The South African Technology Network (SATN) in partnership with National Scientists and Organisations

POSITION PAPER:

PRIORITY SETTING FOR INTERVENTIONS IN PRE- AND POST- PANDEMIC MANAGEMENT: THE CASE OF COVID-19

CONTRIBUTORS:

Dr Anshu Padayachee	South African Technology Network
Prof William Gumede	University of Witwatersrand
Dr Sershen Naidoo	Executive Director of the Institute of Natural Resources (INR)
Prof Urmilla Bob	University of KwaZulu-Natal
Vasu Gounden	Executive Director of the African Centre for the Constructive Resolution of Disputes (ACCORD)
Prof Deon de Beer	Central University of Technology
Prof Tinyiko Maluleke	University of Pretoria
Prof Ryk Lues	Central University of Technology
Dr Ahmed Wadee	Thorntree Coaching, Facilitation and Mentoring
Prof Ames Dhai	Founder and past Director of Steve Biko Centre for Bioethics, University of Witwatersrand
Dr Ntokozo Nzimande	University of KwaZulu-Natal
Prof Lucia Anelich	Central University of Technology
Judge Navi Pillay	Past UN High Commissioner for Human Rights

This disclaimer informs readers that the views, thoughts, and opinions expressed in the text belong solely to the authors, and not necessarily to the authors' employer, organisation, committee or the South African Technology Network.

MAY 2020

Table of Contents

Contents

Abbreviations

ACCORD	African Centre for the Constructive Resolution of Disputes
AIDS	Acquired Immunodeficiency Syndrome
AHA	American Hospital Association
ANC	African National Congress
ANSES	French Agency for Food, Environmental and Occupational Health and Safety
BCG	Bacille Calmette-Guérin
CABs	Community Ablution Blocks
CAR	Central African Republic
CFS	Committee on World Food Security
COGTA	Department of Cooperative Governance and Traditional Affairs
COVID-19	Disease caused by SARS-CoV-2 or Coronavirus 2019
DA	Democratic Alliance
DRC	Democratic Republic of the Congo
DoH	Department of Health
ECB	European Central Bank
EHP	Environmental Health Practitioner
EPWP	Expanded Public Works Programme
FAO	Food and Agriculture Organisation
FDA	Food and Drug Administration of the United States of America
FF Plus	Freedom Front Plus
FSA	Food Standards Agency of the United Kingdom
FSAI	Food Safety Authority of Ireland
FSANZ	Food Standards Australia New Zealand
GDP	Gross Domestic Product
GNU	Government of National Unity
HA	Hepatitis A
HDA	Housing Development Agency
HE	Hepatitis E
HIV	Human Immunodeficiency Virus
HPCSA	Health Professionals Council of South Africa
IMF	International Monetary Fund
ICU	Intensive Care Unit
ISS	Institute for Security Studies
MERS	Middle East Respiratory Syndrome
MPC	Monetary Policy Committee
NatJOINTS	National Joint Operational and Intelligence Structure
NCC	National Command Council
NDMC	National Disaster Management Centre
NEDLAC	National Economic Development and Labour Council
NHRC	National Health Research Council
NHREC	National Health Research Ethics Council
NICD	National Institute for Communicable Diseases
PAHO	Pan American Health Organisation
PI	Principle Investigator
PPE	Personal Protective Equipment
REC	Research Ethics Committee

RESCOP	Research Ethics Support in COVID-19 Pandemic
SAC	South African Constitution
SAHPRA	The South African Health Products Regulatory Authority
SAMA	South African Medical Association
SARB	South African Reserve Bank
SARS	South African Revenue Services
SARS-CoV-1	Severe Acute Respiratory Syndrome Coronavirus-1
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus-*2*
SEIR	Susceptibility, Exposure, Infected and Recovery
SETAs	Skills Education Training Authorities
SMEs	Small-Medium Enterprises
SMMEs	Small, Medium and Micro Enterprise Businesses
SRoDG	Social Relief of Distress Grant
TERS	Temporary Employer / Employee Relief Scheme
UIF	Unemployment Insurance Fund
USA	United States of America
UNICEF	United Nations Children's Fund
VAT	Value Added Tax
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organisation
WPHSS	Web-Based Public Health Surveillance System
WWI	World War 1

List of Figures

Foreword by Dr A. Padayachee (CEO, SATN)

If ever South Africa needed reminding that we live in an interconnected world, the Severe Acute Respiratory Syndrome coronavirus (SARS-CoV-2) or Coronavirus 2019 (COVID-19) pandemic has brought that fact home. COVID-19 has tested the integrity, strength and preparedness of societies, governments, communities and individuals to deal with a pandemic, as a global community. In the World Health Organisation's (WHO) 21st April 2020 media briefing, the Director-General contended that "all countries must strike a fine balance between protecting health, minimising economic and social disruption, and respecting human rights." He went on to point out that the "unique and rapidly-shifting challenges to the promotion and protection of health and human rights of people around the world have presented countries with challenges as they attempt to respond to new issues".

South Africa swung into gear to deal with this pandemic by setting up its National Command Council (NCC), Ministerial Advisory Committee (comprising of 51 scientists) and implementing the Disaster Management Act (Government Gazette, 2002). The sweeping powers exercised by the Executive under the Disaster Management Act has put to the test the strength and resilience of our constitutional democracy. When such emergency powers are invoked, there is a clear risk of violations of human rights and fundamental freedoms and disrespect for the rule of law.

When President Rampahosa declared a National State of Disaster on 26th March 2020 and announced the Stage 5 Lockdown to contain the spread of COVID-19, processes and responses that followed highlighted the under-preparedness of our country and its ability to deal with the predicted impacts on lives and livelihoods. In trying to deal with the COVID-19 pandemic, the stark reality of the extent of inequalities reared its ugly head once again and revealed how underprepared we are to deal with pandemics and perhaps national disasters in general.

We realised that while modern transportation and trade have enabled nations, like South Africa, to be linked to the farthest stretches of the world to drive the global economy, creating opportunities for commerce anywhere in the world, it has also, as Thomas Friedman (Learmer, 2007) says, created an enabling platform to form a flat world. These same pathways of global commerce have become the highways for transmission vectors for the disease. It showed that a sneeze in Durban could become a fever in Dublin with one flight, and within one day. Prof Salim Abdool Karim (Chairperson of South African Ministerial Advisory Committee on COVID-19) (2020) highlighted in his report (Appendix A) to the nation the nature, extent and "waves" of the spread of infections, highlighting travellers in the first wave and how this changed to local transmission of the virus. A further realisation was that the positives of a highly connected global economy could also lead to large populations being at risk from infection and an accompanying economic downturn.

In several media discussions around country preparedness to manage this pandemic, WHO intimated that Africa, with its experience in dealing with national health disasters such as the Ebola Virus Disease, SARS-CoV-1 2003, and Human Immunodeficiency Virus (HIV) might well be better prepared to manage this pandemic. However, it became starkly clear that neither developed, nor developing countries were prepared for the impact of the COVID-19 pandemic. As early as 2006, the WHO urged every country to develop or maintain up-to-date national influenza preparedness plans, and provided guidance on plan content. To date, many countries have yet to develop written plans, while those that have done so, display variations in comprehensiveness, quality, and stage of completion. The 2019 Global Health Security Index (GHS Index, 2019) in its ranking of 195 countries on health security, also revealed that while

there were top performers, healthcare systems around the world were on average fundamentally weak and not prepared for new disease outbreaks.

It has become clear to all the contributing authors of this Position Paper that while countries grappled with managing the COVID-19, pandemic planning and priority setting to deal with the impact during and after the pandemic was neglected. While South Africa made early strides towards containing the spread of the virus, how the country prepares as well as prioritises its actions, interventions, infrastructure and budgets to manage a pandemic while protecting lives and livelihoods, will depend on how it sets priorities and its preparedness for the future.

As we develop the blueprints for preparedness and knowledge around the pandemic, the information and experience gained must be banked, infrastructure enhanced and interventions sustained post-COVID-19, to plan, prepare and prioritise actions for a predicted resurgence and, more importantly, for the protection of lives and livelihoods in the 'new normal'. It must be emphasised that the pandemic hit South Africa at a time when it was already in an economic downturn and plagued by university, union and civil society strikes and protests over the lack of infrastructure, corruption, unemployment, etc. The pandemic has exacerbated the situation and compels us to carefully and strategically prepare the country for this so-called 'new normal', and enhance and sustain the gains we have made during the pandemic (for example, water and sanitation provision, housing, security, local manufacturing of medical supplies, etc.).

The Global Health Security Index (2019) report revealed that it is likely that the world will continue to face outbreaks that most countries are poorly positioned to combat. In addition to climate change and increasing levels of urbanisation, global mass displacement and migration – now happening in nearly every corner of the world – combine to create ideal conditions for the emergence and spread of pathogens.

As many infection curves are being flattened around the world, the question that needs to be answered is, how and what do we do to plan for a whole new dispensation post the pandemic? To prepare for this recovery phase and future pandemics this position paper has focussed on priority setting as a tool for underpinning and implementing preparedness policies and protecting lives, livelihoods and individual rights against unjustified state interventions, which can arise during pandemic events and post-pandemic landscapes. The questions addressed by the position paper are as follows:

1. What was the level of policy preparedness of South Africa before this pandemic?
2. What have we introduced to manage the pandemic?
3. Where are the gaps in our policy, regulations, and infrastructural readiness to manage the disease, the economic impact and inequalities in general?
4. What are some of the policy, regulations, infrastructure and initiatives we will need to put into place for economic recovery?

As we continue to manage and find solutions to protect our countries from the aftermath of this pandemic, we must in all our attempts not ignore attention to prioritisation of ethical and human rights implications that may contribute to reducing the death and disease burden, and minimise political destabilisation and claims of injustice that we have seen during this COVID-19 outbreak response.

It is hoped that out of this dark pandemic will emerge some positive outcomes, namely, reviewing policy, regulations, infrastructure and development in general. The challenge post-COVID-19 will be to find new ways to fast-track the building of the economy and the nation.

More importantly, we will need to find ways of making up for the lost time at educational institutions (that has affected approximately 30 million learners and students in South Africa). Over a billion students worldwide are unable to go to school or university, due to measures to stop the spread of COVID-19 (United Nations Children's Fund - UNICEF, 2020). It must be pointed out that the response to this crisis in South Africa is hampered by a legacy of neglect and underfunding of education in the past. While the conversation around teaching, learning, and curriculum for the Fourth Industrial Revolution has been discussed across the world, implementation of the solutions and setting up the infrastructure to address this has not been dealt with, especially in South Africa. The impacts and costs of the pandemic on education and new ways of teaching and learning as well as research capacity and infrastructure post the pandemic requires a separate detailed investigation altogether.

