate O'Regan has since been appointed)
- An individual whose location information has been obtained must be notified of this, within six weeks of the state of disaster lapsing
- No person, unless authorised to do so, may disclose any information obtained in terms of the Regulations (Milo and Pillay, 2020).

The threat that exists of 'de-anonymising' individuals, as a concern mentioned by those who advocate for our privacy rights, is now possibly resolved. In this regard, a technique called differential privacy is used, where inaccuracies or 'noise' are inserted into the data. This can change characteristics such as age, race and gender. The more 'noise' that is inserted, the more difficult it is to de-anonymise the data. This is the same method that Facebook and Apple use to collect data without identifying a specific user.

Telemedicine

Telemedicine and mobile healthcare can play a significant role in combatting Covid-19. The potential uses of these technologies range from virtual consultations, to awareness raising, to clearing up misinformation. Useful telemedicine will only be possible if we can overcome legal and other challenges, such as exposure to delictual liability, privacy concerns, increased malpractice, insurance rates and scepticism concerning reliability. It is worth noting that the delictual liability risk of medical practitioners participating in telemedicine may be even higher than in

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traditional health care scenarios.

Telemedicine has significant advantages, including the prevention of the overcrowding of hospitals and clinics, and the facilitation of remote interaction – a patient can interact with their doctor via smartphone, for instance, and hospitals without certain specialists are able to contact specialists from other places. There are also the already popular ‘telemedicine robots’, used by more than a thousand hospitals in the United States in areas of cardiology, paediatrics, neurology, and mental health (Achenbach, 2020).

Notwithstanding these benefits, there exist several regulatory drawbacks and conflicting guidelines related to telemedicine, some of which have already been solved. The first barrier for telemedicine was the requirement that a face-to-face consultation had to occur before telemedicine could be practiced, according to the Health Professions Council of South Africa (HPCSA). The second was the requirement that telemedicine could only be practiced where there was an existing doctor-patient relationship. Understanding that these two obstacles stood in the way of the increased use of telemedicine, the HPCSA first did away with the face-to-face requirement, and then watered down the doctor-patient relationship requirement. A solution was also found to a previous written consent requirement by applying the Electronic Communications and Transactions Act 25 of 2002 (ECTA). The required consent can now be given electronically via a legally binding electronic signature on platforms such as WhatsApp and Zoom (Bizcommunity, 2020).

The infringement of a patient’s privacy and how personal and sometimes sensitive information is regulated are considerable concerns with this technology. The security of electronic medical records is difficult to guarantee: statistics show that in 2015 alone, more than 113 million healthcare records were stolen (Andriola, 2019). It is also alarming that no other industry has suffered more breaches of data than the health industry.

Other Technological Successes

AI has been recognised by the media as a formidable new weapon against infectious diseases. As some commentators have rightly pointed out, however, ‘too much confidence in AI’s capabilities could lead to ill-informed decisions that funnel public money to unproven AI companies at the expense of proven interventions such as drug programs’ (Bitran and Gabarra, 2020). Monitoring companies like Metabiota and Bluedot are making use of several natural-language-processing (NLP) algorithms to scan news and official healthcare reports. These are available in many different languages, making it easier to get a global picture for prediction purposes. AI has an established record of picking up on early signs of diseases that human doctors may have missed, including cancer, heart conditions and eye diseases. (Bitran and Gabarra, 2020). In order to make successful diagnoses, however, AI requires significant amounts of training data that may not be available during the early stages of a new disease.

There are also the challenges of AI relying on powerful algorithms, computing power and centralised cloud services – all of which place constraints on the speed and privacy of new applications. There is, however, some good news. It is now possible to run compelling algorithms on smartphones. Developers and researchers have found a way to shrink deep-learning prototypes without sacrificing their capabilities. New specialised AI chips are also able to store added computational power into less space, which also uses far less energy. Labelled ‘tiny AI’, this technology is already being implemented by the likes of Google, Apple and Amazon (Hao, 2020). To be able to operate powerful applications on cell phones, without the need to send requests to remote servers, is enormous progress. Localised or ‘tiny AI’ is also much better for privacy protection, as data does not need to leave the person’s computer or phone to get better performance.

Law and Technology

It is important that technology be regulated in

terms of the framework of existing legal structures, rules and regulations – particularly those that are designed to give effect to the rights-based approach required by the Constitution. These should not be regarded as being redundant in any context and in a country like South Africa, where these rights are the result of struggle and sacrifice, they should not be waived easily. If compliance is not possible, it may call for a re-visiting of legal requirements.

New technology can enormously advance access to healthcare, but it is vital that several regulatory issues are handled correctly. These include the licensing of medical practitioners, the determination of delictual liability, and the role of human rights in monitoring relationships. The law should take notice of the role that robots play in the health services arena. As mentioned above, robots are not totally in charge of medical care, but rather work alongside humans. The specific relationship between machines and humans is therefore meaningful from a legal perspective when determining liabilities and responsibilities.

There is already the case to be made that specific diagnostics by machine learning may have better results than diagnostics made by human doctors. This may affect medical malpractice law, and leads us to question if there should be an obligation on a doctor to make use of machine learning systems as part of the standard of care principle. If that is the case, doctors who fail to use machine diagnosis without a proper excuse may be liable for malpractice if an incorrect diagnosis follows.

Covid-19 and the Limitations of Fundamental Human Rights

The second part of this article focuses on the effect that the limitations of certain human rights may have on combatting Covid-19. Within this limited space, only a few essential rights can be highlighted. A recently-published comprehensive UN report on international human rights is referred to as background to this discussion, and used as a benchmark for the present situation in South Africa (Guterres, 2020). One of the many negatives of addressing pandemics is that approaches can easily divide societies, especially when unpopular laws impact individuals, relationships, businesses, and other institutions. Respect for public health requirements should go hand in hand with a reliance on fundamental human rights law and the protection against any unnecessary abuses.

South Africa's democratic constitutional dispensation requires that a high value be placed on the importance of all human rights. This is particularly true if the Constitution is to be successfully used as an instrument for the transformation of our society. However, it seems

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that these relatively newly acquired human rights have never come under so much pressure as during the past few months, with the government's reaction to the outbreak of Covid-19.

Most rights are not absolute. In other words, international law as well as our Constitution allows restrictions and limitations to our human rights in certain circumstances, especially if these are for the public good. This applies to even the most fundamental guarantees, as found in the International Covenant on Civil and Political Rights (ICCPR), which in times of national crises permits states to suspend certain rights (Guterres, 2020).

In order to limit rights in circumstances such as the Covid-19 pandemic, there must first be a formal proclamation of the public emergency, and the law must prescribe all conditions for the limitations. Curbing rights must be essential and necessary to achieve one or more of the following: public order, public health, public safety and national security, amongst others. We are, according to international law and our own Constitution, not allowed to impose restrictions to a greater extent than what is allowed in our Constitution. In the context of the limitation of human rights where there exists a threat to our public health, it is the balance between individual rights and communal rights that is difficult to strike, as this does not fall within clearly defined areas. The issue is further complicated in circumstances of disaster and uncertainty.

In order to comply with the necessary requirement of protecting public health, situations may necessitate powers to be extended to force individuals to do what they may not prefer to do. There is precedent for this in cases involving tuberculosis, such as *Minister of Health, Western Cape v Goliath 2009 2 SA 248 (C)*, where the court found that involuntary detention was a justifiable limitation on an individual's freedom of movement in open and democratic countries in situations where it was in the interests of public health. The key point, however, is that instances such as involuntary detention can only be justified in specific circumstances if the individual or group poses a real threat to society. To explain by way of another example: public health authorities should not, even within the context of Covid-19, impose mandatory physical examination, treatment or isolation of a person who is not contagious or where there is no reasonable suspicion of contagion. According to one commentator: 'the methods used, moreover, must be designed to prevent or ameliorate that threat. In other words, there must be a reasonable relationship between the public health intervention and the achievement of a legitimate public health objective' (Gostin and Berkman, 2007).

A crucial measure of how the balance should be struck is therefore the principle of proportionality, including a direct relationship between the limitation and the purpose for which the right is limited. South Africa's Constitution includes a limitation clause in Section 36, which spells out that the 'rights in the Bill of Rights may be limited only in terms of law of general application to the extent that the limitation is reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom, taking into account all relevant factors, including — (a) the nature of the right; (b) the importance of the purpose of the limitation; (c) the nature and extent of the limitation; (d) the relation between the limitation and its purpose; and (e) less restrictive means to achieve the purpose'. The Constitution also specifies that: 'Except as provided in subsection (1) or in any other provision of the Constitution, no law may limit any right entrenched in the Bill of Rights' (Constitution of the Republic of South Africa, 1996).

The authorities are responsible for keeping the requirements of Section 36 in mind and striking a reasonable balance between public health and fundamental rights. Section 36 does not provide carte blanche to authorities to disregard rights and requires a high degree of responsibility when exercising powers relying on the limitation provision. If the interference is unfair or biased, it may well be deemed unconstitutional and can be set aside by the courts. In our current situation, some are fearful that the government might be overreaching and unnecessarily and unreasonably restricting rights, and that these restrictions may even continue after the Covid-19 crisis has ended.

Given our history, it is crucial that we only allow our rights to be sacrificed when it is necessary to defend public health. Sufficient attention should be given to due process so that unnecessary infringements on individual rights can be kept to a minimum. As Gostin and Berkman (2007) wrote: 'The threat of an influenza pandemic is real and could affect millions of lives. If such a disaster

occurs, we must not allow the widespread erosion of individual rights to compound the tragedy'.

The Role of Human Rights in a Time of Disaster

Because of the extraordinary situation that the world finds itself in, countries have had to adopt unprecedented regulations. In order to slow down the transmission of the virus, governments around the world have implemented lockdowns. These restrict not only freedom of movement, but also many other rights, including access to medical treatment (not only Covid-19 related), as well as the right to food, water, education and relaxation. These drastic measures have severely impacted the most vulnerable and least protected in our society, underlining our enormous social and economic inequalities, and the inadequacy of our existing health systems, especially for the poor.

Regulations and directives from various bodies and institutions are issued almost daily, and are often vague and contradictory. It is in this context that the Bill of Rights, with its proportionality requirement, can provide us with answers. The government should pay more attention to this as guidance, and should not ignore any of these binding sections. To quote the United Nations on International Human rights: 'This is not a time to neglect human rights; it is a time when, more than ever, human rights are needed to navigate this crisis in a way that will allow us, as soon as possible, to focus again on achieving equitable, sustainable development and sustaining peace' (Guterres, (2020).