Michelle Bachelet and Filippo Grandi (2020) caution, that how we respond to the many challenges posed by this pandemic "must be grounded in the realities of people's lives and focused on eliminating the barriers people face in being able to protect themselves and their communities. Respect for human rights across the spectrum, including economic and social rights, and civil and political rights, will be fundamental to the success of the public health response". Responding to these complexities has implications for how governments prioritise interventions and solutions in the management of this pandemic and its post-pandemic challenges.

Acknowledgements

The South African Technology Network would like to acknowledge the following individuals for their contributions to the facilitation and production of this Position Paper:

- Dr Anshu Padayachee for conceiving the idea of a Position Paper, assembling the team of authors and contributing to the overall recommendations made;
- Prof Urmilla Bob and Dr Sershen Naidoo for serving as editors in addition to contributing their respective position pieces;
- Ms Nadira Kercival for assistance with formatting the document;
- Ms Christelle Venter for administrative support;
- Ms Khanya Mtshali for serving as the media liaison for the project;
- All the authors for their position pieces.

Executive Summary

This pandemic has and will continue to reshape our lives post-COVID-19 fundamentally. It is clearly much more than a health crisis which has resulted in overwhelmed health care systems as well as devastating personal, social, economic and educational disruption. As the government, health professionals, and scientists grapple with saving lives and finding solutions to deal with this pandemic, the question of how to prepare for the 'new normal' is a more significant challenge that we will have to face. This Position Paper is an attempt to respond strategically to this challenge and investigates the level of preparedness pre-COVID-19, interventions made during the pandemic and makes recommendations for post-COVID-19 preparedness and priority setting.

The South African government has adopted a range of policy and leadership approaches in its health strategy to combat COVID-19 that made this vastly different to previous government responses to crises. The shift in approach in government's implementation strategy, also made its policy appear more logical, credible and palatable, to broader constituencies. There has been far less public opposition than would have been expected. Some business sectors and groups criticised the government for not opening selected sectors of the economy during the lockdown but did not oppose the government's overall response strategy. Similarly, civil society organisations may have criticised specific aspects of government's response, such as not initially providing income support and food to the poor, but they also backed government's overall COVID-19 strategy. There were also fewer grassroots protests against the enforcement of the lockdown as one would have expected. Finally, the government did achieve reasonable success in securing societal behaviour change, such as getting individual citizens to take personal responsibility for enforcing social distancing, personal infection control and avoiding hoarding of food, in a society where people are not particularly apt to taking personal responsibility for their behaviours.

The spread of the virus, together with measures to contain it, will increase the risk of social unrest and violent conflict. The COVID-19 pandemic is a threat multiplier/ stressor, reinforcing existing as well as generating new forms of tensions and conflicts in South Africa. Specifically, a pre-existing mix of economic, social and political tensions (aggravated by climate-related security and development risks) together with job losses and unemployment, threats of food shortages, protests and uprisings, and disruptions of peacekeeping operations associated with the COVID-19 pandemic will reinforce or create new forms of conflicts and violence (including gender-based violence). 'Pandemic refugees' also need to be considered in relation to the possibility of increased migration from sub-Saharan Africa. South Africa needs to develop and implement appropriate conflict resolution strategies and peacekeeping initiatives that are proactive rather than reactive, embedded within a comprehensive framework to address and mitigate against the vulnerability factors to reduce/ control infection rates, manage conflict incidents, address development challenges and deal with climate vulnerability. Focusing on social cohesion and gender issues (especially gender-based violence) are also crucial to building socio-economic resilience. The development of a Monitor, drawing on networks of the African Centre for the Constructive Resolution of Disputes (ACCORD) African practitioners, that tracks COVID-19 related conflicts and resilience trends, aimed at contributing to early warning analysis and informing collective response strategies is imperative.

The frequency of infectious disease outbreaks in pandemic proportions is increasing globally. The advent of COVID-19 has resulted in South Africa having to face incredible challenges on various fronts. These include the virtual impossibility of social distancing in informal settings, limited or unavailability of health facilities in these and rural areas that adversely affect

identification treatment, the low number of health care personnel per capita, small numbers of isolation facilities in public hospitals, limitations on the availability of personal protective equipment (PPE), and the higher demands placed on South African health care workers for the care and treatment of infected persons. Although the Health Professions Council of South Africa (HPCSA) has provided guidelines that fall under the Health Professions Act for health care practitioners particularly in response to the pandemic, concerns have surfaced from the perspective of professionalism in healthcare delivery at the coalface. Other aspects of concern are, (a) The highly restrictive approach of the HPCSA concerning digital / e-health, and in particular, the limiting of its use to the COVID-19 period, and (b) The HPCSA's ethical guidelines on Withholding and Withdrawing of care does not address the pandemic situation where justifiable trade-offs will have to be made, and beneficial care denied to some patients because of resource constraints. Because of the potential for the rapid international transmission of emerging infections, laboratory-based surveillance is essential. To this end, the National Institute for Communicable Diseases (NICD) follows a surveillance approach in keeping with International Health Regulations defined at the 58th World Health Assembly held on 23rd May 2005 to identify and respond to potential health threats. The global imperative to understand the virus and develop treatments and a vaccine have given rise to large numbers of research studies focussed on COVID-19. However, COVID-19 research priorities have not been determined at a national level by the National Health Research Committee (NHRC) nor have guidance for reviewing proposals responding to the pandemic been provided by the National Health Research Ethics Council (NHREC). In this regard, there is a need for a centralised national ethics committee to be established as a matter of urgency.

Flattening the infection curve comes at the expense of steepening the macro-economic recession curve. In South Africa, the situation could be even dire as the country entered the crisis in a vulnerable state with sluggish economic growth and high public debt and thus limited fiscal space to support its weak health systems. Forecasts suggest that the country's economy could contract by between 5-17%. While the government has reacted swiftly to keep firms and households afloat during the pandemic, the question remains: what will happen after the crisis? Undoubtedly millions of South Africans will be scrambling for the piteously limited jobs post the epidemic. Additionally, many of these jobs will be ill-paid, with no basic employment protection, much like the ones 'essential' personnel currently have (delivery drivers, cashiers, etc.). This implies that while the relief programmes are useful, they are not job creation policies, which is what is needed most at this stage. We need to think beyond the current phase – think about tomorrow as well. Hence, one critical recommendation going forward is that the government protects jobs by acting as the employer of last resort. However, such an intervention may have an impact on the public wage bill and in turn on government's budgetary allocations to the various sectors. This highlights the need to prioritise the development of an entrepreneurial ecosystem. In this regard, the pandemic highlighted the global shortage of personal protective equipment (PPE) and medical equipment and highlighted South Africa's dependence on importing rather than manufacturing. Special consideration must be given to the manufacturing sector, which will improve socio-economic development in the country and move South Africa from an import to export economy. Universities will play a significant role in enhancing research and innovation around the commercialisation of products.

The COVID-19 pandemic has had a significant impact on food security, safety and nutrition, albeit in different ways. Currently, 135 million people globally face acute hunger, and it is estimated that by the end of 2020, this figure will have almost doubled to 265 million, as a result of the COVID-19 pandemic. Food distribution programmes are often the only meals available to poor communities, but the usual systems of distributing food parcels increase the risk of

spreading COVID-19. The immediate needs of vulnerable populations should be met, and several approaches should be taken to curb malnutrition. Streamlining and adapting food security and agricultural policies are key to enable countries to fight epidemics and their impact on food supply chains. In addition to saving lives and meeting the immediate needs through emergency responses, South Africa must include planning for longer-term solutions to support recovery, strengthen preparedness, build resilience in the food supply chain and simultaneously promote socio-economic development. Immediate concerns include the availability of food for the impoverished. Authoritative evidence suggests that food and food packaging do not present a significant risk in the transmission of SARS-CoV-2. However, shocks to the food supply chain usually occur during times of crises, ultimately affecting the health and well-being of a population, particularly the most vulnerable, which includes the poor and malnourished individuals. Many factors could further exacerbate potential malnutrition in vulnerable communities: halting of school feeding schemes; the implosion of food markets; declining purchasing power resulting in decreased demand for more expensive items such as vegetables, fruit, and animal-protein; purchase of cheaper and less nutrient-dense items; and the diversion of resources in a strained healthcare system from nutritionally important functions toward combatting the pandemic.

The pandemic has exposed housing and service delivery inequalities and backlogs in South Africa, subjecting a large proportion of the population to a range of health and socio-economic vulnerabilities. Government went into over-drive in its attempt to service vulnerable communities by providing short-term service delivery solutions but to build pandemic and disaster resilience in the future, substantially improving basic service delivery needs to be a priority. Furthermore, current responses to provide basic services (such as water) and temporary housing arrangements to deal with the pandemic may have the unintended consequences of increasing pollution and vulnerability if the entire value chain is not understood and managed. This will also ensure that all citizens' rights to live and work in healthy and safe environments are realised and protected. Additionally, it is clear that housing and population densities create conducive conditions for the spread of the virus in many communities that are already under-serviced. Thus, the types and structures of low-income housing provision need to be seriously reconsidered during and post the pandemic. Utilising under-utilised accommodation facilities should be prioritised for the homeless and other vulnerable groups both during and after the pandemic. More importantly, guidelines and programmes to assist international migrants and illegal immigrants who reside in South Africa need to be designed and developed with urgency.

The pandemic has directed our attention to the fact that South Africa's impressive track record of protecting its abundant and diverse natural resource base can be undermined if guidelines, regulations and monitoring and evaluation of these resources is not prioritised during and after the pandemic. In terms of the natural environment, funding and human resources need to be made available to ensure that South Africa's natural environmental assets (which provide critical ecosystem services and underpins the ecotourism sector, which supports employment/ livelihoods and businesses) are maintained and properly conserved. For many vulnerable households in South Africa, especially rural areas, livelihoods are tied to the natural resource base. A significant concern is the increased and improper disposal of waste (including medical and PPE waste). Therefore, proper waste management processes need to be in place to ensure that responses to deal with the pandemic do not undermine the ecological integrity of the natural resource base. A life cycle approach is proposed in relation to how PPE and sanitisation products needed are produced and how needs of the populace (water and sanitation, food provision, etc.) are being met, to how the different types of wastes generated are disposed of, reused and recycled, if possible. The circular green economy, therefore, should be encouraged and

supported, including driving the development of innovations and Small, Medium and Micro Enterprise Businesses (SMMEs) within the waste sector. This will have a significant impact on skills development and job creation within the environmental sector.