The current crisis we face also reminds us of the adage that with great power comes great responsibility. In securing compliance with the limitation of rights, there is an additional concern. Law enforcement agencies, including the armed forces, do have an essential role to play in combatting the pandemic and safeguarding people. However, in South Africa we have witnessed a situation where broad powers were speedily granted to individuals who might not have been sufficiently trained for the job at hand. This carries risks that cannot be ignored. Oppressive and brutal enforcement is not productive and may cause more damage than anyone could have imagined. The actions of law enforcement officials, who admittedly work under challenging and stressful circumstances, should be judged by how they respond to immediate threats, while protecting human rights and the rule of law. South Africa was heralded for its quick response to Covid-19. It should strive to also be heralded as a leader for its ability to adopt a rights-based approach under challenging circumstances. ■

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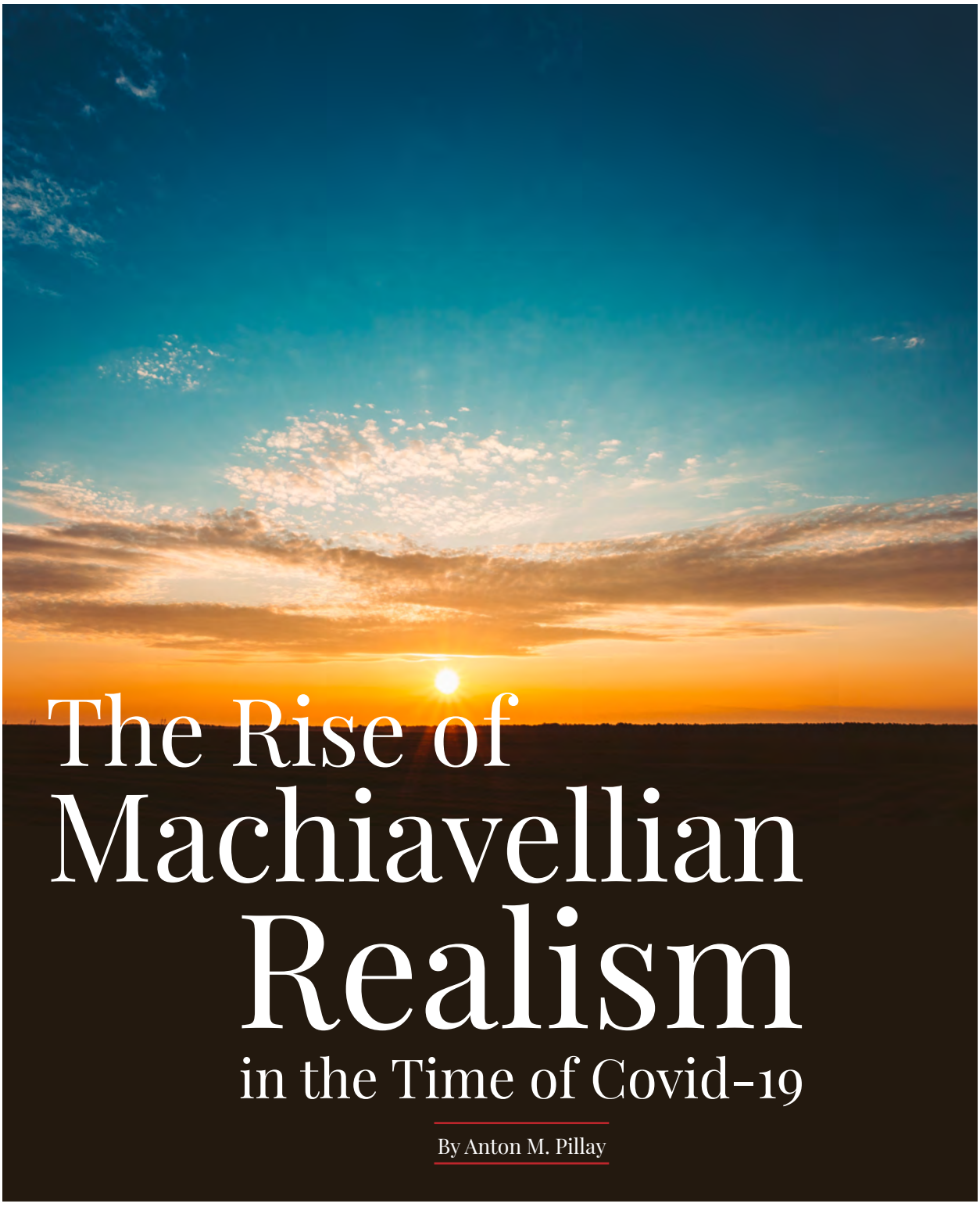

The Rise of Machiavellian Realism in the Time of Covid-19

By Anton M. Pillay

The theories of liberalism and realism have for approximately half a millennium provided those wanting to understand human behaviour with a 'lens' to view the world. Both of these theories translate superbly into theories of International Relations, because the same rationality used to interpret or predict human behaviour can be applied to states.

At the most elemental understanding, liberalism presumes that humans are inherently good-

natured and seek to help each other. Realism, on the other hand, contends that individuals are egocentric and always search for their own benefit. This juxtaposition is framed in the 'Hobbes vs Kant' paradigm, which places the work of two prominent political philosophers against each other.

The German Immanuel Kant (1724–1804) argued that idealism and morality ultimately shape human interaction, with the question of 'what ought I to do?' taking precedence. Kantian theory, also known as 'deontological ethics', translates into 'goodwill is humanity's duty'. In his most popular work, *Critique of Pure Reason*, Kant proposed a moral law called the 'categorical imperative' — an unconditional obligation often known as the principle of universalizability or the 'universal principle'. According to it, human interaction should be based on the world which one would hope to live in. That is, a person should treat other people as having intrinsic value, and not merely as a means to achieve one's end.

The values and virtues of liberalism translated at the state level equivocate to the quest to establish patterns of rules, norms and procedures amongst states. The rationale is that bringing states together under an umbrella of laws and customs makes states more confident in complying with international rules. Kant thought that the civilized state depended upon the application of the rule of law to achieve a state of perpetual peace, not only within nation states but also between them (Kant, 1795). Thus, the liberal worldview emphasises that states should band together to induce the mutual benefits of cooperation via the techniques of free trade and capitalism as the path towards peace and prosperity (Lamy, 2001).

On the other side of the debate, realism appears to be the opposite of liberalism. The Englishman Thomas Hobbes (1588–1679), in his books *Leviathan* and *Behemoth,* contended that man's selfishness forces him to create laws. Without laws, man would experience a 'solitary, poor, nasty, brutish and short life'. To Hobbes, each person must eventually rely on themselves, on their own strength and intelligence. Hobbes claimed that 'the original of all great and lasting societies consisted not in the mutual goodwill men had towards each other, but in the mutual fear they had of each other' (Robin, 2006). Hobbes argued that whatever people deem to be good, their self-preservation is the precondition for their pursuit of it.

"If one sentence could summarise the Hobbes vs Kant debate it would be 'the ends justifies the means', with the realist focus on the ends and the liberalist focus on the means."

State-level realism is summarised in the 'three S's': Statism, Self-help and Survival. These three S's all speak to the focus on the individual, selfishness, and self-preservation. To Hans Morgenthau, the contemporary architect of realism, the analogy of state behaviour to human nature is that states seek power and dominance at all costs.

If one sentence could summarise the Hobbes vs Kant debate it would be 'the ends justifies the means', with the realist focus on the ends and the liberalist focus on the means. In the centuries since both Hobbes and Kant have passed on, their two theories continue to compete, as states adopt one or the other in order to navigate the difficult waters of international affairs.

South Africa is a good example of a state which was formerly a key proponent of the liberal world order. Between 1994–2008, South Africa's bold and assertive liberal vision commanded greater international respect and stature amongst states. South Africa backed up its vision not only with words but also with 'duty', becoming a respected peacemaker and conflict mediator, as many states recovering from war sought its guidance in the field of truth and reconciliation. In 2007, for example, it was listed as the UN's 8th largest troop contributor (Landsberg and Kondlo, 2017). In Liberia, Burundi, the DRC and Sudan, South Africa led the way for credible peace and post-war reconstruction. Outside of Africa, South Africa played a pivotal role in the Lockerbie case, mediating in Northern Ireland and Timor Leste.

South Africa's commitment to 'duty' and 'goodwill' is a stark contrast to the behaviour of states like Israel, Taiwan, Morocco, or Venezuela, who have always viewed their state as the ultimate actor in international relations. These states' commitment to self-help and survival reveals an insular approach which is referred to as the

> “Within the chaos of the Covid-19 pandemic, the virtues of liberalism are taking a metaphorical backseat in the greater scheme of the ‘Hobbes vs Kant’ debate. In fact, states which had previously strongly advocated for the liberal agenda are reverting to classical realism to navigate through our current crises.”

‘primacy of realpolitik’.

Within the chaos of the Covid-19 pandemic, the virtues of liberalism are taking a metaphorical backseat in the greater scheme of the ‘Hobbes vs Kant’ debate. In fact, states which had previously strongly advocated for the liberal agenda are reverting to classical realism to navigate through our current crises. At both individual and state levels, the selfishness and greed which are tenets of realism have become shockingly clear. The spread of Covid-19 around the world brought fear, irrationality and the global phenomenon of ‘panic-buying’, with the ethos of ‘every man for himself’ demonstrated in the hoarding of hundreds of rolls of toilet paper.

In England, the football clubs Liverpool and Tottenham – which last year made a combined profit of $160 million – furloughed many non-playing staff, while opting for a government job retention scheme which uses tax money to pay the furloughed workers 80% of their wages. The Beckham empire – with a combined fortune of $420 million – looked to the government to pay 30 staff. South Africa, the world’s third-largest exporter of citrus fruits, saw many stores double the price of these fruits, though they were in season. The American company Amazon had face-masks going for $0.04 in January 2020, but as of April 2020 had hiked this price up to $11.25.

These are examples of the shameless profiteering that we have witnessed worldwide during this pandemic. The ethics and morality of capitalism have also been exposed. In Germany, the Neumünster Zoo announced that with disrupted supply chains and steep revenue declines, it was considering turning some of its residents into food. Virgin Atlantic, whose headquarters were purposely set up in a tax-haven, began to beg the UK government for bailouts. In China, African immigrants became the target of xenophobia, with China seemingly looking for a scapegoat.

At the state level, countries immediately sealed off their borders as antagonisms and finger pointing increased in intensity. The situation became so evident that the German President Frank-Walter Steinmeier, King Abdullah II of Jordan, President Halimah Yacob of Singapore, President Sahle-Work Zewde of Ethiopia and President Lenin Moreno of Ecuador co-wrote an article asking states to work together instead of leaving every country to fend for itself. Despite the wisdom behind this sentiment, this has not materialised. For example, on 2nd April, a Chinese cargo plane loaded with masks destined for Paris was rerouted to the US after the Americans paid triple the price that the French had paid. France was notably silent on the issue, given that they had also confiscated masks destined for the UK. In another case, a shipment of 200,000 Thai masks intended for Germany was diverted on the tarmac of Bangkok to the US at the last moment. This ‘modern piracy’ led Canadian Prime Minister Justin Trudeau to express concern that masks were being diverted from Canada. Likewise, Brazil’s Health Minister remarked that attempts by his government to buy masks from China were fruitless, given that the US had sent 23 cargo jets to that country. Similarly, Turkey banned the export of protective gear and reneged on foreign sales of masks already paid for. In the case of Kenya, 6 million masks bound for Germany vanished into thin air at Jomo Kenyatta International Airport. Even more deceptively, Italy received an invoice from China on 11th April for masks and supplies that the latter had previously ‘donated’.

Beyond the hoarding of protective gear, states are exhibiting anti-social and suspicious behaviour towards each other. Russian aid to Italy was declared by a top Italian newspaper as ‘useless’. In various Italian circles, the Russian army presence was denounced as a military intelligence operation. Kazakhstan, a major flour and wheat producer, halved the quantity of its normal exports and Vietnam, the world’s third largest rice exporter, suspended exports altogether. Serbia also moved to block the export of medicines and sunflower seed products. These export bans are more likely a way of reassessing contracts, with the aim of future massive price hikes. On 26th March, Mexico – which has long benefited from illegal immigration

– demanded that their side of the border should be closed to Americans. On April 10th, Mexico shut down an American factory for refusing to sell its hospitals ventilators which were being made on site.

Here in South Africa, the question of ventilators is also a cause for concern. According to sources in the Health Department, South Africa has approximately 6,000 ventilators. The South African Emergency Ventilator Project made an urgent appeal on humanitarian grounds to Penlon, a UK-based company, to share their blueprints for ventilator production. Penlon's response was direct: they had no time to be busy digging around for old schematics while they were trying to meet the demand of the British healthcare system.

The story of India, the US and hydroxychloroquine showcases the adage that 'in politics there are no permanent friends or permanent enemies, but only permanent interests'. At around the time that many – including President Trump – were touting the anti-malaria drug hydroxychloroquine as a remedy to fight Covid-19, India banned its export. On April 11th, the ban was overturned as Trump warned of 'retaliation' if India did not resume the export of the drug. This undiplomatically strong language was in stark contrast to the great friendship the two countries had displayed a little less than two months earlier, during Trump's visit to India.

All of the cited examples are textbook instances of the tactics theorised by the Italian diplomat Niccolo Machiavelli. Born in 1469 in Florence, Italy, Machiavelli is considered one of realism's founding fathers. His discourse on leadership and a reputation for evil and cruelty has garnered his work to be labelled as the 'handbook of realism'. His fame spread across Europe, with the phrase 'Old Nick' becoming an English term for the Devil.