COVID-19 has highlighted the importance of stringent hygiene management during a pandemic. Water, Sanitation, and Hygiene (WASH) are the key considerations in managing the pandemic, given that the provision of water and sanitation facilities in South Africa's ever-increasing number of informal settlements remains basic and largely shared. It is abundantly clear that high user rates, frequent failures and high levels of greywater production have placed community members and caretakers at risk of exposure to potentially contaminated water in low-income settings. Government efforts to make water and sanitising agents available to residents of informal settlements has thus far been inadequate, exacerbating the risk within such communities. It is common knowledge that the use of wastewater for a variety of domestic and agricultural purposes in many low-income areas can present further health risks. Preventing infection can place increased pressure on water resources. In a pandemic such as this, authorities responsible for the provision of basic services (water and sanitation), disposal of wastewater and treatment of drinking water must make decisions that minimise occupational and public health risks based on available evidence. A research priority in this area is to investigate the fate of infective viruses in the urban water cycle and locations of potential human exposure within informal, non-traditional, dwellings. The impacts of the widespread and increasing use of hand sanitisers, spraying of disinfectants, and PPE manufactured from non-biodegradable materials on natural water sources is also of concern. Importantly, a shift towards adaptive infrastructure, particularly in respect of decentralised wastewater treatment solutions must be considered for low-income settings. This is yet another opportunity to employ the populace and help them develop skills to maintain and manage their service delivery infrastructure. The Department of labour, Skills Education Training Authorities (SETAs) and educational institutions will play a major role in ensuring this.

This Position Paper notes South Africa's successes and challenges in respect of responding to the COVID-19 pandemic to date. It also highlights the limitations of the Disaster Management Act, asserting that South Africa needs to improve and in some cases rethink its disaster management policies, guidelines and strategic frameworks. It offers recommendations for priority setting for the period post-COVID-19 and in the event of its resurgence or any future pandemic. Finally, it is important to note that when South Africa's success in managing the current and future pandemics is eventually measured, the government's respect for its people may serve as an even more important indicator than its infrastructural, policy and economic responses.

Introduction

The COVID-19 pandemic has not only highlighted the under-preparedness of countries to deal with a pandemic but has simultaneously shown the stark reality of the extent of inequalities that has reared its ugly head across nations and within countries. It has also highlighted the importance of modern transportation and trade that has enabled nations to be linked to the farthest stretches of the world, to drive the global economy. It also revealed that these very same pathways of global commerce have become the highways and transmission vectors for disease. It also revealed the behaviours of health donors and how national and global health donors rushed to provide funding to deal with the various priorities and areas of risk and threat of the disease. We saw similar donor behaviour and country responses in the wake of past outbreaks like the 2014-2016 Ebola outbreak and the 2003 SARS-CoV-1 epidemic. However, once the pandemic was deemed to be 'under control', funders moved on to other concerns. As a result, countries never actually got around to building a genuinely effective pandemic preparedness system. Peter Sands (2020), Executive Director of the Global Fund to Fight AIDS, Tuberculosis and Malaria, calls this pattern "cycles of panic and neglect".

Despite the urgent calls made by the WHO Director-General Tedros Adhanom Ghebreyesus (WHO, 2020) to the 196 member countries to "invest in preparedness" and not in just "panic funding", he maintains that the "out of sight, out of mind" attitude of policymakers and funders appeared to take precedence as the disease was deemed to be under control. He cites examples from the 1930s to the 2000s, where despite warnings about the resurgence of the disease, there were 75 episodes of malaria resurgence across 61 countries because policymakers withdrew funding for malaria programmes once the disease appeared to be under control. This is an issue that Professor Salim Abdool Karim (2020) cautioned the South African public and government about.

The literature is replete with information indicating that, only if both the national and global community makes a serious effort to establish a robust and proactive national and global pandemic preparedness system and plans for post-pandemic investment in system enhancement and maintenance, will we be able to break the vicious cycle of panic followed by neglect. It is under-preparedness that is cited as a major cause of massive loss of life and economic shocks from outbreaks. Just as defence and military expenditures are prioritised in the concept of state security, so too should health be prioritised in the concept of human security. Managing the pandemic effectively will, therefore, require priority setting and ongoing analysis and adaptation of national preparedness plans (Uscher-Pines et al., 2006). The WHO (2005) published guidelines on the management of pandemics which focussed on a variety of issues, ranging from surveillance and communications to prioritisation of vaccine but appears to have not dealt explicitly with issues, inter alia, poverty and hunger, environmental issues, natural resource management, sanitation, the economy, education, etc.

We can already learn from the successes and the errors in the management of the present pandemic globally, in respect of what has been prioritised, the strategies, interventions, and policy and legislative changes that have been employed to ensure that we can make swift and effective interventions that are suitable for our country's socio-economic and cultural context. What has emerged over the last month is the need for countries to assess their pandemic disease preparedness, their priorities and how to fund these priorities and prepare for a post-pandemic environment. While maintaining low mortality rates remains the highest priority as in the management of any pandemic, governments are also putting in place measures to ameliorate the inevitable adverse effects on their economies and related sectors. The influence of legislative and policy factors on the efficacy of these preventative and ameliorative measures remains poorly

understood, especially in respect of SARS-CoV-2 or Coronavirus 2019, now globally known as the COVID-19 pandemic.

Epidemiologists are assisting policymakers to identify the main objectives of mitigation, and policymakers need to prioritise regulation, policies and legislation to ensure that dealing with the epidemic does not overwhelm health-care services, lead to unrecoverable downturns in the economy, security risks and violation of human rights (Anderson et al., 2020). There are therefore difficult decisions ahead for governments, and researchers have a role to play in informing the prioritisation processes that governments will need to engage in. Furthermore, the unintended consequences of further marginalising the marginalised and disadvantaged groups need to be considered.

At this juncture, it is worth looking back at the country's political and pandemic history. For instance, some of the key lessons that South Africa ought to have learnt from the deadly 1918 influenza epidemic include the importance of a coherent and robust equitable national health system that is pandemic-ready, the efficacy of appropriate policies as well as the legislative agility necessary for swift, decisive and sustainable action. After all, South Africa lost up to three hundred thousand lives to the influenza epidemic (Patterson and Pyle, 1991). Indeed, the first prime minister of the Union of South Africa, General Louis Botha succumbed to influenza in August 1919. Such was the devastation caused by influenza, which formed the backdrop of some of the most memorable songs of gifted musicians like John Knox Bokwe (for example, 'A plea for Africa') and RT Caluza ('influenza').

The reality, however, was that the public health system was uneven across the provinces, across the urban and rural divides as well as across the colour line. A pandemic like influenza is no respecter of class, race or creed. Thus, the development of a strong and robust national health system was recognised as a priority. But several mistakes had already been made. The state was lax in the enforcement of a stringent cordon sanitaire regime for soldiers returning from World War 1 (WW1) postings and somewhat slow in the formulation of the requisite travel policies. Whereas there was evidence of remarkable solidarity between black and white people at the height of the influenza epidemic, indications are that in the aftermath, the clamour for segregation became more intense.

One hundred and two years later, COVID-19 arrives in democratic South Africa, to find a country armed with a good Constitution. Our Constitution makes provision for the management of provincial and national disasters as well as the invocation of a state of emergency to deal with situations of emergency. These constitutional provisions, particularly the Disaster Management Act 57 of 2002 (Government Gazette, 2002), have framed the South African response so far. It was the invocation of this Act that enabled government to suspend schooling, close the South African borders; firstly for travellers coming from affected countries and later to all travellers. The Act has also been used to invoke a national lockdown – still in place as we write these lines, albeit at a less severe level than it was during the second half of March and the whole of April.

However, it is important to point out that the Disaster Management Act and Guideline: Development and Structure of a Disaster Management Plan (National Disaster Management Centre - NDMC, 2017) fail to sufficiently consider the possibility of a virus pandemic although the Act states that each province and municipal area should have disaster management plans that "anticipate the types of disaster that are likely to occur in the province and their possible effects". The Act does stipulate that a 'disaster' is a "progressive or sudden, widespread or localised, natural or human-caused occurrence" that has the potential to cause "death, injury or disease",

"damage to property, infrastructure of the environment" or "disruption of the life of a community". While a pedantic point, the definition of disaster in the Act is that it causes the disease and not that the disease itself causes the disaster. The types of 'disasters' therefore anticipated seems to be confined to climate-induced disasters. This is noted by Van Niekerk (2014) as well, who indicates that the Act was promulgated after severe flooding in the Western Cape. Health is referred to in the Act only in relation to health facilities being an important aspect to have information on for purposes of emergency response resources and capacity. There is a failure to consider a health pandemic as a national disaster in itself that can impact on all sectors and all aspects of life as is the case with the COVID-19 pandemic. It is also important to note that the Act tends to focus on administrative structures and institutional arrangements (including powers and responsibility assigned at each level) and the 'what to do' with limited focus on how to implement, which is a major flaw that needs to be addressed in the future. Additionally, housing and environmental conditions are not mentioned in the Act. The pandemic has highlighted how these aspects can create breeding grounds for the transmission of the virus. Given the above, there is little doubt that South Africa needs to rethink its disaster management policies, guidelines and strategic frameworks.

This motivated the present *Position Paper* on priorities, legislative, policy, economic and related preparedness initiatives in relation to pandemic management. The paper seeks to identify priorities to drive effective policy, legislative interventions, plans to enhance and sustain infrastructure installed, and interventions to reboot the country's economy in the management of COVID-19 now and in the event of the resurgence of this or another pandemic. Importantly, the current contribution focuses on the role of priority setting as a tool to underpin and implement preparedness policies and concomitantly protect individual rights against unjustified state interventions, which can arise under these circumstances (Martin and Conseil, 2012).

From patient zero to the 'new normal': Positioning key issues

Since March 5th 2020, when South Africa's first COVID-19 case was reported, the number of cases has increased steadily until mid-May 2020 after which there was a dramatic increase in both positive cases and mortalities. What is also evident is that certain provinces (e.g. Western Cape and Gauteng) have emerged as 'hotspots' of infection. Following the close to 10 week lockdown, certain restrictions were relaxed in the interest of preventing complete economic collapse and allowing the business sector to serve the needs of an already struggling medical and civil sector. The predicted effects of COVID-19 on the wellbeing of citizens, industry and the environment has been alleviated to some extent by a number of civil society and corporate philanthropic initiatives. While these are not reported on here, their potential to influence the success of pandemic management in the country should not be disregarded. Furthermore, aid from countries such as Russia, the United States of America, China and a number of civil society and corporate organisations highlights the role of maintaining and drawing on established local and international relationships/partnerships during a pandemic.

As alluded to earlier, the education (both basic and higher education) and research aspects are beyond the scope of this *Position Paper* and needs a focused sectoral assessment and examination. This also includes the need to relook at South Africa's research capacity strengths and weaknesses particularly in relation to adaptive capacity for research and development. The pandemic highlighted the global shortage of PPE and medical equipment, and South Africa's dependence on importing rather than manufacturing. Special consideration must be given to the manufacturing sector, which will improve socio-economic development in the country and move South Africa from an import to export economy. Universities will play a significant role in enhancing research and innovation around commercialisation of products.