Today, the adjective 'Machiavellianism' is given to the doctrine that the end justifies the means. In such a theory, neither intentions nor ideals are important, except insofar as they allow persons or nations to reach their goals. The term represents a form of politics that is marked by cunning, duplicity, and bad faith.

“Today, the adjective 'Machiavellianism' is given to the doctrine that the end justifies the means. In such a theory, neither intentions nor ideals are important, except insofar as they allow persons or nations to reach their goals. The term represents a form of politics that is marked by cunning, duplicity, and bad faith.”

In his famed work *The Prince* (banned by the Catholic Church and rumoured to have been brought into battle by Napoleon Bonaparte and read in bed by Adolf Hitler), Machiavelli recommends that state leaders must be cunning and at times cruel if they are to maintain power. More specifically, he contended that the safest option was to annihilate one's enemies and that abuses should be sudden and severe to make victims incapable of revenge. As an advisor to princes in the early 1500s, Machiavelli urged leaders to deploy deceit when necessary, and to not depend solely on moral values and ethics to influence their decisions. To Machiavelli, 'he who neglects what is done for what ought to be done, sooner effects his ruin than his preservation'.

According to Kaplan, Machiavelli emancipated politics from theology and moral philosophy. He simply described what rulers actually did, and thus anticipated what was later called 'the scientific spirit', in which questions of good and bad are ignored, and the observer attempts to discover only what really happens (Kaplan, 2005).

In conclusion and going forward, Covid-19 speaks to the lack of disaster planning by many states. A growing trend globally is to look to China for help. China, however, is too busy exporting ventilators and protective gear to the Dollar, Euro and Pound economies. Similarly, it is only natural that companies seek profit in times of crises. They cannot be expected to take the altruistic road. Overall, states should take this moment in time as a lesson in naivety if they thought that the virtues of Western liberalism were coming to save them. ■

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The Reverberations of the Covid-19-Hit International Diamond Market on Botswana

By Kalo Makaloba

A semi-desert country in southern Africa, Botswana has historically never had any economic significance – a narrative supported by how the country became a British protectorate in 1885, as opposed to the normal trend at the time of being forced into becoming a colony. The rationale behind this was that the then Bechuanaland had no significant natural resources, unlike South Africa and Rhodesia. Because of its lack of natural deposits, Bechuanaland was one of the world's poorest nations and its transition to independence in 1966 went smoothly, as the British saw no reason to hold on. Shortly into her independence, Botswana discovered diamonds, which went on to become the propeller of the country's economy – helping her to transition from being one of the world's poorest countries to an upper-middle-income country by the late 1990s, a status shared with only a few other African countries (Lock, 2019; Jefferis, 1998). Botswana has continued to enjoy relative economic success, which has aided its development in different spheres, due largely to its prudent political leadership. This transformation has been a consistent story, with the exception of a few hurdles, such as the 2008 global economic meltdown. The common denominator in any instance that the economic prosperity of Botswana has slowed has been the international diamond market.

In his 2020/2021 budget proposals, the Minister of Finance and Economic Planning projected a revenue of BWP 62.4 billion – with revenue from the diamond industry being a significant contributor. A month after these February proposals, the spread of Covid-19 from its Wuhan epicentre gathered pace and by mid-March the economic repercussions of the pandemic were evident, as economies around the world closed and governments directed their efforts and finances towards combatting the virus. Developed economies took a significant hit, and it was only a matter of time before the same happened to Botswana's economy, with a significant loss of revenue. As countries imposed lockdowns and markets tumbled, consumption patterns changed and the demand for luxurious goods, such as diamonds and its related by-products, fell sharply. A diamond-reliant Botswana is therefore in for a long, rough ride. This piece examines the economic impact of Covid-19 on the diamond-reliant and fragile economy of Botswana and how this economic meltdown will impact all aspects of the country's development. The paper will

conclude by suggesting economic reforms that should be a priority for Botswana as she recovers and faces the future.

Botswana and Diamonds – A Fragile Prosperity

The discovery of diamonds in 1969 spelled a new story for Botswana and as a result she became the world's fastest growing economy for a period of over 20 years. Mineral revenue reached highs of 80% of her total income in some financial years (Acemoglu et al, 2001; Armah, 2015). Botswana has relied on her diamonds for over 45 of her 53 years of independence, but the magic of these gems has not come without warnings of unsustainability. Through various policies, the country has targeted economic diversification, but with very little success – Botswana's economy is still largely reliant on diamond revenue. There exist two types of diamonds in the country. The first are industrial diamonds used in the manufacturing of industrial machinery, found and mined in Orapa and Letlhakane. These diamonds do not carry the same financial value as gem stones used for jewellery and other delicacies in modern-day fashion. Gem stones are the second type of diamond, and are Botswana's main source of income, found mostly in the Jwaneng Mine (Lock, 2019). These two sets of diamonds continue to propel Botswana's economy, despite diversification efforts that have seen very little success.

Early Warnings

The Covid-19 pandemic is not the first threat to the international diamond market and consequently to the economy of Botswana. The most significant and recent reminder of the fragility of Botswana's diamond-reliant revenues is the 2008 financial meltdown. This most recent economic recession brought most economies to their knees, resulting in a downward spiral of the consumption of luxury goods such as diamonds. This had a direct hit on Botswana, with the country suspending its National Development Plan 10 in 2009. When it was resumed a year later, most development projects had fallen behind, forcing the government to introduce an Economic Stimulus Package that took a toll on the country's foreign reserves (Botlhale, 2017; Government of Botswana, 2017). This was a warning sign of the unsustainability of the country's reliance on diamonds.

The story of 'diamonds are not forever' reminds us that this current reliance could translate into economic suicide in Botswana's future. This is anchored on two main arguments. The first is that diamonds could be extinct in the near future, a fact which Botswana is well aware of. Until the Cut 8 Mine Expansion Project, Jwaneng Mine's predicted lifespan did not extend beyond 2025 (Grynberg, 2013). The second is the introduction of synthetic diamonds, which have been poised to take the place of the natural gems, despite having a far lower market value (Sunday Standard Botswana, 2014). These factors should have been warning signs for Botswana to diversify its economy, but its 2020/2021 budget proposals reflect a continued reliance on diamonds, with mineral revenue led by diamonds expected to contribute BWP 20.2 billion (32% of the country's total revenue). In this context, the Covid-19 pandemic could not have come at a worse time for the country (Matsheka, 2020).

The Economic Impact of Covid-19: An Unforeseen Hit

In the 2020/2021 financial year, Botswana's economy was expected to grow at a rate of 4%, higher than the 3% global economic growth projected for the same period. The country expected a total revenue of BWP 62.4 billon, of which 32% was to come from mineral revenue led by diamonds (Matsheka, 2020). This is consistent with the annual pattern of mineral and diamond revenues, as shown in the table below.

Financial Year	Mineral and diamond revenue (in billion BWP)	Contribution as % of the country's total revenue
2015/2016	19	34.4
2016/2017	17	35.2
2017/2018	16.33	28.6
2018/2019	24.6	38.3
2019/2020	21.9	35
2020/2021	20	32
(Sources: Mathambo, 2015–2019; Matsheka, 2020)		

As can be seen, the mineral and diamonds sector has been the largest contributor to Botswana's total revenue over the past few years, hovering

> “The Covid-19 pandemic is not the first threat to the international diamond market and consequently to the economy of Botswana. The most significant and recent reminder of the fragility of Botswana’s diamond-reliant revenues is the 2008 financial meltdown.”

consistently above the 30% mark. Any change in this sensitive market therefore has a direct correlation to the income at Botswana’s disposal. Over the years, Botswana has failed to diversify its income away from diamonds, meaning that this income continues to be extremely vulnerable.

The projected loss of revenue in the current financial year has seen the country reduce its projected economic growth from the initial 4% to -13%, a record low. This loss of income will be felt directly by a number of economic areas, and the impacts have already started to show barely two months into the pandemic (Matsheka, 2020). The government of Botswana spends most of its budget on recurrent expenditure, as it has a sizeable public sector in relation to its economic size and population (Matsheka, 2020). In 2019, the government had proposed a 6–10% salary increment across different salary scales for public servants, to be implemented over two consecutive financial years (2019/2020 and 2020/21). This was meant to cushion the implications of a long period without increments, due to the global meltdown. However, this decision has since been deferred until the economy stabilises, as the government has been unable to raise the required BWP 1.4 billion (Mmegi Online, 2020). This represents one of the few economic impacts that Botswana will have to tackle due to the fall in projected diamond sales as a result of the Covid-19 crisis.

Like most countries, Botswana has had to introduce social protection nets to support those who have been directly hit by the implications of the national lockdown, which has now been in place for over a month. The government set up a BWP 2 billion fund, which is to be used for wage subsidies for affected companies, tax concessions and other social protection services (Kgamanyane, 2020; Botswana Guardian, 2020). This will also take away from the already shrinking government coffers affected by the Covid-19 pandemic.

In addition to the loss of diamond revenue, Botswana is projected to lose over BWP 1 billion in value-added tax, another major hit on the country’s economy (Matsheka, 2020). After mineral revenue, the second largest contributor to Botswana’s economy is the Southern African Customs Pool, which was expected to contribute 27% of total revenue in the 2020/2021 financial year, although no official figures exist as yet. This is expected to take a major dive, as all the Southern African Customs Union (SACU) countries have been on lockdown for over a month, meaning that there has been very little economic activity at ports of entry. South Africa, the biggest SACU economy, will have its own economic ramifications to deal with, as it is currently the African country that has been the worst affected by Covid-19 (Johns Hopkins University, 2020). Other sectors – such as public enterprises and corporate tax – are also expected to take a tumble, leaving Botswana further stricken by Covid-19.

Beyond Covid-19: Lessons for Botswana

Covid-19’s projected economic impact on Botswana is largely due to the country’s overreliance on its diamond industry. This overreliance has characterised Botswana’s post-colonial economy. The government’s well-intended diversification drives have been ineffective for a number of reasons – one of which has been the reliability of diamond revenue. The Covid-19 pandemic, however, has revealed the fragility of the country’s economy. It is imperative that the government of Botswana finds alternative sources of income. Below, I present three main areas that Botswana could turn to in this pursuit.

Tourism

Botswana is home to the Okavango Delta – the largest inland delta in the world and a UNESCO World Heritage Site. As well as the famed Big 5, the Delta boasts the largest herd of elephants in the world (Chase et al, 2016). The excellent anti-poaching strategies adopted by the country over the years have also enabled it to be a safe haven for rhinos and many other endangered species – contributing to its potential as a tourism hub. Beyond the Delta, Botswana has many other tourism sites with massive potential, if the right investments are made. The tourism industry has

so far been dominated by foreign investment, with most profits leaving the country. With the right economic empowerment policies in place, the tourism industry can grow to become a significant contributor to Botswana's national revenue, following in the footsteps of countries such as Kenya and Egypt.

Knowledge-Based Economy

With the onset of the Fourth Industrial Revolution (4IR), economies around the world are becoming increasingly knowledge-based. The education sector in Botswana is one of the few in the world that is wholly government funded, and has the potential to become a key driver of the country's economy. Investments into the education sector and the information sector can therefore be improved, enabling the country to move towards a knowledge-based economy, as opposed to its current reliance on natural resources.

Re-Awakening the Beef Industry

The Botswana Meat Commission is a state-owned enterprise that has held the status of Africa's best performing public enterprise for a number of decades. However, the withdrawal of the European market has brought this sector to its knees, despite Botswana having a cattle population of over 2 million (a ratio slightly above 1:1 to its human population). With the right management and the sourcing of new emerging markets such as China, this sector could become the mainstay of Botswana's economy, as it was before independence and the discovery of diamonds.

Conclusion

In addition to its dire health impacts, Covid-19 has collapsed many economies in the first quarter of 2020. Botswana has so far not been severely impacted in terms of infections and fatalities, but the same cannot be said economically, as the country has had to endure the gruesome economic implications of the highly-affected global diamond industry. Botswana's overreliance on diamonds means that the country is facing a significant decrease in revenue, on top of the costs incurred by the pandemic. This moment in time should serve as a wake-up call to Botswana to speed up its diversification process and to reduce the vulnerability of its economy by finding means of revenue other than its diamond industry. ■

"Botswana's overreliance on diamonds means that the country is facing a significant decrease in revenue, on top of the costs incurred by the pandemic. This moment in time should serve as a wake-up call to Botswana to speed up its diversification process."

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The ongoing challenge of violence against women and children in South Africa.

Why are we deeper in crisis?

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By Shahana Rasool

Gender Based Violence (GBV) has been referred to as the Shadow Pandemic, since it has tripled internationally from the start of the outbreak of COVID-19. The increased rates of reported GBV around the globe have ranged from 30% to 200%. We have seen high numbers of GBV reports in SA as well, with the GBV toll-free emergency hotline reporting 120 000 calls in the first three weeks of lockdown. Lifeline and Childline hotlines have also reported increased calls. Usually survivors are reluctant to seek help or only seek help many years after violence begins. The reasons that survivors do not seek help are complex, and include the extensive normalization of abuse among other reasons, that will be discussed further. However, the conditions of lockdown have exacerbated the intensity of GBV to such an extent that some women may be reaching out for help, while others have less access to help and support because of lockdown conditions.

In general, women are more likely to seek help when their lives, or the lives of their children or other loved ones are in danger. Hence, the high levels of reporting are not necessarily indicative of huge amounts of additional women experiencing GBV – it is more likely that more women are

reporting because of the intensification of such violence. Research has shown that much of GBV is hidden, just like much of the iceberg is hidden. Lockdown is revealing the depth of the iceberg. It is likely that the usual coping mechanisms and outlets for survivors of intimate partner violence are no longer available –walks, perpetrator and/or survivor going to work, children being at school, access to social networks etc. Hence, the sudden influx of calls reporting GBV may be because the lockdown conditions have made the usual outlets for dealing with violence unavailable.

LOCKDOWN

Nevertheless, for many women accessing help because of the lockdown, is made more difficult because of confinement with the perpetrator. Under such conditions, a safety plan is critical. The survivors could have code words for when they are in danger, which is shared with a trusted friend or family member so that when the survivor uses the code word, the support person is able to respond in the agreed upon manner. However, this is assuming that the survivor had access to support or information prior to lockdown in order to plan code words and make a safety plan. In fact, perpetrators often isolate their victims and this isolation is exacerbated in lockdown conditions. Victims end up stuck with abusers, and so may have fewer opportunities for escaping. Nevertheless, when situations get desperate, survivors find innovative ways to try to reach out for help. Seeking help is then not a simple issue and is limited by various factors, such as isolation, access to data, knowing where to get help, trust in service providers, ability to find an opportunity to escape safely (sometimes with children, other times they have to leave them to escape for survival, which is not ideal); overcoming fear, and so forth.

It is important to note though, that most GBV is not necessarily new, but probably more intensified under lockdown. This can be attributed to the social cultural norms that perpetuate GBV and gender inequality, which remain entrenched in society. The lockdown conditions have aggravated an already persistent problem that we have not tackled effectively. What lockdown has done is to reveal the deeply embedded inequalities that permeate our societies and families. It has also given rise to, or intensified newer forms

“Hence, the sudden influx of calls reporting GBV may be because the lockdown conditions have made the usual outlets for dealing with violence unavailable.”

of, harassment such as cyber or online sexual harassment that has increased since lockdown. Many of us have experienced this on Zoom, among other platforms. Horrific forms of online sexual harassment have been highlighted, since more people are increasingly engaged on online platforms, and perpetrators are taking advantage of these spaces to victimize women. Moreover, the increased militarization of society in response to Covid-19 has increased women's vulnerability to violence.

SOCIO-CULTURAL NORMS

The reasons that we are still stuck with GBV are two-fold. First, we have not been able to shift our responses and make our services appropriate and relevant for survivors of GBV. This relates to the second and more persistent problem, which is the deeper issue of structures, institutions and attitudes that are deeply patriarchal. Working with the drivers of GBV – such as patriarchy and gender inequality- are an ongoing challenge. Whilst we have engaged in training the police, developing gender sensitive policies, creating women's policy bureaus, increasing quotas etc., the underlying socio-cultural institutional arrangements remain deeply entrenched in patriarchy.

People often ask why women stay in violent intimate relationships. A critical reason is linked to the socio-cultural norms that perpetuate gender inequality and violence against women. Various constructions of gender, family, and marriage keep women tied to violent relationships. Women are expected to be the guardians of families and thereby have the responsibility of keeping the family together, even in the face of violence. In the same vein, women are expected to keep the marriage intact and do whatever necessary- including sacrificing themselves- to ensure that the marriage does not end.

If, as families and friends, we prioritized the safety of women and children over these ideas of family and marriage, we could reduce both GBV and femicide. We know that there are high rates of femicide in South Africa- a woman is murdered every 4 hours in South Africa We have recently seen the reports of three such cases in Mpumulanga alone. Hence, it is only when we realize the extent of the risk and danger that living in an abusive relationship presents to both women and the children, could we reduce femicide levels.

CO-OCCURRENCE OF WOMAN AND CHILD ABUSE

Women and children are most insecure in their homes where they should be safest. Yet, we expect women to stay in violent relationships for these children in order to keep the family together. Of course nobody wants to break-up functional families. However, is this the appropriate option in situations where the lives of women and children are at risk? Why is the pressure not on the abuser to change his behavior instead of on the woman to stay and to make the relationship work? Staying for the children ignores the risk that gender based violence presents for both women and children. We often forget the impact of witnessing abusive behaviour on the emotional state of children, as well as the long-term consequences of exposure to abuse for society. Moreover, research has shown the co-occurrence of woman abuse and child abuse. Research also points to the relationship between witnessing abuse and the likelihood of either the perpetration of abuse or its victimization, as children who are exposed to abuse are more likely to become perpetrators or victims themselves- and the cycle continues unabated. Hence, staying in an abusive relationship for the children is not a solution.

NORMALISATION OF ABUSE

Despite the impact on children, the extensive normalization of abuse in intimate relationships continues. With such adages as: 'he didn't mean it', 'abuse is a sign of love', 'marriage is not a bed of roses', 'he wouldn't beat you if he didn't love you'. Many abused women seek solace in the counsel of older women, who often share similar stories of their own experiences of victimization that contributes to normalizing such abuse. Abuse has become so normalized, for some women and communities, that seeking help is not always even a consideration. Moreover, women's economic dependence makes escaping abusive relationships complex when options are limited.

FINANCIAL INSECURITY

The continued economic dependence of women, their lower salaries then men in similar positions, working in insecure and casual labour, managing the triple burden of care, all impact on women's financial security. In some cases where they do earn an income, especially in domestic violence situations, they may not have control or access to that income. Hence, economic abuse is one of the forms of GBV that is least spoken about. Additionally, increased financial stress on families in the current economic crises, generated by lockdown and limited options for financial activity, could have contributed to increased GBV. Often financial dependence on abusive partners or limited access to or control of resources in the household, make it difficult for survivors to leave abusive relationships.

PSYCHOSOCIAL IMPACT

GBV also affects the psychosocial well-being of the survivor. Fear, depression, anxiety, and other repercussions on the mental health of the survivor, impact on the ability of the survivor to seek help or/ and leave an abusive relationship.

SERVICE PROVISION INADEQUACIES

Seeking help is also complicated in an environment where service provision is unreliable, mistrusted, inefficient, complicated, inaccessible and often unhelpful. For many communities and survivors, there is mistrust of the police, limited clarity of how social services can help, inadequate knowledge of where psychosocial services can be accessed, limited faith in the criminal justice

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system, difficult and alienating bureaucracies, etc. that make reaching out to formal services improbable. Moreover, women are reluctant to use the criminal justice system, as they do not want their children seeing their father arrested. Often times, family members support the abuser and victimize survivors for reaching out to the criminal justice system. Reporting abusers to the police can be stigmatized and women may be isolated and chastised for doing so, instead of receiving support from family and friends. Hence, work needs to be done in communities so that informal networks, which form the first line of reporting for women, are enabled to become more supportive and knowledgeable on how to assist survivors better. This is critical, as survivors are most vulnerable when they are trying to leave abusive relationships. Protection and support from both the community and the police is critical when women are seeking help and trying to leave.

VULNERABLE GROUPS

Under lockdown conditions, access to services for rural women are even more limited because of their geographical distance from hospitals, police, courts, social workers etc. They are often also economically marginalized where access to data, electricity, unstable networks for calls and other ways of reaching out online for help, are inadequate. Hence, rural women are extremely vulnerable as their options for reporting are minimal with COVID-19, especially with travel limitations. Migrants, refugees, people living in other people's homes, temporary workers, LGBTQI+ communities are also usually at greater risk with less pathways for help

SUGGESSTIONS AND OPTIONS FOR CREATING CHANGE

CRIMINAL JUSTIVE SYSTEM

Much still needs to be done to overhaul the patriarchal underpinnings of the criminal justice system that makes services unfriendly and inaccessible to women. The procedures for accessing a protection order remain complex and alienating, particularly for survivors who are already stressed and traumatized.

Extensive work still needs to be done to improve the conditions (like privacy and comfort) of reporting spaces at police stations for survivors. It is necessary to improve the facilities available for police officers to assist survivors, as much as facilitating the transmission of appropriate knowledge, attitudes and practices for police officers. There also needs to be systems in place that hold police accountable when they do not record reports of survivors, do not respond to warrants of arrest or do not remove the firearms of perpetrators after incidents of GBV.

A strong court support program that deals with the physical, emotional and logistical needs of survivors needs to be enabled. Pre, during and post- court support needs to be available to survivors. Other women who can guide, support, and assist a survivor through the reporting and court process are critical in this difficult process.

Ensuring that protection orders are served on perpetrators (within 24 hours) at no cost to survivors, should be prioritized. This could be facilitated by making protections orders available via the internet which is then widely publicized so women are aware of it.

COMMUNITY INTERVENTIONS, MONITORING AND FUNDING

Outreach work needs to be done in communities such that there is zero tolerance for violence against women and children. Ideally any person who a survivor reaches out to should become a 'safe space' for them.

We need to think through ways to help survivors remain safely in communities if they do not want to go through the criminal justice system but still need protection. We can do this by enabling family and friends to assist in providing care and protection to women in their own homes or in the community. There needs to be a few people or safe houses as 'go to' places in every community. Awareness need to be created about these spaces so that survivors can use them if they need to escape – community networks are crucial to this process.

Better monitoring and evaluation of responses to GBV in the health, social services and criminal justice sectors are needed. Consequences for non-compliance with protocols for best practice need to be both clear and implemented.

Awareness of the role of social workers and community workers in dealing with GBV needs to be made clear to communities so that they can reach out for help. These services also need

“Comprehensive multi-disciplinary services, through the extension of one-stop centres that work effectively together, is critical. Training, education and public awareness campaigns on how to prevent, intervene and get help for GBV may all coalesce in these one stop centres.”

to increase their accessibility and availability. All these responders need to be enabled to do their jobs through the provision of appropriate resources and improving the conditions for multi-disciplinary interventions.

Improving the infrastructure, knowledge, attitudes and service provision of victim empowerment centres, Thutuzela care centres and other social service professionals to better serve the needs of survivors is critical. Comprehensive multi-disciplinary services, through the extension of one-stop centres that work effectively together, is critical. Training, education and public awareness campaigns on how to prevent, intervene and get help for GBV may all coalesce in these one stop centres.

COVID screenings can be used as opportunities for GBV screenings to identify vulnerable women and children, as well as to help women to develop safety plans.

These measure all rely on adequate funding for GBV interventions, which would indicate a clear commitment to this issue from both government and the private sector.

PREVENTION

A prevention messaging programme about how to prevent, intervene, and get help for GBV needs to be available in public places such as supermarkets, food distribution points, pharmacies, community health workers involved in testing, etc.