The discussion of key issues addressed in this Position Paper focuses on the following themes:

- Governance;
- Implications of the COVID-19 pandemic for social cohesion and public order during and post the pandemic;
- Healthcare;
- Financial/ economic implications;
- Food security;
- Living/ housing conditions;
- Natural environment;
- Water, sanitation, and hygiene.

Governance

The South African government has proactively adopted a series of policy and leadership approaches in its strategy to combat the COVID-19 pandemic. The coronavirus crisis has rightfully been likened to a war-time emergency. For this reason, all policy interventions aimed at combating COVID-19 must necessarily be pragmatic, imaginative and effective. An effective coronavirus strategy must simultaneously be an economic stimulus, combating the virus itself while also pushing for economic and societal behavioural changes.

It has been heartening to observe that while some in the business and civil society sectors voiced their disagreement against certain aspects of the government's lockdown strategy, they were all in support of the government's COVID-19 health strategy, including its wide-ranging lockdown measures. For a moment, even the ruling party factions appeared to be under a cease-fire of sorts. Overall it seemed that the government managed to secure societal behaviour change, such as getting individual citizens, to take personal responsibility to enforce social distancing, personal infection control and avoid hoarding of food.

However, as the level 5 lockdown came to an end, cracks began to show: between government and some civil society groups, between government and some opposition parties, notably the Democratic Alliance (DA), the Freedom Front Plus (FF Plus) and the EFF (Economic Freedom Fighters); between government and big business and between government and rights-based civil society organisations. Sadly, we have also witnessed several government failures to communicate and explain some of its lockdown measures. More worrying were the seeming contradictions in communication between members of the cabinet themselves, notably between the President and his key Minister of Cooperative Governance and Traditional Affairs (COGTA).

Prior constraints to successful COVID-19 strategy implementation

From the start of the crisis, it became clear that for South Africa to effectively tackle the devastating health and socio-economic impacts of COVID-19, government would have to simultaneously overcome all the economic and developmental obstacles which, until now, have remained unresolved. These problems have been compounded by lack of trust in government, among the key societal intellectual, business and civil society capital (Edelman, 2020). This is largely due to government corruption with seeming impunity, incompetence and indifference. During the pandemic, corruption reared its ugly head in the distribution of food parcels and cash.

The period preceding the COVID-19 crisis saw continuous public protests against poor public services, corruption and indifference among officialdom (Alexander et al., 2018). In many cases, there appears to be little effective communication within government, across departments, and different spheres of government (Makgale, 2020). Government communications to citizens about

policies, decisions and actions have in the past been patchy (Vivier et al., 2014; Mkhize, 2018). Information either drips out slowly or when it finally comes out it was often defensive, obtuse, and confusing.

Attempts at building sustainable partnerships or social compacts among government, business and civil society, which had been tried in the past, rarely succeeded because of lack of state capacity, distrust in government by stakeholders and distrust among stakeholders themselves (Gumede, 2012). To successfully tackle a pandemic demands partnerships between state institutions themselves, between the state, business and civil society, and between the state and individual citizens.

The key pillars of government's COVID-19 response strategy

Evidence-based policies

Evidence-based policy was a key pillar of the management strategy model the South African government used to tackle the outbreak of COVID-19, the first time this has been the basis of sustained governmental decision-making since the end of apartheid. Over the past few years, policymaking has often been criticised as either based on ideology, wishful thinking or being corrupted (Booysen, 2001; Gumede, 2012; Saul and Bond, 2014). Throughout the COVID-19 response, government appeared to be guided by advice from experts. This made government policy also more logical, credible and palatable, to broad constituencies.

The Health Minister (Zweli Mkhize) and the COGTA Minister (Nkosazana Dlamini-Zuma) were themselves medical professionals, which gives both of them a sound grounding to lead the COVID-19 fight. The government appointed a Ministerial Advisory Committee, made up of medical experts, including 20 medical academics, led by Professor Salim Abdool Karim to guide the government's COVID-19 response. Abdool Karim played an instrumental role in the Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) pandemic response in the 1990s and early 2000s. Importantly, the advisory team consists of health specialists across government entities, academia and the private sector.

Coordination within government

The COVID-19 response is coordinated by the National Command Council (NCC) which is chaired by President Ramaphosa and compromises of Cabinet Ministers from portfolios impacted by COVID-19, including the Departments of Health, Justice, Home Affairs, Defence Force and the Police. Reporting to the NCC is the National Joint Operational and Intelligence Structure (NatJOINTS), which is made up of senior public servants from the national and provincial governments. The NatJOINTS are responsible for coordinating the management of COVID-19 operations, from public health infection containment to enforcement operations and border control. In the past, the NatJOINTS structure was largely ineffective (Flanagan, 2016) but during the COVID-19 crisis, the NatJOINTS seemed to operate much more efficiently.

Government communications to citizens

The hallmark of the government's COVID-19 communication has been that it happened regularly, was relevant and honest. Health Minister Zweli Mkhize with his almost daily briefings to the media and public brought much-needed clarity of information about the spread, containment measures, and the behaviour changes needed. Importantly, Mkhize's health subject knowledge brought authority to government's response, which has been lacking in many previous crises.

Regular public and media briefings by the Ministerial Advisory Committee members, and especially its head, clarified the government strategy to the public and also increased public confidence in government's COVID-19 response. But most importantly, President Ramaphosa's regular public briefings, explaining the government's strategy and urging behaviour change, played a crucial role to rally people behind the government's COVID-19 response.

Merit-based Advisory Structures

The members of the COVID-19 Ministerial Advisory Committee, which includes 20 medical academics and is led by Professor Karim, has guided the government's COVID-19 response and appear to be appointed on merit. It is going to be important that government ensures that appointments to all implementing structures are based on merit - that the best people in the country are used to manage the stimulus package (Mkentane, 2020a).

Partnerships with social partners

The COVID-19 response is arguably the most effective public-private partnership South Africa has seen since the end of the apartheid. Partnerships between the public, private sector and civil society in crisis strategy execution are even more crucial when the state lacks sufficient capacity, resources, and ideas. Partnerships not only bring goodwill, they bring skills, resources and wider buy-in for policies, decisions and delivery. Government has to broaden its partnership approach beyond the National Economic Development and Labour Council (NEDLAC), which has only two trade union federations and outdated civil society representatives, with no representation for the informal and small-business sectors.

Going forward, government will have to facilitate and enable partnerships with the private sector, for example in the management of the Unemployment Insurance Fund (UIF) (Bloomberg, 2020). Similarly, government should partner with civil society groups and small businesses in order to distribute food to communities.

Public-private sector health partnerships

So far, the government has unevenly brought the private health sector into a partnership to fight COVID-19, with each largely focusing on their own initiatives to battle the virus. In the early days of the COVID-19 pandemic, there were limited explicit resource-sharing arrangements between the public and private health sectors (Davis, 2020). Yet, the best health delivery strategy should be based on a public-private partnership model of delivery. Those in government who argue that only the state should lead the delivery of health public services, and the private sector and civil society should just meekly follow diktats from government, are simply wrong. Similarly, those in the private sector who argue that only the private sector is the perfect vehicle to deliver health services are also wrong.

Medical specialists in the public and private sectors and medical professional associations must be at the heart of the intellectual, management and patient response to an epidemic, not bureaucrats. There has to be a sharing of resources, based on a partnership between the public and private health sectors. In such a partnership, the state may lead in some aspects and the private sector in other aspects. In the health sector, public and private hospitals must strike a partnership where the private sector proactively avail beds, medicines and personnel to the public sector. Joint leadership between private hospital groups, medical aid schemes and public hospitals should be established during an epidemic.

Partnerships with opposition political parties

The government's first move at the onset of the COVID-19 crisis was to take opposition parties into confidence - explaining the government's strategy, listening to them and seeking ideas from them - which enabled the support of opposition parties. Although a national government of unity between the African National Congress (ANC) and key opposition parties was not practical, the first thing in a crisis had to be to create to closest equivalent to a Government of National Unity (GNU) by involving the best talents of all political parties in the national response to the disease at all levels of government.

Opposition parties also for the first time stood together to support the government initiatives. "The 14 political parties in our Parliament are standing together, across party political divides, to fight this disease together. We hereby demonstrate practically that we are united as the leaders of our nation to overcome this global crisis facing our country and our people," the opposition parties declared collectively (Head, 2020).

President Cyril Ramaphosa met with all the opposition party leaders to discuss the government's COVID-19 strategy, and to ask them for their input and cooperation. The government appeared to listen to opposition parties - and took on board some of their more pragmatic ideas. For example, opposition parties proposed that government gave a UIF contribution holiday to employers, allow for Value Added Tax (VAT) refunds, and for government to encourage business to propose payment holidays on property loans, business loans, and vehicle loans (Democratic Alliance, 2020).

Tackling corruption

The R500 billion "war-time" COVID-19 emergency economic stimulus will not achieve the desired impact if there are no measures to prevent it from being captured for the purposes of corruption. President Ramaphosa has said the government would closely monitor how the R500 billion emergency economic stimulus will be used, to prevent corruption (Ramaphosa, 2020). Allegations of food stealing, corruption and waste of government food have been levelled at local ANC councillors who were given food to distribute to the needy in their areas. In one of many such cases, a councillor in the Moses Kotane Municipality is due to appear in court for allegedly selling hand sanitisers meant to give to the poor to local shops (Mkentane, 2020b). "We are going to keep a hawk's eye on how the money is going to be spent. I spoke to the auditor-general [Kimi Makwethu on Thursday]. I said, 'auditor-general we need to put in place systems, on a proactive basis, to prevent the abuse of resources that we are putting in place, so that money doesn't end up in people's pockets" (Ramaphosa, 2020). It is going to be crucial that oversight mechanisms are in place to monitor the spending to curb corruption. Should corruption be allowed to infiltrate COVID-19 funding, government credibility may be severely eroded. In the process, many will go hungry, leading to much disappointment, anger, protests and even disregard for lockdown rules. The ultimate success of the COVID-19 strategy will heavily rest on whether government can contain corruption.

Implications of COVID-19 for social cohesion and public order during and post the pandemic

The exercise of emergency powers is permitted under International Law, but under strict conditions: the measures adopted must be necessary to combat the public health crisis, be reasonable and proportionate and are lifted as soon as they are no longer necessary for protecting public health. Despite appeals by President Ramaphosa to the army and police for restraint and

empathy, there were many reports of brutality and unreasonable arrests of women and children in the immediate aftermath of the restrictions.