Hot spots and other places where women will be more at risk of sexual violence need to be publicly identified - such as empty roads and buildings. Improving safety and protection in isolated routes and hot spots for sexual harassment and rape is critical.

Educational programmes in schools about appropriate behaviour in intimate relationships to prevent GBV needs to be iimplemented.

Support programmes for children and young people who have witnessed GBV or been victims of child abuse are essential if we are to prevent the ongoing intergenerational cycle of violence.

CHANGING THE LANDSCAPE

We need to shift to a victim/survivor centered approach in reality, not just in theory. Perpetrators must be asked to leave if they are abusive. The development of semi-correctional facilities needs to be established for cases in which a protection order has been violated and there is a warrant of arrest attached. Women and children should not be displaced from their homes, having to deal with the effects of dislocation after experiencing abuse and its psychosocial impacts on their wellbeing. They should receive protection and economic support to stay in their homes while the perpetrator should rather be moved.

It is important that men hold each other accountable for sexual harassment and GBV, rather than ignoring it when they are witnesses, as that this is tantamount to complicity.

CONCLUSION

Whether there is or is not an increase in GBV is unclear. What is clear is that the numbers of GBV are high, the responses are not as effective as they need to be while the availability of user-friendly accessible and appropriate services and responses, need to be increased. COVID-19 and lockdown has exacerbated psychosocial and economic conditions that already make seeking help for GBV difficult; this is worse for groups who are more marginalized such as LGBTQI+ community, rural women, migrants and refugee communities. It is clear that despite the development of progressive legislation to deal with domestic violence, as well as the establishment of gender policy bureaus and many women representatives, there is still much that needs to be done to address GBV effectively under Covid-19 restrictions, and in general. We have not done enough around working with young people for the prevention of the intergenerational cycle of abuse, for example. Hence, despite efforts over many years by GBV organizations, shelters, and women’s movements, the shifts have been slow because the underlying structures and systems of patriarchy that perpetuate gender inequality and violence against women and children remain. ■

The Effects of the Covid-19 Outbreak on the Positive Development of Young People in Malamulele, South Africa

By Thulani Andrew Chauke and Rachel Chinyakata

The advent of the Covid-19 pandemic has brought dire social, economic, physical and mental health consequences worldwide (World Health Organization, 2020). The rapid increase of Covid-19 infections and fatalities has caused much concern around the world and has resulted in the implementation of various mitigation measures. Covid-19 has taken everyone by surprise, and disrupted the world's economy tremendously. South Africa has one of the highest Covid-19 infection rates in Africa, and the South African government has embarked on a nationwide lockdown to minimise the spread of the virus. This decision was not welcomed by many people, especially unemployed youth, informal traders, post-graduate students at higher learning institutions, and matriculants.

Covid-19 has been proven to have an especially severe effect on people above the age of 60, and people who have compromised immune systems or other underlying medical conditions (World Health Organization, 2020). Younger people in general do not face the same health risk from Covid-19 as the elderly, but their educational, spiritual, physical, and economic development will be impacted by the pandemic. These adverse impacts on young people's development will be the focus of this paper.

According to Delivorias and Nicole (2020), people living in poverty will be especially hard hit by Covid-19's economic effects, as they do not have enough savings to protect themselves against financial catastrophe. Furthermore, the Global Employment Trends for Youth (2020) highlight the impact that Covid-19 will have on youth unemployment, as 77% of youth hold informal jobs and perform manual routine jobs with no security, making them especially vulnerable to the disruptions caused by Covid-19. In addition, young people between the ages of 15–24 are more likely

to be unemployed post-Covid-19. According to UNHCR (2020), unemployed youth are more likely to be impacted by Covid-19 than employed youth.

South Africa's youth unemployment rate stands at about 52% percent of the country's overall 27.6% unemployment rate. Due to limited employment opportunities, many young people resort to informal trading and small businesses (Duncan et al., 2019). The Covid-19 pandemic has resulted in a temporary ban of operations for youth-owned businesses that do not fall under the essential services criteria. This has affected income generation in the lives of these young people. Results from a study conducted by the Centre for Development and Enterprise (CDE) indicated that 233 registered entrepreneurs from six provinces in South Africa across 17 different industries showed frustration in this period. More so, 95% of these entrepreneurs were worried that they could not afford to pay their employees, most of whom were young people. Furthermore, the CDE study indicated that 87% of the entrepreneurs could not work from home, resulting in an inability to take care of their families (CDE, 2020).

The Covid-19 pandemic has led to many sectors of the South African economy closing. Amongst these is the tourism industry, which largely employs young people, and contributes significantly to the economic development of African countries. South Africa is the third top tourist destination in Africa, attracting over 10 million visitors in 2019 alone (UNECA, 2020). The closure of the tourism industry will result in many young people losing their jobs and their only source of income.

In response to the rapid spread of Covid-19, countries around the world have closed schools. Evidence indicates that the closure of schools, especially in times of global crisis, is linked to negative outcomes for youth. Kostelny et al. (2016) found that during the Ebola outbreak the rate of sexual activities amongst youth increased because of the closure of schools, resulting in unplanned pregnancies and sexually transmitted infections. Furthermore, UNFPA (2017) emphasised that in a time of global crisis hospitals and clinics may not prioritise the distribution of contraceptives, putting young girls at a higher risk of falling pregnant. The Lancet (2020) and the Centers for Disease Control and Prevention (2019) have reported that pregnant women and new babies are at risk of Covid-19 infection, indicating the need for social protection for these vulnerable groups.

"Youth from disadvantaged and rural schools will be more negatively affected than learners who have access to e-learning technologies and remote learning opportunities. Studies indicate that about 89% of learners in Sub-Saharan Africa do not have access to household computers, and 82% lack internet access. This makes it difficult for them to access education, thus increasing inequalities between the rich and poor."

The positive development of young people is enhanced in school environments (Taylor, Oberle, Durlak, & Weissberg, 2017), and the closure of schools is likely to have a negative impact on young people who are in school (UNESCO, 2020). Youth from disadvantaged and rural schools will be more negatively affected than learners who have access to e-learning technologies and remote learning opportunities. Studies indicate that about 89% of learners in Sub-Saharan Africa do not have access to household computers, and 82% lack internet access. This makes it difficult for them to access education, thus increasing inequalities between the rich and poor. This inequality gap is a real threat to learning continuity at a time when most young people cannot go to school.

The lockdown measures taken by governments worldwide have forced many people to be locked up with their families. For some this is an opportunity to spend time with their families, but for others it has become an opportunity to abuse their partners (Time, 2020). Reports have indicated an increase in domestic violence worldwide during the Covid-19 pandemic (Zhang, 2020). This might be attributed to the frustrations felt by many families related to uncertainty about the future, poverty, and hunger, as many breadwinners are unable to work. According to scholars, there is an existing correlation between gender-based violence and poverty (Karupiah and Gopal, 2017; Slabbert, 2017).

The promotion of positive and holistic youth development is essential, as young people are the backbone of society and determine the future of any given society. The objective of this study was to explore the effects of the Covid-19 pandemic on the positive development of youth in Malamulele, South Africa, and to give recommendations

towards the well-being of youth during and after the Covid-19 pandemic.

Methodology

The study used a qualitative research approach to understand the effects of the Covid-19 pandemic on positive youth development. Through qualitative methodology, the meaning that people ascribe to social and human problems is understood as part of the development of solutions to these problems (Creswell, 2014). De Vos et al. (2011) indicate that qualitative research is important because its focus is on exploring realities from the perspective of participants. A qualitative approach was therefore essential for this study because it helped participants describe their own stories as influenced by their lived experiences. Information was collected from participants using online semi-structured individual interviews, enabling participants to be interviewed in their natural context and allowing for an interaction between the researcher and the respondents. The interviews were conducted online because of the social distancing measures put in place by the South African government to minimise the spread of Covid-19.

The study looked at the experiences of eight young people between the ages of 18–35 living in Malamulele township in Limpopo province in South Africa. Purposive sampling was used to select the participants by selecting the characteristics of the respondents to be included in the study. The researcher used thematic analysis to analyse the study findings. Informed consent, confidentiality, privacy, and voluntary participation were adhered to in this study. The researcher explained the objectives of the study to participants, and no participants were forced to participate.

Results and Findings

The findings of the study indicate that the Covid-19 pandemic has negatively affected the health and well-being of young people in Malamulele township, as well as their educational, spiritual, economic, social, and emotional development.

Educational Development

The Covid-19 pandemic has negatively affected the educational development of young people, as indicated in this study. Education is one of the most important components of the development of a young person. All eight participants indicated that the 2020 academic year has been disrupted by the lockdown measures implemented by the government. P1 and P2 stressed that the lockdown has interrupted their studying patterns and therefore their exam preparations:

> P1: 'I used to read early in the morning before I go to school and later at night before I go to bed but, now I hardly do it because am not even sure to when we are going to write our exams.'
>
> P2: 'Closing of school was necessary but, something I guess should have been done to disrupt the exam because now our exam preparation is disturbed. We just read for the sake of reading.'

Due to the fact that they are out of school and with the uncertainty surrounding exams this year, the participants indicated that they feel demotivated to study. Failure to prepare for the exams might have a negative impact on their academic performance.

The study further revealed that the initiative taken by the Department of Higher Education to promote remote-learning is not working for some of the participants, as their home environments are not conducive for studying. As one participant indicated:

> P1: 'I share my room with my brother, so even if I want to study my brother just wants to be around making noise. I can't chase him away because it's his space too.'

Shared living spaces make study very difficult, unlike studying at a university library. A 2020 study conducted by UNESCO highlighted that young children from poor backgrounds found it difficult to study online because of the lack of resources and a conducive environment.

The responses of participants in the study also indicated that most young people in Malamulele township could not continue with their studies online, as they do not have e-learning materials such as computers and the internet. As one of the respondents commented:

> P2: 'I find it difficult to study online because I do not have modern technology like other kids from rich families.'

From the above statement, it can be denoted that the Covid-19 pandemic has further exposed inequalities in South Africa, despite many initiatives taken by the democratic government to eradicate poverty. In addition, the gap between the haves and the have-nots continues to widen. Modern technology is needed for a young person to study from home and attend online classes, but this is out of the reach of many. According to UNESCO (2020), the effect of Covid-19 is much worse for underprivileged learners who tend to have fewer educational opportunities outside of school, due to a lack of access to technology. Furthermore, the disruption in education during the pandemic could result in a rise in child labour and child marriage, further impacting the growth and development of developing countries (UN, 2020).

Participants in the study indicated that some institutions have ceased academic activities due to a lack of resources such as trained staff to deliver lectures online:

P1: 'At my institution everything has stopped, there is no communication whatsoever, no online lectures.'

P2: 'I might not be affected as some full-time schoolers but, this time of year I thought I would have completed my studies.'

Academic activities in some institutions have stopped completely, meaning that progress for many has also stopped, and that the 2020 academic year might be lost for some students. This will ultimately delay the completion of their studies, and their ability to achieve their set goals.

Nutrition

The study also indicated that the nationwide lockdown has resulted in malnutrition for some young people, as it has cut off their access to school feeding schemes. As one participant explained:

P3: 'I am raised by a pensioner, who is always ill. I can sleep without food sometimes while am not at school. But school is open am able to get healthy food not now schools are closure are worried.'

According to UNESCO (2020), many children and young people rely on free or cheaper meals for healthy nutrition, and when schools are closed their nutrition is compromised. The closure of schools as a result of the Covid-19 pandemic is contributing to the malnutrition of learners who depend on school feeding schemes. This consequently affects their overall well-being and functioning.

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Spiritual Development

Spiritual development is of significance in ensuring the holistic well-being of young people, as it promotes community participation, socialisation and personal development. Participants were asked to reflect on how Covid-19 is affecting their spiritual development. They gave varied responses, as indicated below:

P4: 'I usually go to church every Sunday and Wednesday, I am affected so much because at church I also do counselling session. I cannot fellowship with other believers who I call my other family because they support me.'

P5: 'Covid-19 it has helped me to stayed connected to God and gave the personal space I never knew I needed.'

P4's response indicates that church is a source of social support, belonging, and security for the individual. Participation in church activities promotes spiritual development, which is important for improved health and well-being. The Covid-19 pandemic has robbed young people of the opportunity to take part in such activities. The church plays a central role in many young people's lives, as a place of worship and as a place for emotional support, as some young people are more likely to confide in their pastors than in their parents. In contrast to this, P5's response is interesting, as it indicates that the pandemic has helped some young people to reflect on their lives and to form a closer connection with God.

Responses from other participants indicated that the Covid-19 pandemic has helped some

young people to strengthen their faith, providing them with the opportunity to demonstrate resilience:

> P7: 'I think in a time like this young people need to be strong and believe to this time shall pass.'
>
> P8: 'Some parents and youth might lose income due to coronavirus pandemic, and it will hurt but they need to trust almighty God to will rescue our beautiful land.'

P7 and P8 shared words of encouragement in the face of a global crisis. They also both agreed that since churches are closed, parents should take the lead in ensuring the development of their children's spiritual health.

Economic Development

South Africa has high levels of youth unemployment, which will be further exacerbated by the Covid-19 pandemic. The study indicated that the lockdown is negatively affecting the economic development of young people. Participants who are entrepreneurs were sceptical about the survival of their businesses post-Covid-19:

> P5: 'As an entrepreneur am fed up, do not know if my business will survive post this Covid-19 thing.'
>
> P6: 'I run a salon but, my business is closed now because hairdressers are not providing essential service. I running a loss at this period and I hope soon we can return to work.'

Entrepreneurial activities have been affected in Malamulele township, as only essential services can remain open during the lockdown. This means that many young entrepreneurs are running at a loss and living in fear, as they do not know when the pandemic will end, and whether their businesses will survive. The World Leading Travel Trade Show (2020) attested to this finding by stating that young entrepreneurs in the travelling industry are worried about the future of their business post-Covid-19. Young people who run businesses as informal traders are more affected than those whose businesses are registered, as they do not fit the criteria to benefit from the government's Covid-19 relief funding for SMMEs.

More so, even those entrepreneurs who are registered are finding it hard to apply for this funding, as there is a lot of paperwork required and some banks are taking advantage of the current situation to offer them loans which will leave them further indebted. The government's relief funding is difficult to access, as it requires tax compliance, UIF compliance and six months' bank statements (CDE, 2020).

The study also revealed that even young entrepreneurs who run spaza shops (and who are therefore considered essential workers) are struggling to make a profit because the economic activities of their customers have also been disrupted due to the lockdown:

> P5: 'I am running a spaza shop people are not buying items in form of cash, they just come and borrow and I can't say no because people have no money at this moment. I fear that I might close the business when I run out of money to order new stock.'
>
> P6: 'I run a small business and I have hired two youth and now I have no money to pay them. Am worried if post-Covid-19 they will return to work or not.'

The responses above show that Covid-19 is hindering economic activities that are essential to young people's economic development and the overcoming of poverty. This finding concurs with a recent report by the CDE, which indicates that young entrepreneurs are in distress during the Covid-19 pandemic, as they do not know how they will pay their employees (CDE, 2020). According to Bouey (2020), the income for SMEs has dropped by more than 50 percent, with street vendors' businesses hardest hit.

Social Development

Social distancing is encouraged as a measure to minimise the spread of Covid-19. This limits physical gatherings and socialisation with friends, neighbours, and others in the community, which in turn affects social and behavioural development. As one participant commented:

> P1: 'It's really difficult because I am always inside the home. I cannot even socialise and play with my friends. Just staying at home is very frustrating.'

From the above quotation, it can be denoted that the lockdown measures are negatively

affecting the social development of many young people. Social activity and interaction have been limited, and this consequently results in the deprivation of emotional and social development of many young people. According to the UN (2020), Covid-19 is having profound effects on young children's social development. Social distancing is an important measure in the mitigation of the spread of Covid-19, but measures also need to be taken to ensure that the social development of young people is supported.

Conclusion

The Covid-19 pandemic has caught the world by surprise, with its impacts being felt in all sectors of life. South Africa's nationwide lockdown in response to the pandemic is having a negative impact on education, the economy, health, and the development of young people.

This study indicated that the Covid-19 pandemic is further exacerbating inequalities in education, as learners from disadvantaged backgrounds are unable to afford the e-learning technologies necessary for remote learning. The study also showed that the health of young people who depend on school for nutrition has been affected. The nationwide lockdown is affecting the social and religious development of young people, as many young people cannot socialise or attend religious gatherings, consequently leading to the deprivation of their holistic development. Furthermore, the Covid-19 pandemic has led to the temporary closure of many youth-owned businesses, and those that remain open have reported low profits.

There is a greater need for specific youth development relief in South Africa to mitigate the negative effects of Covid-19. The government must collaborate with different stakeholders to assist learners from disadvantaged backgrounds with e-learning materials and support so that they can adequately participate in remote learning. South African government departments should also have a specific youth development relief fund to mitigate the effect of Covid-19 on the economic development of youth. Government departments, districts, metros, and local government should prioritise youth development post-Covid-19 to help young people bounce back from the effects of the pandemic. Positive youth development should be prioritised for the sustainable development of the nation. ■

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The Impact of Covid-19 on the Level of Productivity and Industrial Development in South Africa

by Thakaramahlaha Lehohla and Pule Kholopane

South Africa has identified the manufacturing sector as a key driver of the economy via the re-industrialisation drive, with incentive programmes such as the Manufacturing Competitive Enhancement Programme (MCEP), Cluster Development Programme (CDP), 12I Tax Allowance Incentive, and Special Economic Zones (SEZs). These include the development of black industrialists, with the purpose of growing the economy via manufacturing, growth in exports, revitalisation of industrial parks, and broad-based black economic empowerment (B-BBEE). Black industrialists must be directly involved in the strategic and operational leadership of the operation, and have the requisite expertise. They should take personal risk in the business, and be locked in for a reasonable time frame to the entity.

The Department of Trade and Industry (DTI) policy requires black industrialists to have a high level of ownership (>50%), and/or exercise control over the business. The DTI describes black industrialists as 'black South Africans who own and, through significant shareholding, control an enterprise whose products are significantly used and have a considerable impact on decent employment and create broad-based economic opportunities' (DTI, 2020).

The DTI has various incentive schemes for individuals who are planning to start their own businesses, as well as for those who have existing

businesses. The Department seeks to broaden participation in entrepreneurial activity to all, with an emphasis on youth development, women, and B-BBEE, and developed the Industrial Policy Action Plan (IPAP) as a blueprint to realise this vision. In the midst of this plan, the country faces economic challenges, losing some of the advances made prior to the onset of the Covid-19 pandemic.

Covid-19 has caught the South African economy and industries off guard, as emergency approaches have had to be applied towards mitigating its spread. The greater focus has been on containing the virus by closing internal and external economic activities, with the exception of essential services. This comes as a double blow to an economy already bleeding from the consequences of state capture (poor management of state-owned entities, and corruption), a distressed steel sector, and the generally poor performance of its key sectors, such as the manufacturing industry. As a result, credit rating agencies have downgraded South Africa, reducing investor confidence and the possibility of positive growth. It is projected that manufacturing in South Africa will regress to 42.60 points by the end of this quarter, according to Trading Economics global macro models and analysts' expectations.

Further projections estimate that the Purchasing Managers' Index (PMI) (an indicator used to measure the level of productivity in industry) in South Africa will stand at 47.00 in 12 months' time. In the long term, South Africa's manufacturing PMI is projected to trend around 49.00 points in 2021 and 51.00 points in 2022, according to our econometric models (South African Manufacturing PMI – 1994–2019 Data). This raises an alarming question regarding what went wrong in terms of industrial development, as manufacturing's contribution to GDP was at 24% in the early 1980s, and regressed to less than 13% in 2017.

As seen in Figure 1, South Africa's GDP staggered between a 0% – 1.6% growth rate between 2017 and early 2019, then grew by 0.9% from mid-2019, followed by a 0.1% growth rate, then a drastic drop in January 2020 to a negative growth of 0.5% GDP.

This trend of minimal and negative growth in GDP can be attributed to Moody and Fitch's global credit rating downgrade of South Africa, due to poor governance and corruption precipitated in South Africa's state-owned entities (SOEs), resulting in load shedding (electricity), an increased unemployment rate (at 29%), negative growth in the financial year, expenditure of GDP at 62.5%, and a myriad of other economic deficiencies. The worst-case scenario is a further 5–7% contraction in economic growth, resulting from the Covid-19 pandemic.

Manufacturing

Over the past two decades, South Africa's manufacturing sector has been experiencing a

Figure 1: South Africa GDP Annual Growth Rate – 1994–2019 Data | 2020–2022 Forecast | (**Source:** Adapted from Trading Economics, 2020a).

significant revolution, including thorough shifts in management strategies, goods and process technologies, consumer expectations and supplier outlook, as well as competitive behaviour. Manufacturing and tourism are rated as the main job providers, followed by the mining industry. A collapse of these industries will deliver a significant blow to the South African economy.

According to the Manufacturing Circle (2020), South Africa requires a strong manufacturing sector in order to sustain the more than 1.6 million people it currently employs. It should also provide a platform for load and scale for key national infrastructure such as electricity, rail and municipal services. The manufacturing sector is among the top three multiplier sectors in terms of value addition, job creation, export earnings and revenue generation, as well as a driver of tertiary education and the absorption of people into the workforce.

Despite these great expectations for the manufacturing industry as a driver of productivity in the South African economy, the contrary is revealed in recent statistics. Since 2008, almost 400,000 South African manufacturing jobs have been lost, and manufacturing has declined from contributing more than 15% of GDP to just under 13% of GDP in 2016 (Manufacturing Circle, 2020). Key factors contributing to this decline include domestic electricity supply constraints, rapid increases in administered prices, labour instability, and competition from unfairly incentivised imported products.

Projected Impact During and Post-Covid-19

As a result of South Africa's nationwide lockdown in response to Covid-19, most manufacturing companies have closed, delivering a serious blow to the supply chain. Most stores and essential services have closed, and major projects intended to boost infrastructure and industrial development have been impacted. The DTI incentive programmes, such as the Critical Infrastructure Programme, as well as the 12I Tax Allowance Incentive – which focus on brownfield and greenfield projects at SEZs, attracting foreign and domestic direct investment, are non-operational as a result of the lockdown.

The author is involved in the incentivisation of industrial development projects, and can attest to the adverse impact on industrial development in terms of efficiency in the processing of applications and claims meant to finance industrial development projects. This particular value chain has become significantly inefficient, from the processing of claims, quality control, authorisation, and finally paying the claim. While a necessary precautionary measure to avoid the spread of a deadly virus, South Africa's lockdown will – in the long term – adversely impact industrialists and the economy.

A case in point is the Cluster Development in the

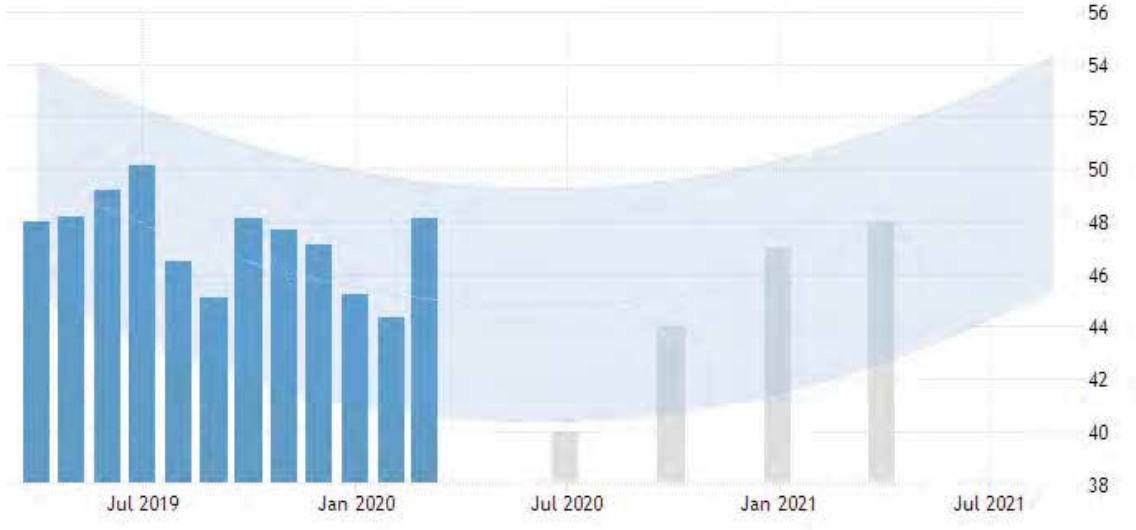

Figure 2: South Africa Manufacturing PMI – 1994–2019 Data|2020–2022 Forecast| (Source: Adapted from Trading Economics, 2020b).