The COVID-19 pandemic-induced crisis has prompted panic buying, looting, riots, protests and violence. The African Centre for the Constructive Resolution of Disputes (ACCORD, 2020), a civil society organisation working throughout Africa, has warned that the spread of the virus, together with measures to contain it, will increase the risk of social unrest and violent conflict. Similar sentiments have been expressed by the Institute for Security Studies (ISS, 2020) who indicate that the measures taken to prevent the virus spreading are having major implications on economies, political governance, peace, and security. ISS (2020) specifically warns that Africa faces the loss of livelihoods for millions of citizens, popular uprisings, threats of food shortages, terrorism, the halting of ongoing peace support operations, and a surge in gender-based violence. Moore et al. (2020) assert that the impact of the Coronavirus on the staggering levels of hunger, as household incomes have collapsed and nutritious food has become increasingly difficult to access, cannot be underestimated. They further argue that other social impacts, such as job losses, interruptions to public health programmes, loss of access to educational and other child support services, growing challenges with mental health, and increased gender-based violence are all collectively deepening destitution in communities in South Africa. If citizens become disillusioned with the measures that government is taking to manage the pandemic and government fails to identify and address social and economic impacts adequately, public mass action and protests will ensue and social cohesion and nation-building efforts in South Africa will be severely undermined.

The COVID-19 pandemic is likely to be a threat multiplier/ stressor, reinforcing existing as well as generating new forms of tensions and conflicts in South Africa. As ACCORD (2020) indicates, the COVID-19 pandemic adds additional stress to a pre-existing mix of economic, social and political tensions; which among a variety of other influences, are also aggravated by climate-related security and development risks as shown in Figure 1. Furthermore, ACCORD (2020) notes that the economic measures to contain the virus have more severe and direct impacts on people's livelihoods than the public health aspect of the pandemic. It is also important to note that ACCORD's analysis of the impact of the pandemic on conflict and resilience in Africa identified twelve countries that may be especially vulnerable to COVID-19 related social unrest and in some cases to violent conflict. South Africa is among these countries together with Algeria, the Central African Republic (CAR), Burkina Faso, Cameroon, the Democratic Republic of the Congo (DRC), Ethiopia, Libya, Mali, Niger, Nigeria and Somalia. These countries exhibit key vulnerability factors as shown in Figure 1 below: These are COVID-19 cases (with South Africa having the highest number of recorded cases), conflict incidents, climate vulnerability and Gross Domestic Product (GDP) growth. It is worth noting that South

Africa has recently been relegated to 'junk status' (the country's international credit rating is below investment grade) by credit rating agencies.

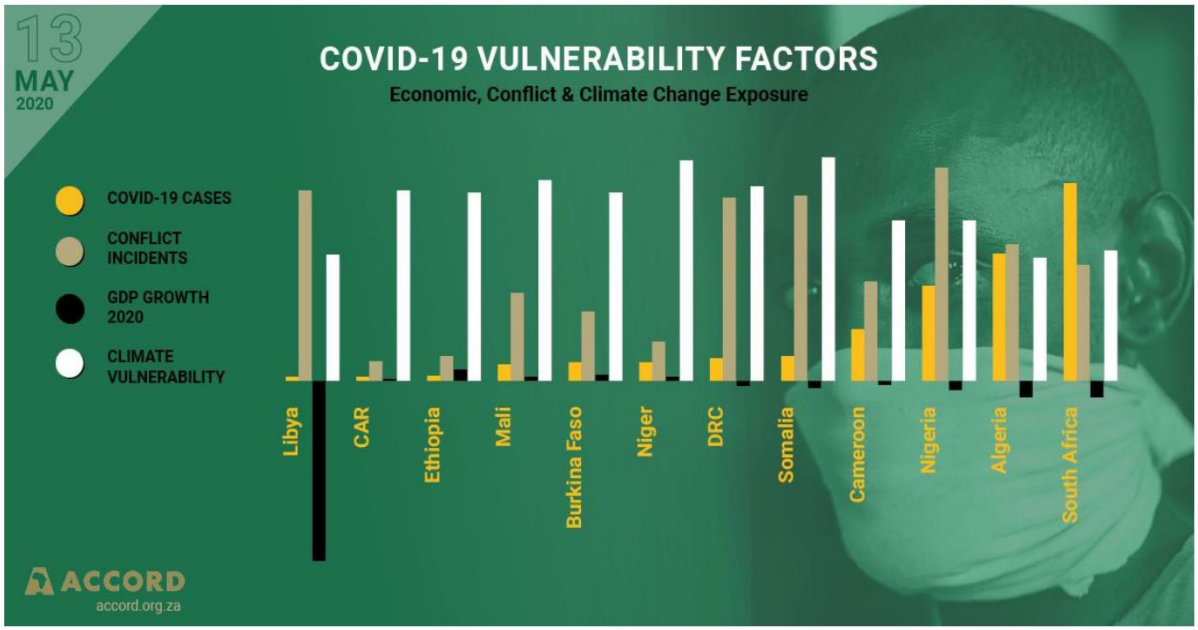


Figure 1: Illustration showing the COVID-19 Vulnerability factors in selected African Countries (ACCORD, 2020)

An aspect that has received limited attention is the likelihood of 'pandemic refugees'. South Africa already has high levels of migration from sub-Saharan Africa specifically. ACCORD's (2020) analysis of the impact of the pandemic in Africa reveals that currently, there is no correlation between COVID-19 cases and overall levels of conflicts in Africa. This could be attributed to the low levels of infections on the continent generally, with Africa still expected to reach the first wave as experienced in Europe and the United States of America (USA). ACCORD (2020) further indicates that Africa's economic resilience differs considerably from country to country, including the ability to activate or enhance social protection (in the form of grants, business support and other measures). South Africa has invested considerably more of its GDP on the COVID-19 crisis than any other Africa country and has higher levels of social protection measures for vulnerable citizens. The possible increase in immigrants can also trigger xenophobic tensions and conflicts in South Africa, which remains a major challenge in the country (Solomon, 2019). Of concern also, as highlighted by ACCORD (2020) and De Coning (2020), is that the COVID-19 pandemic has severely disrupted peace operations in Africa. This can also curtail the level and nature of responses should major conflicts or violence erupt, especially if peace operations contract in size and scope.

ACCORD (2020) indicates that incidences of protests and riots have dropped considerably post the WHO's declaration of COVID-19 as a pandemic. This is as a result of strict regulations restricting movement and gatherings. However, as economic conditions worsen if the pandemic is not controlled, protests and riots will likely increase, and even exceed rates before the pandemic. The disruptions will have particularly devastating impacts on African youth. South Africa has a high youth unemployment rate, 1 out of 4 job seekers under 35 years old is unemployed, which is the third-highest in the world (Dzomonda and Fatoki, 2019). The youth unemployment rates will increase as job opportunities contract. As indicated in the section of this paper focusing on economic impacts of COVID-19, economic recovery and job growth is likely to be protracted given that the pandemic has plunged the entire world into an economic

recession; the worst in recorded history. Developing countries like South Africa, with dire economic challenges before the pandemic, will take even longer to recover.

The social delivery protests, as well as persistent higher education violence (Bosch, 2017; Breakfast et al., 2019; Webb, 2019), indicate the propensity among some youth in South Africa to express their dissonance violently, often referred to as 'protest culture' that has characterised the country. The African youth in South Africa have regularly adapted to violent conflicts, political instability, displacement, persistent poverty, and lack of opportunities and access to services (including healthcare). However, the vulnerable conditions faced by many in the country (particularly the youth) which the pandemic will worsen, can trigger protests and violence. Domestic and gender-based violence is also a cause for concern, with high levels among South African youth (Chitsamatanga and Rembe, 2020). The national lockdown geared to curb the spread of the violence is likely to contribute to increased violence against women and girls who are vulnerable in their homes and communities.

Healthcare

The past few decades have been witness to infectious disease outbreaks such as Ebola, and influenza. These have featured prominently at an international level. Data suggests that these catastrophes are increasing in frequency (Karan, 2020). The world has experienced at least three pandemics every 100 years since the 16th century. Many critical issues have arisen in the healthcare context. These have occurred between 10- to 50-year intervals with varying levels of morbidity and mortality. Predicting the impact of future pandemics has not been possible (WHO, 2007). This is evident in the novel SARS-CoV-2 pandemic, which has resulted in an unprecedented burden on human health, major disruptions in healthcare systems, and grave social and economic consequences (Dhai et al., 2020). It is also becoming clear that the pandemic is affecting a large proportion of the population and it will likely last for several years (British Medical Association, 2020).

This section of the Position Paper highlights areas of the healthcare system requiring review. Scientific and technical aspects including healthcare personnel, safety measures including PPE for healthcare personnel, the implementation of community practices to prevent viral spread, surveillance and the important roles of relevant bodies like the National Institute of Communicable Disease (NICD), WHO, Health Professions Council of South Africa (HPCSA), Department of Health (DoH), National Health Research Committee (NHRC) and the National Health Research Ethics Council (NHREC) are highlighted (see Figure 2 below). There is also a specific focus on ethical issues and practices in the face of such pandemics.