DTI, where claims to the value of R10 million – which could have been processed and paid within three to four working days – may now be delayed until the end of the lockdown. This scourge could lead to the possible closure of the Cluster Development in the DTI, and the loss of many jobs. Additionally, on the industrialist side, the supply value chain is impacted adversely since there will be operational disturbances, and this will impact some industries' local and international markets.

Covid-19 has led to grim forecasts for the South African economy, from both a micro- and macro-economic perspective, with estimations that 75% of SMMEs will close down, and an additional 400,000 jobs could be lost. An additional provision of R150 billion is being sourced for economic sustenance, and there are currently conflicting views regarding sourcing a loan from the International Monetary Fund (IMF) to service the economy post-Covid-19. A 5-7% contraction is projected, and the economy is at negative growth as a result of Moody's downgrade (Boonzaier, 2020; De Lange, 2020).

According to Trading Economics (2020b), it is projected that the present lockdown will result in a further regression of the PMI – which has been on a downward slope for the past eight months.

Figure 2 explains the actual PMI manufacturing trend covering 2019 to early 2020, and provides projections for mid-2020, into 2021. It can be seen that the PMI rose by 48.1 in March 2020, whereas previously it was at 44.3. Prior to March 2020, there had been a downward slope since October 2019 as a result of contraction in industrial activity, which was due to slower delivery times. These delays are an indication that suppliers are busier under normal circumstances. This illustrates the clear adverse impact of the Covid-19 pandemic on global supply chains (Trading Economics, 2020b).

It is further projected that the Manufacturing PMI in South Africa will regress to 40.00 points by July 2020, as a result of credit rating downgrades and the slowing down of the production process due to Covid-19. Further projections estimate that Manufacturing PMI in South Africa will take an upswing to 47.00 points in January 2021 – which is a sign of recovery. As for the long term, the South African Manufacturing PMI is projected to trend around 49.00 points in 2021 and 51.00 points in 2022 (Trading Economics, 2020b).

“For a productive post-Covid-19 economy, Viegi (2020) suggests that expansion and diversification will be the key drivers of long-term growth. By engaging in an export strategy, exporting national firms can capitalise on becoming more productive, competitive and innovative.”

Recommended Solutions for Productivity Post-Covid-19

For a productive post-Covid-19 economy, Viegi (2020) suggests that expansion and diversification will be the key drivers of long-term growth. By engaging in an export strategy, exporting national firms can capitalise on becoming more productive, competitive and innovative. This is in line with the National Integrated Export Strategy, which aims to increase national export from the current 0.02% to 2% in 2030 (DTI, 2017).

On the industrial financing side, the DTI and Development Finance Institutions (DFIs) provide industrial development incentives in support of the country's IPAP. The industrial development incentive programmes are inclusive in the Master Plan, with the aim of supporting and developing the manufacturing sector, developing an export-driven economy which is globally competitive, as well as enhancing skills development in terms of contributing to product and process improvement. The positive effect of this is that productivity, wages and standard of living will increase, and generate resources for public services and redistribution. For long-term growth and resilience, there should be an incentive to boost public investment in health, education and infrastructure (Bloomberg, 2020).

Additionally, a limitation to monopoly power, promotion of innovation, and increase in accountability and transparency will result in a competitive environment. This scenario further reinforces the sentiments of Mwambari (2020), ascertaining that this pandemic could lead to the decolonisation of Africa, in terms of self-reliance, further economic reforms, prioritisation of African markets, innovation, and local manufacturing embracing the objective behind the establishment of the Africa Free Trade Agreement. Additionally, this initiative will gradually lead to African industrial development programmes diverting from foreign

“This perceived economic overhaul requires greater investment into the development of social sectors, such as the prioritisation of healthcare, thereby stimulating the growth of local pharmaceutical industries and biotechnology. Furthermore, a key priority would be greater investment in the education and innovation sectors.”

funding to national funding drawn from taxation, repatriated funds, and new, higher-value exports.

This perceived economic overhaul requires greater investment into the development of social sectors, such as the prioritisation of healthcare, thereby stimulating the growth of local pharmaceutical industries and biotechnology. Furthermore, a key priority would be greater investment in the education and innovation sectors.

Conclusion

This article has discussed the massive impact of Covid-19 on the economy in general, and its effect on the manufacturing sector in particular. What happens next will depend on how the Covid-19 crisis evolves. It is hoped that this virus will be contained, and that its transmission will be slowed down enough for production to resume, and for the economy to go back to normal. This would certainly bring relief to South Africans, and would help companies to bounce back relatively quickly with the help of tailored government measures. If the virus continues to spread, the government will be forced to extend the lockdown, further harming the economy and the supply chain. The global outbreak of the virus could possibly become an eye-opener for the African continent, in terms of realising the dream of self-reliance, and of utilising natural and intellectual resources to re-industrialise and develop the continent (Mwambari, 2020).

The new birth of industrial development in South Africa post-Covid-19 should focus on a ‘lessons learned’ path, and on an integrated industrial development strategy that involves the government, industry associations, industrialists (1st tier, 2nd tier, 3rd tier, 4th tier within supply value chains), and other relevant stakeholders. It should also assess the state of industry by means of a SWOT analysis (strengths, weaknesses, opportunities and threats), and develop a path for sustainable industrial development. The key competency will be operational efficiencies within Finance Development Institutions supporting manufacturing and industrial development, and accompanied by set targets per sector in terms of expected level of productivity, global competitiveness, contribution towards exports, and operational efficiencies within supply value chains. This requires enhanced strategic transformation processes within organisational value chains. It would also involve continuous improvement through industrial development systems’ value chains within the state departments responsible for developing the country’s industrial development policy and strategy.

Operations management approaches, such as business and operations strategy, market analysis, financial planning, master planning, demand management, master scheduling and order fulfilment processes, need to be integrated into the national industrial development strategy. This will result in filtering and feeding into the various sector and industry value chains, accompanied by projections and applied interventions in terms of the desired level of productivity in the South African economy, and in terms of manufacturing’s contribution to PMI and South Africa’s GDP. ■

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EXITING THE COVID-19 LOCKDOWN

Economic Interests Must Not Take Primacy over Public Health

By Declan Kearney

The ongoing human carnage and misery caused by Covid-19 was overshadowed last week by the wrongheaded decision of the US administration to withdraw funding from the World Health Organisation (WHO) in April 2020, whilst making unfounded allegations about its leadership and the best scientific and medical advice on how to combat the coronavirus pandemic.

At the same time, the US itself now has the highest number of global deaths and cases, recording 40,000 fatalities, and approximately 750,000 detections. One writer in *The Guardian* called the situation in America a 'lethal fiasco' as federal and state governments publicly challenge each other over their powers and responsibilities, over which appropriate public health strategies to adopt, and on the lack of emergency medical supplies.

It is now clear that the US acted too slowly when the evidence was already emerging that a global pandemic existed. New revelations have reported that the British government also failed to respond fast enough, with catastrophic consequences. The British approach has proved to be a disaster. Ten years of Tory austerity had already brought the health service in Britain and Northern Ireland to a crisis cliff edge. Britain's health service was

hugely underfunded, and did not have the beds or equipment to deal with a crisis of this magnitude. From the earliest indications, neither the leadership focus or necessary state of preparedness existed to face the onslaught of coronavirus.

The British government's pandemic policy was based upon planning for a flu pandemic and developing 'herd immunity', rather than focusing on the specificities of Covid-19. Even more alarming are the revelations that as early as 24 January 2020, a British government Cabinet Office Briefing Rooms (COBRA) meeting received a report which confirmed the virulent, contagious nature of Covid-19, and advised on the urgent need to achieve a 60% cut in the community transmission rate. This meant stopping contact between people and introducing a lockdown. This, however, was an economically unthinkable scenario for the British government, which on the same day had just signed the withdrawal agreement treaty from the European Union (EU).

A picture was already being painted. From the very beginning, both the US and British administrations have failed to follow the international advice of the WHO – which urged that community testing, contact tracing and isolation strategies should be implemented on a vast scale to hunt down where the virus was most contagious. The WHO cautioned that 'you cannot fight a fire blindfolded', and yet only some countries – such as China, Germany, Singapore, Cuba, and South Korea – heeded that advice.

The attempt to try and cause reputational damage to the WHO is therefore much more than just an impetuous outburst. Even in the eye of the coronavirus storm, some appear to be already shaping up for a later 'blame game'. Last week, announcements were made that lockdown restrictions would be extended in Ireland and Britain until after 5 May 2020, when a further review would be conducted. That news follows the extension of lockdown measures in other European countries, Eurasia, the Middle East, and Africa. Those decisions are correct, even though they will cause more economic and social hardships, as well as psychological and emotional pressures for us all.

The anguish being caused for so many who have been unable to mourn and bury their loved ones with dignity, or to visit graves and places of worship for quiet moments of reflection, or

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to meet up with friends and family, is without precedent. The effects of isolation and lockdown measures cannot be underestimated. It is therefore important to conduct frequent reviews, allowing for the opportunity to reassess the threat posed by Covid-19, giving some hope and reassurance that we may all eventually leave this tunnel, even if in a phased way.

In the meantime, however, strong and united leadership across society which asserts the primacy of public health over all other priorities and political agendas is required in the fightback against Covid-19. Any change or relaxation in restrictions before it is safe to do so will send out mixed messages, potentially resulting in complacency and our guard being dropped.

The worst thing at this time would be to create the false impression that we, as a society in Ireland – north or south – have got to the other side. We have not. Covid-19 has not been beaten. Disturbingly, the extension of lockdown in the short-term masks an argument which is being encouraged by some right-wing elements in the British Cabinet, and also by some Unionists in the north of Ireland: that the lockdown measures should be relaxed, and that economic activity and productivity should be resumed. This is a typical capitalist reflex which puts the market economy first: corporate greed over public welfare, and the elevation of neo-liberal values and priorities above what's actually needed at this time.

It is precisely these contradictions which have taken centre stage in the US. At a time when approximately 24% of all global deaths have occurred in America, the corporate, industrial and financial elites are trying to lift lockdowns across the US, and to push for a return to the preCovid-19 status quo. Talk of getting back to normal, however, is completely misplaced. There will of course need to be preparations for economic reconstruction,

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but that must not take place separate to, or in isolation from, a strategic debate about the future of public health.

Free market economic interests must not be allowed to take primacy over the health priorities and wellbeing of wider society. This is one of the big ideological challenges which faces Irish society beyond Covid-19. Irish republicans and other progressives need to shape discussions on how to democratise economic reconstruction, and how to guarantee the future of public health on an egalitarian basis. Protection of the environment and ecology must also be central to these discussions. All of these issues will also be key priorities for the international, progressive left more generally.

For now, more investment is still required to try and get on top of the immediate Covid-19 emergency. However, even greater investment will be required to put in place universalised community testing and contact tracing programmes, underpinned by enabling technologies. In order for us to contain the pandemic for the foreseeable future, however, manual testing will be necessary – something which can only be staffed by a large cohort of public health workers. In the north of Ireland, this is an area of work where the available staff and expertise of our largest sporting organisations, and most experienced community-based health projects, could and should be effectively mobilised.