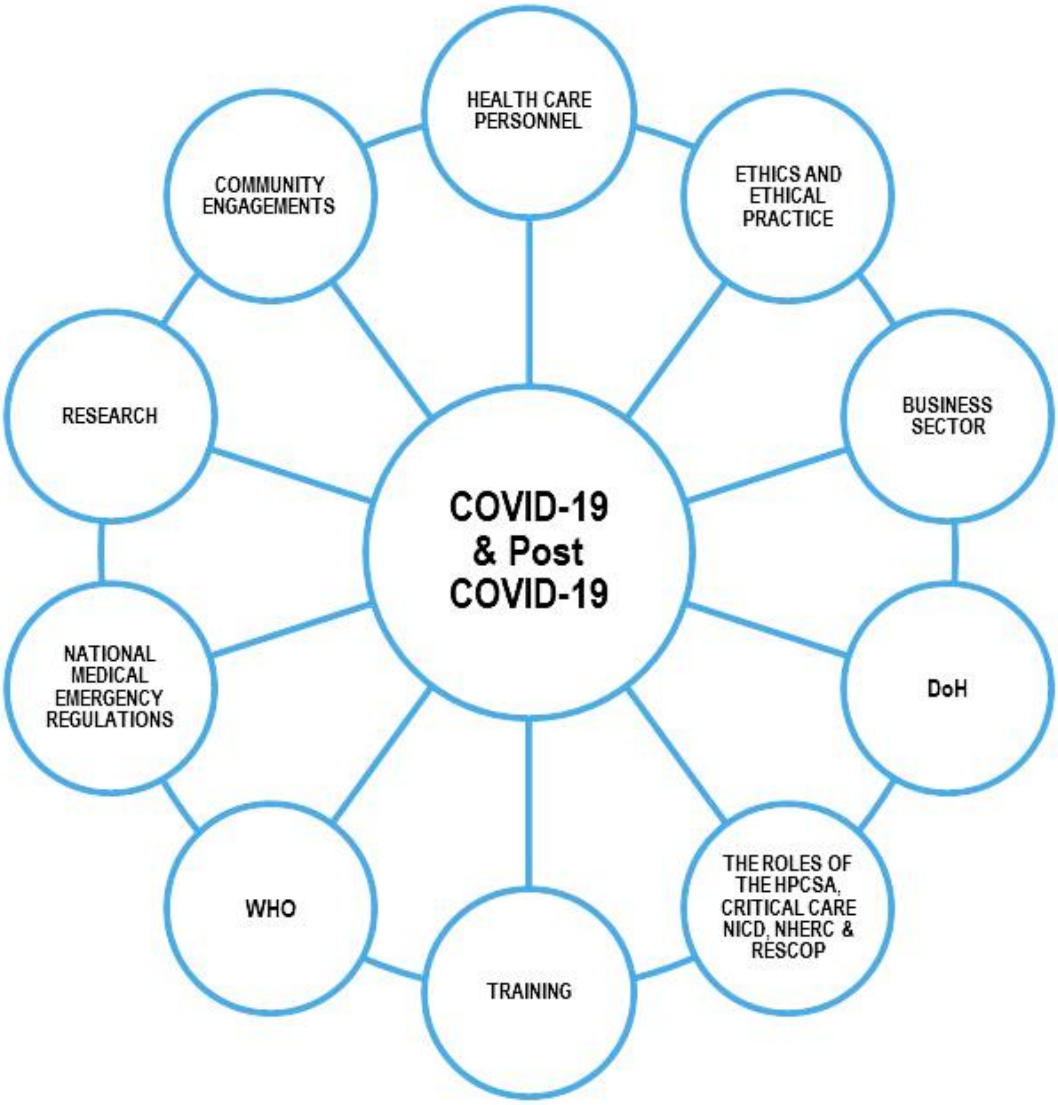


Figure 2: Illustration showing the areas of the Healthcare System being reviewed in relation to COVID-19 and post COVID-19. DoH: Department of Health, HPCSA: Health Professionals Council of South Africa, NICD: National Institute for Communicable Diseases, NHERC: National Health Research Ethics Council, RESCOP: Research Ethics Support in COVID-19 Pandemic, WHO: World Health Organisation.

Scientific and technical considerations

With the advent of the COVID-19 pandemic, the care and treatment of infected persons consequently place greater demands on South African healthcare workers. This implies that the healthcare system would require a greater number of practitioners; with the added risk of these practitioners placing themselves at risk of infection (HPCSA, 2020a). As at 16th March 2020, South Africa's confirmed COVID-19 cases stood at 2 783, which by 22nd April increased to 3 635 and by 27th May, this figure increased to 25 937 with 552 deaths recorded (DoH, 2020). The provinces with the highest confirmed cases as at 27th May 2020 are Western Cape (16893), Gauteng (3167), Eastern Cape (3047) and KwaZulu-Natal (2186).

The NICD has provided detailed information on various aspects of the COVID-19 pandemic to keep South Africans updated with infection rates and consequences thereof. This information is based on what is currently known about COVID-19. Furthermore, the NICD on its website has

provided information to healthcare personnel and the general public. These include technical resources (for healthcare workers, testing and patient care, guidelines and advice for the public and travellers, information on diagnosis, testing and public health responses). The importance of laboratory-based surveillance in the world is well recognised, because of the potential for the rapid international transmission of emerging infections. The NICD follows a surveillance approach in keeping with International Health Regulations defined at the 58th World Health Assembly held on 23 May 2005 to identify and respond to potential health threats.

The NICD laboratory-based surveillance covers several communicable diseases including epidemic-prone diseases, to facilitate early outbreak identification and implementation of control measures. In light of the current COVID-19 crisis, the NICD has focused its attention on the surveillance of the disease in South Africa compared with the rest of the world and produced a guide for the management of staff in healthcare and laboratory settings exposed to or infected with the virus (NICD, 2020).

The contributions of Professor Karim (2020) and his team have added a scientific approach to combatting the outbreak (Appendix A). Whilst the measures and guidelines in place are impressive, South Africa faces an incredible challenge on various fronts. Social distancing in informal settings is virtually impossible. The limited or unavailability of health facilities in these and rural areas also makes identification and treatment difficult, if not almost impossible. To add to these, the low number of healthcare personnel per capita, the low number of dedicated isolation facilities within public hospitals, and the limitations on the availability of PPE provide hurdles that the country needs to overcome for an effective healthcare response to the viral outbreak. The worldwide shortage of protective gear has only added to the dangers posed by this pandemic.

To maintain hygienic environments, the Department of Water and Sanitation has provided water tanks to low income and informal settlements. We have also been urged by our Minister of Health to utilise cloth face masks, especially for those unable to access commercially available masks. Although this may not be ideal, it does provide an additional barrier against viral exposure. In this regard, the role of social media should not be underplayed in South Africa's response to COVID-19. Information on producing home-made and affordable masks and protective clothing, and awareness of sanitising and social distancing have been well propagated on various social media platforms. All of these would not necessarily stop the virus but would go a long way in preventing or slowing down the viral infection rate.

South Africa has in place a Disaster Management plan (Government Gazette, 2004). The DoH had introduced its approach to the notifiable conditions under the early warning surveillance system (DoH, 2011). Thus, South Africa has a notification system to detect and report notifiable medical conditions. The system is managed by the Directorate: Epidemiology and Surveillance and is based on the Health Act, No. 63 (Government Gazette, 1977). Specific regulations are also in place for notification and the notifiable conditions are subject to revision for the National Health Act, 61 of 2003 (Government Gazette, 2003) to include new emerging conditions. These regulations would likely be extended to COVID-19, although the current surveillance processes appear to be providing valuable information. However, specific regulations for COVID-19 control are not available as yet. With greater interaction and experience with COVID-19, legislation may be required to be introduced to manage specific viral infections. Recently, the DoH introduced a Web-Based Public Health Surveillance System (WPHSS). The WPHSS is a national electronic disease reporting system that not only links healthcare providers such as hospitals, clinics and private physicians to the corresponding local, provincial and national departments of health but also facilitates the electronic transfer of laboratory results from state

and private laboratories. It is envisaged that this system would provide standardised approaches to disease surveillance and enhance the reporting of and responses to notifiable medical conditions. This appears to be working well for the approach to surveillance and its subsequent reporting.

Several models have also recently emerged to predict the spread of COVID-19. These include: IT analytics, projection of the COVID-19 trajectory and various mathematical models for predicting the course of the coronavirus (American Hospital Association – AHA, 2020; De Walque, 2020; Kent, 2020; Rogers and Molteni, 2020) Dr Shamim Bodhanya (2020) from the Leadership Dialogue in South Africa has also recently developed an online simulator CoSimPub (https://exchange.iseesystems.com/public/shamim/covid19-basic-c/index.html#page1), based on an underlying Susceptibility, Exposure, Infected and Recovery (SEIR) epidemiological model, utilising the system dynamics methodology. The model is designed such that it can be extended to assess a variety of socio-economic impacts of the pandemic on, for example, public health capacity and infrastructure, business productivity and economic fallout, social welfare strategies, and a range of others. In addition, the model may be utilised to assess a range of mitigation strategies such as social distancing, lockdowns, use of PPE, etc.

Whilst admirable healthcare policies, processes, and tools are in place, there may be room to evaluate and strengthen South Africa's COVID-19 response. These include:

- Emphasising the public health objectives - reduce morbidity and limit virus circulation;
- Surveillance testing - to expand current activities to cover the entire country;
- Testing capacity - to expand on the number of testing sites, and capacity by obtaining increased numbers of testing material and engaging more laboratory personnel;
- Partnerships - with communities and community screening to be nurtured and expanded to limit community transmission;
- Contact tracing - although this is in place, active case finding quarantine protocols and social distancing need to be enforced;
- Healthcare capacity - to increase the numbers of community-based testing sites and staff to alleviate the current burden on the stretched healthcare personnel;
- Assessing South Africa's response to COVID-19 in comparison with the effects of practices undertaken by countries such as China, France, India, Italy, Spain, and South Korea.

Ethical considerations in the service provision context

The HPCSA has provided guidelines that fall under the Health Professions Act (No 56 of 1974) for healthcare personnel particularly in response to the pandemic. These include essential services, undergraduate and postgraduate teaching/training, the possible negative effects of postponing the Colleges of Medicine of South Africa examinations - delaying the production of specialists, practitioner's wellbeing, the provision of PPE, and encouraging the use of telemedicine/ telehealth, amongst others. In addition, the HPCSA has suggested the restoration of practitioners to the Clinical Register in their publication: "Practitioners who have been on the non-clinical register and/ or applied for voluntary erasure for a subsequent period not exceeding five years (from the date of registration), will be considered for restoration to the clinical register without the need to meet further requirements. This measure is put in place to ensure that the healthcare system has enough resources to respond to the pandemic."

The HPCSA has produced guidance for specific aspects of telemedicine/ telehealth (HSPCA, 2020b). On 3 April 2020, the HPCSA published a notice to amend its Telemedicine Guidelines

during the COVID-19 pandemic. More specifically, Clause (b) which provided for telehealth only where there was an already established practitioner-patient relationship was amended as follows:

> *"Telehealth should preferably be practised in circumstances where there is an already established practitioner-patient relationship, and where such a relationship does not exist, practitioners may still consult using Telehealth provided such consultations are done in the best clinical interest of patients".*
>
> Clause (c) which allowed for practitioners to charge a fee when rendering services using the telehealth platform, was amended as follows:
> *"Although practitioners may charge fees for consultations undertaken through Telehealth platforms, the Council strongly cautions against practices that may amount to over-servicing and perverse incentives".*

Practitioners were reminded that the Ethical Rules of Conduct for Health Practitioners registered under the Health Professions Act remained in force even when practising telehealth. Practitioners were informed that the amended guidance was only applicable during the COVID-19 pandemic because it would assist practitioners to continue servicing their patients while observing the Regulations of Section 27 of the Disaster Management Act (2002), in particular, regulation 11B. (1) (b) which states: "During the lockdown, all businesses and other entities shall cease operations, except for any business or entity involved in the manufacturing, supply, or provision of essential goods or services, save where operations are provided from outside of the Republic or can be provided remotely by a person from their normal place of residence". The HPCSA is to inform practitioners soon after the end of the pandemic as to the status of the guidance and whether or not it will be allowed to be used going forward.

The highly restrictive approach of the HPCSA with regard to digital/ ehealth, and in particular the limiting of its use to the COVID-19 period is of concern. President Ramaphosa in his 2019 State of the Nation Address made it clear that South Africa was in need of a high tech economy with advances in ehealth, robotics, and remote medicine being applied in parallel with the roll-out of the National Health Insurance (President Cyril Ramaphosa, 2019). There is also a National Digital Health Strategy Document in which the commitment and direction of the government are captured (DoH, 2019). Given that COVID-19 is likely to last a few years, and that other pandemics will possibly follow, responsible and appropriate use of telehealth will be essential. A proactive response aligned to the country's policies and needs is required from the HPCSA in this regard.

While the HPCSA has published several ethical guidelines and policies regulating professional practice, concerns have surfaced from the perspective of healthcare delivery at the coalface. The HPCSA has not as yet addressed, nor produced guidance for practitioners with regard to challenges to professional practice that could arise during these vexing times. Responses from healthcare professionals regarding participating in the care of patients in the era of COVID-19 has generally been positive. However, there have also been disturbing experiences on the ground. Questions that have repeatedly arisen include whether healthcare professionals have obligations to work during the pandemic irrespective of the level of personal risk and risk to their families; whether they have a right to refuse to provide care; whether government and society have reciprocal obligations towards them; and whether they should be absolved of their obligations in the event of these reciprocal obligations not being honoured. Concerns from the ground include some nurses and doctors having been heard to say, "if there is no PPE, the patient can die" (Dhai et al., 2020). Ethically and legally, practitioners should not be expected to assume a significant

and unreasonable risk of harm to themselves and their families. There is a reciprocal obligation on the state and employers to ensure their safety. However, it is the attitude that is devoid of compassion and caring that is of concern. With limited availability or inadequate access to PPE, Canellie et al. (2020) have recommended the use of protective barrier enclosures for use during endotracheal intubation on these patients. Some students are reluctant to resume their clinical training because of a fear of infection to them and their families; they will not be paid to 'work' in the frontline during the COVID-19 pandemic and that they are not eligible to compensation should they contract the virus. Some staff are similarly not happy to be involved in screening because of the fear of contagion. Fear is understandable, however, responding to the pandemic is intrinsic to the contract between the healthcare professional and society so that their expertise is available to respond to the outbreak (Dhai et al., 2020). It is imperative that the HPCSA formulates ethical guidelines for its practitioners that are specific to pandemics and include professionalism and duty of care. In addition, these guidelines need to include the ethical approach for priority setting and triage.

The HPCSA's ethical guidelines on Withholding and Withdrawing of Care does not address the pandemic situation where justifiable trade-off will have to be made and beneficial care denied to some patients because of resource constraints. Most of these decisions involve the allocation of medical interventions, such as hospital beds, medications, Intensive Care Unit (ICU) admissions, ventilators, and other medical equipment. In line with the principle of utility, allocation of scarce resources must take into consideration inter alia appropriate risk-taking, the futility of treatment, co-morbid conditions, and other relevant factors (South African Medical Association - SAMA, 2020). The Critical Care Society of South Africa (2020) has provided guidelines for ICU admission and ventilator support and uses the Clinical Frailty Scale and the Sequential Organ Failure Score to prioritise care. The guidelines have been endorsed by the SAMA, which has also developed a comprehensive set of ethical guidelines for its members. However, these guidelines are not binding in that they do not have the quasi-legal standing of the HPCSA's regulatory guidance documents. It will be left to the particular health facility on how it approaches priority setting and triage, and this may not always be in the best interests of patients and society. It is therefore imperative that national binding guidance in this context is made available as a matter of urgency.

The rights to consent and confidentiality, regarded by many as the cornerstone of ethical practice in healthcare are governed by the Bill of Rights of the Constitution, the National Health Act, the common law, the HPCSA ethical rules, and the Patients' Rights Charter. In terms of the Constitution, these two rights can be limited if reasonable and justifiable. The National Health Act can also limit these rights when faced with a public health threat. Because COVID-19 poses a risk to the broader community, it has been declared a notifiable disease in terms of Regulation 12 of the Regulations Relating to the Surveillance and Control of Notifiable Conditions (Government Gazette, 2004). Added to these are regulations relating to the surveillance and the control of notifiable medical conditions (Government Gazette, 2017). It is also subject to extensive regulations under the Disaster Management Act (Government Gazette, 2002), so as to control the spread of the disease throughout the country.

Ethical issues in the health research context

The duty of the South African health authorities is to protect the health of all those that live in the country. This includes rapidly responding to public health emergencies with information that is current and up to date. Critical to the COVID-19 response is health research that is timely and responds to the uncertainties about the pandemic, its effects, and its aftermath. Evidence-based interventions, including diagnostic tests, treatments, vaccines, and management practices are

essential. While protection of research participants, in particular, those that are highly vulnerable during the emergency cannot be circumvented, it is necessary to devise processes for rapid ethics review so that ethical research can be conducted in a judicious and well-timed manner. Rapid review does not mean lowering ethical safeguards. Research Ethics Committees (RECs) would need to fast-track the review process while at the same time ensuring a rigorous ethics review (Pan American Health Organisation and World Health Organisation - PAHO - WHO, 2020). Furthermore, the global rush to understand the virus and develop treatments and a vaccine have given rise to large numbers of research ethics applications specific to COVID-19. RECs in South Africa are at present under tremendous pressure. The NHRC, whose mandate it is to determine the health research priorities in the country, is currently in limbo as the term of the last NHRC came to an end in 2019, and the new NHRC has not as yet been established. This means that there is no committee to determine South Africa's COVID-19 research priorities. Of note, in identifying health research priorities, the NHRC must have regard to the burden of disease; the cost-effectiveness of interventions aimed at reducing the burden of disease; the availability of human and institutional resources for the implementation of an intervention at the level closest to the affected communities; the health needs of vulnerable groups and the health needs of communities (sec 70 National Health Act). It is imperative that the NHRC is constituted and it as a matter of urgency determines the COVID-19 health research priorities. For example, there has been a call for responsible stewardship of the Bacille Calmette-Guérin (BCG) Vaccines in the context of the COVID-19 pandemic, with the first priority being given to neonatal BCG vaccinations for all infants in high tuberculosis burden settings. With stock-outs having just been sorted out, it would be of grave concern if much-needed vaccines were channeled to COVID-19 research. It is for reasons like this that the NHRC is necessary to determine country-level priorities in research. Currently, BCG research for protection against COVID-19 is already underway in the country, and pediatricians, amongst others, have raised grave concerns (Schaaf et al., 2020). In South Africa, the Bill of Rights of the Constitution, Section 12 (2)(2)(c), on freedom and security of the person affirms that everyone has the right to bodily and psychological integrity including the right not to be subjected to medical and scientific experiments without their informed consent (South African Constitution – SAC, 1997). The National Health Act (Government Gazette, 2004) defines health research (s1) and stipulates in Chapter 9 that health research ethics committees registered with NHREC must grant approval for health research conditional to the research meeting ethical standards (s73). Section 72 mandates the establishment of the NHREC and lays down its functions which include determining guidelines for RECs (s72(6)(a)) and setting norms and standards for conducting research in humans, including norms and standards for clinical trials (s72(6)(c)). Clinical trials are defined as "a systematic study involving human subjects that aims to answer specific questions about the safety or efficacy of a medicine or method of treatment" (s72(7)). Of note, is that there is no mandate for the NHREC to review health research. Neither is there a stipulation that it should not establish centralised review structures.

The NHREC has established binding national guidelines, Ethics in Health Research: Principles, Processes and Structures (DoH, 2015) as the norms and standards for the conduct of health research in the country. At the time of the COVID-19 pandemic, as indicated earlier, there is no statutory council to guide the process with regard to rapid review, nor a centralised process for review as, similar to the NHRC, the NHREC term had ended at the end of 2019 and a new NHREC has not as yet been appointed. The research ethics community in South Africa recognised COVID-19 research review as a priority that needed to be addressed and on the 24th March, constituted a group, the Research Ethics Support in COVID-19 Pandemic (RESCOP) to address the hiatus. RESCOP is an informal, voluntary research ethics support group. Its 'membership' is currently chairs of RECs, members of the South African Health Products

Regulatory Authority (SAHPRA) and other research ethics role players and interested parties with research ethics expertise. The RESCOP drew from sections of the NHREC guidelines to take forward the rapid review process.

In terms of the guidelines, a major incident is described as any sudden event that occurs where local resources are constrained, making urgent response difficult. Unusual and sudden demands on local resources could have ethical implications for patient care. Research in these contexts could be critical for advancing emergency healthcare interventions and treatments (s3.4.1 of NHREC Guidelines). It is underscored that patients in these contexts would be extremely vulnerable, however, RECs are cautioned not to be overly restrictive and that the ethics clearance process must occur very rapidly with related research proposals being rapidly processed without compromising rigour. For example, minimal risk studies could undergo rapid expedited review, while more than minimal risk studies could undergo rapid full committee review. Therefore, RECs need to be innovative and develop rapid review processes in line with DoH (2015) (s 3.4.1 of NHREC Guidelines).

With regard to consent in major incident research, the guidelines make allowance for proxy consent and delayed consent where the patient is incapacitated. However, there are no guidance points on what to do with the data that has been collected should the patient die and no proxy is contactable, which is likely to be the case for several of these patients. Minimum conditions for research involving adults who are incapacitated are described (s 3.2.4.4 of NHREC Guidelines). Section 4.5.1.4 of the Guidelines allow RECs to recognise prior review and approval by another registered REC at their discretion to avoid duplication of effort. Where two or more RECs recognise each other's prior review, this is termed "reciprocal recognition". It is for the REC to determine the nature of the documents to be filed locally. At a minimum, this should include a copy of the approval letter from the other REC. The decision to recognise prior review and approval may be revised by the REC if justifying circumstances arise for such revision. The reasons for such a reversal of decision will need to be documented.

RESCOP in principle supports the rapid review and recognition of prior review by another REC as per the NHREC guidelines, provided that the rights and interests of research participants are safeguarded, and that national and international ethics norms and standards are adhered to at all times. RECs are advised to develop standard operating procedures for rapid review of health research where indicated. If RESCOP is requested to advise on the ethics of clinical trials and other COVID-19 related research, a possible process to be followed is outlined below:

1. RESCOP could advise on and track the rapid review process;
2. For multi-site, multi-institution proposals, the primary rapid expedited or rapid full review (depending on risk level) will be conducted by the institutional REC of the National Principal Investigator (PI) of the study in question;
3. The rapid review should take at minimum 48 hours for a minimal risk study and ideally no longer than 72 hours for a clinical trial;
4. The primary REC or PI may consult RESCOP for informal advice;
5. The National PI may share the review outcome of the review to RESCOP;
6. The REC's concerns, comments, and recommendations may be reviewed by RESCOP and the National PI;
7. On request, RESCOP is available to support and advise the National PI and local PIs and related RECs during this process as and when the need arises.

RESCOP (Appendix B) took the step to 'self-regulate' within the constraints of the binding national guidelines as a priority response to ethics review of COVID-19 research projects like the Solidarity Trials from WHO. However, a recommendation is that the NHREC is duly constituted and that it develops policy/ regulations on rapid review in emergencies as a matter of urgency.