In Wuhan, China, for example, there were 81 public health workers available for every 100,000 of the population. Research by Johns Hopkins University in the US has concluded that to bring a health crisis under control, where extreme transmission is occurring, a region would need 15–30 public health workers per 100,000 of the population. In the immediate term, we need to begin a detailed public health discussion on the use of masking, as well as the utility of temperature testing and swabbing checks in all public spaces, such as hospitals, care homes, community centres, shopping malls, airports, and ferry ports.

It is obvious that our current model of public health will have to be completely overhauled, with a new emphasis placed on sustainable strategic investment, in all aspects of health and social care, staffing levels and training, equipment and resources. Covid-19 has moved us beyond the two-tier health and social care systems. The major lesson from our experience of the coronavirus pandemic is that Irish society, north and south, and indeed societies everywhere, should have access to universal, high-quality, properly-funded healthcare systems, which are free at the point of access. Standards of care for all citizens must no longer be subordinate to the demands of free market interests.

The future of public health in Ireland depends on an all-island strategy, in the same way the fight back against Covid-19 demands a common north/south approach. Just as Brexit demonstrated that it is impossible to pull the north of Ireland out of the EU without causing massive, negative repercussions and disruption for the regional and all-island economies, the challenge of economic reconstruction, north and south, beyond the pandemic, will require an all-Ireland road map to sustainable economic recovery. The modern-day contradictions of Ireland’s partition prove the negative impact of this island’s division upon the wellbeing, prosperity, and progress of our citizens.

Coronavirus has changed everything. It will force us all to rethink how public health and economics are managed, not just in Ireland, but across the globe. It has made the world a much smaller place. In recent months, all of us have been sharply reminded of how interdependent we are upon each other as individuals, regions, and nation states. This reality needs to be embraced. Our global community does not have the resilience to absorb continuous international power plays, economic blockades, sanctions, sieges, and conflicts. The only way forward should be on the basis of peaceful coexistence, global solidarity and international diplomacy. It is finally time to start shaping our collective future with new values which prioritise public health, economic justice, sustainable ecology, and multilateralism. ■

COVID-19 ANTI-LOCKDOWN RALLIES

A View from America

By William D. Slicker

Much of the world has been under lockdown orders in the past few months, due to fears about the possible impact of Covid-19. As this is a highly contagious virus, there were initial fears that the death rate from Covid-19 would be quite high. Death rate statistics for previous notable epidemics/pandemics are as follows: 100% for HIV (prior to treatment becoming available), 50% for Ebola, 34.3% for Middle East Respiratory Syndrome (MERS), 50% for the plague in the Middle Ages, 9.6% for Severe Acute Respiratory Syndrome (SARS), and 2.5% for the Spanish Flu. Fortunately, the death rate from Covid-19 has proved to be much lower. Dr. Anthony S. Fauci – a leading infectious diseases expert and advisor to the US President – estimates that the death

rate from Covid-19 will be about 1%. Other sources suggest that the death rate will be lower than this, given that many people are asymptomatic and are not counted in official Covid-19 statistics.

Due to this low death rate, many people are of the opinion that lockdowns are causing more harm than the threat of Covid-19. There have been anti-lockdown rallies around the world. The chart below shows the number of rallies held in European countries:

“Due to this low death rate, many people are of the opinion that lockdowns are causing more harm than the threat of Covid-19. There have been anti-lockdown rallies around the world. The chart below shows the number of rallies held in European countries.”

Country	City	Date	Attendees	Source(s)
Austria	Vienna	April 17	200	Reuters
France	Paris, Toulouse, Leon, Strasbourg	April 18, 2020	?	Washington Post
Germany	Berlin Berlin Berlin Stuttgart	April 18 April 25 May 2 May 2	500 1000 300 5000	Vice The Telegraph SBS News SBS News
Poland	Zgorzelec	April 24	400	Reuters
Russia	Vladikavkaz	April 20	500-1500	Moscow Times
Ukraine	Kiev	April 29	Several hundred	Europost
United Kingdom	London	May 2	20	Evening Standard

Anti-lockdown rallies have also occurred in other countries around the world, as shown below:

Country	City	Date	Attendees	Source(s)
Brazil	Brasilia	April 20	Several hundred	BBC News
Canada	Toronto	April 25	?	BlogTo
Canada	Toronto	May 2	300	BlogTo
Canada	Ottawa	May 2	20	CBC News, CPV News
Canada	Vancouver	April 13	?	The Independent
Canada	Edmonton	April 29	100	CTV News
Chile	Santiago	April 20	?	BBC News
India	Mumbai	April 13	Thousands	Reuters, The Financial Times
India	Surat	April 11	Over 1000	Financial Times
Lebanon	Tripoli	April 17	Several hundred	DW News, Washington Post
Lebanon	Zouk	April 27	Dozens	Global News
Turkey	Istanbul	May 1	?	The Guardian

However, nowhere have anti-lockdown rallies been more prevalent than in the US. According to CNN, it has been estimated that 97% of Americans have been placed under stay-at-home orders. These orders were put in place by a government with good intentions, but – as is often the case when the government steps in to deal with a problem – other problems have been inadvertently created. After six weeks of stay-at-home orders, there have been anti-lockdown rallies in at least 42 states in the US, as shown below:

"These orders were put in place by a government with good intentions, but – as is often the case when the government steps in to deal with a problem – other problems have been inadvertently created."

State	City	Date	Attendees	Source(s)
Alabama	Montgomery	?	Dozens	Alabama News
Arizona	Phoenix	April 20	500	Arizona Family, BBC
California	Sacramento	April 20	100's	Sacramento Bee, San Francisco Chronicle, Newsweek
California	San Diego	April 18	250	Times of San Diego, LA Times
California	Huntington Beach	April 17	100	LA Times, Sacramento Bee
California	Huntington Beach	May 1	2,500 to 3,000	The Guardian, The Daily Mail
Colorado	Denver	April 19	550	Denverite
Connecticut	Hartford	April 20	?	NBC
Delaware	Dover	May 1	Hundreds	Delaware News Journal
Florida	Orlando	April 17	?	Times Union
Florida	Orlando	April 25	A few dozen	Fox News
Florida	Delray Beach	April 19	100	South Florida Sun Sentinel, Fox News
Florida	Miami	?	?	New York Times
Florida	Miami	April 25	A few dozen	Fox News
Georgia	Canton	April 19	Small group	AJC (Atlanta Journal Constitution)
Hawaii	Honolulu	April 19	Two dozen	Hawaii News Now
Idaho	Boise	April 17	?	The Idaho Statesman and BBC
Illinois	Chicago	April 18	?	Daily Mail
Illinois	Chicago	May 1	Hundreds	Forbes
Indiana	Indianapolis	April 18	250	Indianapolis Star, USA Today
Kansas	Kansas City	April 20	Handful	The Kansas City Star, KCTV
Kansas	Kansas City	?	80	The Kansas City Star
Kentucky	Frankfort	April 15	100	The New York Post
Kentucky	Louisville	April 17	30-40 cars	Fox News

State	City	Date	Attendees	Source(s)
Maine	Augusta	April 20	?	The Huffington Press
Maryland	Annapolis	April 18	200 cars	Capital Gazette, WUSA9
Massachusetts	Cape Cod	April 19	Dozens	Boston.com
Michigan	Lansing	April 15	3000-4000	USA Today, NBC News
Michigan	Lansing	May 1	Hundreds	The Guardian, Mercury News
Minnesota	Saint Paul	April 17	800	VOA News
Missouri	Jefferson City	April 21	Several hundred	Associated Press
Montana	Helena	April 19	Hundreds	Independent Record
Nevada	Carson City	April 18	Hundred	Reno Gazette Journal
New Hampshire	Concord	April 18	A few hundred	Associated Press
New Jersey	Trenton	April 17	Two dozen cars	The Blaze
New York	Albany	April 16	About a dozen	Times Union
North Carolina	Raleigh	April 14	100	NBC News
North Dakota	Bismarck	April 20	?	The Daily Mail, Internewscast
Ohio	Columbus	April 9	75	The Daily Mail
Ohio	Columbus	April 13	200-300	The Cleveland Scene, NBC News,
Ohio	Columbus	April 17	Dozens	
Ohio	Columbus	April 18	Hundreds	Columbus Dispatch, The Alliance Review
Ohio	Columbus	April 20	?	Huffington Press
Ohio	Hudson	April 18	?	
Oklahoma	Oklahoma City	April 15	Hundreds of cars	Politico, The Oklahoman
Oregon	Salem	April 17	Dozens	The Register-Guard
Oregon	Redmond	April 17	200	Associated Press
Pennsylvania	Harrisburg	April 20	2000	USA Today, The Daily Item, The Source, Internewscast
Rhode Island	Providence	April 25	100	Providence Journal
Tennessee	Memphis	April 19	?	The Tennessean, USA Today
Tennessee	Jackson	April 19	?	The Tennessean, USA Today
Tennessee	Chattanooga	April 19	?	The Tennessean, USA Today
Tennessee	Knoxville	April 19	?	The Tennessean, USA Today
Tennessee	Nashville	April 19	Hundreds	The Tennessean, USA Today
Texas	Austin	April 18	Hundreds	Business Insider
Utah	Salt Lake City	April 18	1000	The Daily Mail, BBC, NPR
Vermont	Montpelier	April 22	20	Burlington Free Press
Virginia	Richmond	April 19	Couple dozen	The Daily Mail

State	City	Date	Attendees	Source(s)
Washington	Olympia	April 19	2,500	The Seattle Times, Washington Post, The Stranger
Washington	Spokane	May 1	?	Reuters
West Virginia	Richmond	?	?	WHSV
Wisconsin	Madison	April 19	70	USA Today
Wisconsin	Brooksfield	April 19	1,000	The Tennessean, YouTube
Wyoming	Cheyenne	?	?	The US Sun

Most media coverage of these anti-lockdown rallies has focused on the fringe elements of the crowds. For example, the media have picked out the few people who compare the strictness of stay-at-home orders with the Nazi Government, or the few members of the crowd who are carrying guns because they are mixing up their Second Amendment right to bear arms under the United States Constitution with their First Amendment right to assemble. In focusing on these fringe elements, the media is not paying sufficient attention to the core reason for these rallies.

The core reason for these rallies is economic: people are not earning money and are therefore not able to buy food, pay their mortgage, or pay for their utilities. There are now over 22 million people in the US who are unemployed, and this number is far greater around the world. Globally, lockdowns are worsening life for the poor, who fear hunger more than the threat of Covid-19. A woman protestor in Lebanon said: "Hunger does not have mercy on anyone." Another female protestor in Kansas City said: "I haven't been able to provide for my children and to me that is scarier than that virus." Or as a sign in North Carolina read: "The Government does not consider my business essential, but it is essential to feeding my family." These people would rather face the threat of contracting Covid-19 and becoming sick than having their family starve for lack of food. After all, the Covid-19 mortality rate is somewhere around 1% or less (the true statistics are still unclear, as discussed above), but we know that prolonged starvation leads to death. Up until now in the US, most people were able to stand in a line at a food bank to get basic food. However, even food banks are now running out of food.

"I haven't been able to provide for my children and to me that is scarier than that virus." Or as a sign in North Carolina read: "The Government does not consider my business essential, but it is essential to feeding my family."

In addition, prominent news sources – such as The New York Times and CNN – have begun to beat the warning drums, telling us that the disruption of the world economy will lead to famine in many parts of the world. Who has the authority to decide that saving people in the industrialised world from sickness and a low possibility of death is worth more than the sure deaths of people in the third world from starvation? There are those who might say that making such a decision is elitist.

Perhaps it is time to start letting people earn a living again so that they can feed their families – both in the US and in other parts of the world that have been under lockdown. This would help to resurrect economies and save lives in the process. This can be done if people do not confuse a total lockdown with allowing movement outside of homes, while maintaining social distancing and wearing masks when in public. This is apparently the decision of the governors of over half of the states in the US who have begun phasing out lockdown orders this week by allowing businesses and public places to reopen, so long as people stay at least six feet apart. It is unknown how much the anti-lockdown rallies have affected these phasing out decisions, but they almost undoubtedly had an influence on policymakers. ■