Financial / Economic Implications

What started as a 'Chinese virus', according to the President of the United States of America, Donald Trump, then Italian problem (Baldwin and Mauro, 2020), has undoubtedly become a global 'crisis'. Some countries downplayed the severity of the COVID-19 pandemic until they were compelled by the exponential rate of transmission to take containment measures. These measures include social distancing regulations, closing down of borders, and limiting the movement of persons - inter-country/ or city (that is, lockdown). This inexorable pandemic has led to economic difficulties, especially for the middle-class and the poor; and thus necessitates swift policy reactions (Nzimande, 2020). This point is stressed by the International Monetary Fund (IMF). They suggest that, while economies are shutdown, lawmakers need to ensure that people are able to satisfy their needs and that businesses can pick up when the acute period of the pandemic has passed. However, at this stage, it is difficult for policymakers to develop appropriate policy responses given the uncertainty about the trajectory and duration of the pandemic (McKibbin and Fernando, 2020).

Whilst the national lockdown is necessary to flatten the infection curve, the economic consequences associated with it will be severe and it remains uncertain how, and how long our economy can withstand the resulting economic hardships. South African households and businesses, particularly small businesses, are already showing signs of distress. Small businesses play a crucial role in the country's economy. For instance, Kongolo (2010) argues that Small-Medium Enterprises (SMEs) accounted for 91% of the formal business entities, contributing more than half of GDP, and providing about 60% of the employment. Therefore, their significance in the country's economy requires substantial support from both government and financial institutions. To this effect, government continues to give the required assistance in various forms: loans, grants, and debt restructuring to both formal and informal businesses. However, in an online meeting on 28th April 2020, the Minister of Small Business Development, Khumbudzo Ntshavheni, reported that the amount set aside to small business relief scheme is not adequate and is depleting faster given the number of businesses seeking financial support. To date, the scheme is reported to have aided 665 businesses, which resulted in the salvation of about 10 000 jobs (Omarjee, 2020).

In an effort to diminish the effect of 'lay-offs' due to the coronavirus outbreak, the UIF established a special *COVID-19 benefit*[1] (COVID-19 Temporary Employer / Employee Relief Scheme - TERS scheme) that will support employees whose employers are incapable of paying their wages. Hitherto, UIF has reportedly paid approximately 1 035 303 workers COVID-19 relief benefits amounting to over R4 million. This will allow those who lost their jobs/ incomes to continue supporting the economy, themselves, and their families through consumption (Gruber, 1994). Although this may not be sufficient, it will assist a great deal in reducing the multiplier effect resulting from the loss of income. In addition to the COVID-19 TERS scheme, the government introduced the *COVID-19 Social Relief of Distress Grant* (COVID-19 SRoDG) to assist people who are beneficiaries of any form of a social grant or UIF. The beneficiaries will

[1] The scheme only pays 33% rather than full salary.

receive support of R350 a month for 6 months. In a country where unemployment is almost 30%, this grant will assist a great deal. Other support provided by the government to ensure that people continue to meet their basic needs under the lockdown includes: an increment in child support grant by R300 in May 2020 and from June to October beneficiaries will receive an additional R500 each month; while other grantees such recipients of the old age grant will receive an additional R200 each month. These increases will help thousands of families whose only source of formal income is a social grant.

South African financial conditions have tightened significantly since December 2019 and the situation as shown in Figure 3, has worsened since the outbreak of COVID-19. This threatened to unleash a risky macro-financial shock feedback loop that, if left unattended, would have put at risk the South African Reserve Bank's (SARB) price stability mandate and imperiled financial stability. Therefore, to ensure that what started as a health emergency does not turn into a financial crisis, a swift policy response was needed.

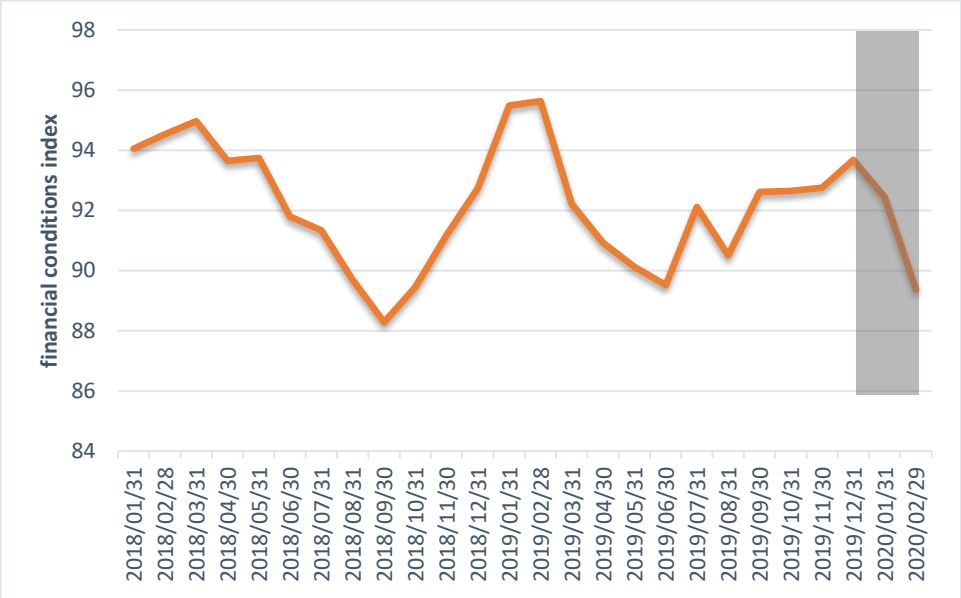


Figure 3: Graph showing South Africa's financial conditions based on the Quantec online database

The required action had to be guided by two overarching objectives (European Central Bank - ECB, 2020):

- Restoring the orderly function of the South African financial market, which like every other market, suffered from an unusual degree of volatility, fast de-risking, and thin liquidity conditions;
- Supporting firms and households in shouldering the significant economic and social costs that this crisis would inflict.

In line with the second objective, the Monetary Policy Committee (MPC) of SARB, reduced policy rates by 100 basis points, which took the repo rate to 4.25% per annum. This will ease the pressure on South African consumers and firms, which are already burdened. In addition to the deployment of monetary tools, particularly policy rate, the "prudential authority will support the banking system in response to the needs of banking customers" (SARB, 2020). The support will take the form of "capital relief on restructured loans that were in line with the first objective mentioned above" (SARB, 2020).

Despite the initiatives implemented by governments across the globe to boost economic activity, recessions/ or economic downturns are inevitable. IMF (2020) posits that the speed and extent of the 'expected' economic collapse will be unlike anything that has been experienced in our lifetime. The global economic growth is expected to contract by 3% (6 percentage points lower than the January estimates). This renders the 'Great Lockdown' the worst recession since the Great Depression, and far worse than the Global Financial Crisis of 2007/09 (see Figure 4). Gourinchas (2020) argues that flattening the infection curve comes at the expense of 'steepening' the macro-economic recession curve. The situation could be even worse for South Africa. The country faced an additional challenge with unparalleled capital reversals resulting from the waning risk appetite due to the recent sovereign credit rating downgrade. Moreover, the country entered this crisis in a vulnerable state with sluggish economic growth and high public debt, therefore limited fiscal space to support its weak health systems. What is everyone's concern now, is the extent to which the economy will be affected. Current forecasts by various institutions such as the Business for South Africa, IMF, National Treasury, and SARB suggest that the economy could contract by between 5% - 7%; this would be six to eleven times more than the 2008 economic contraction. This could result in unemployment levels rising to over 50%. On the other hand, the South African Revenue Services (SARS) Commissioner, Edward Kieswetter, warns that the imminent business closures and job losses, among others, could result in about R285 billion loss in tax revenues. Although there is still a lot of uncertainty about the actual impact this crisis may have, what is crystal clear is that we should not be myopic in our approach; we should start thinking about life after the pandemic and, most importantly, think of how long our economy can withstand the lockdown.

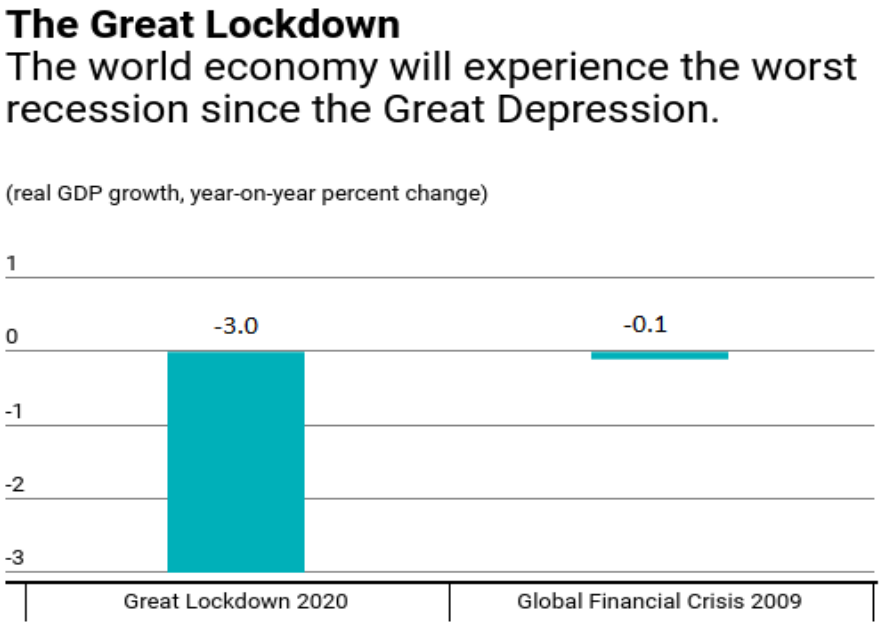


Figure 4: Graph showing a comparison between the 'Great Lockdown 2020' and the 'Global Financial Crisis 2009' (IMF, 2020)

As a consequence of the above, it is argued, in line with the IMF, that the government has to prioritise measures that are consistent with its medium-term development needs. For example, South Africa has been, for a long time, battling with the widening of the income gaps amongst its population. The recently designed COVID-19 Social Relief Programme can be strengthened by increasing its coverage and targeting. Because the propensity to consume is generally large for the most vulnerable (Carroll et al., 2017), effective targeting can aid in boosting and getting

the economy back to life after the pandemic (IMF, 2020). In this way, the government would be killing two birds with one stone, that is, addressing its developmental needs while, on the other hand, dealing with the present and future economic impacts of the pandemic. Moreover, more people will be out of jobs post the crisis and therefore, poverty and inequality levels will undoubtedly mount to new highs. Therefore, if the programme is continued after the crisis, it will go a long way towards ensuring that poverty and inequality do not rise as much.

Lately, pandemics have become more frequent than ever before, but countries, especially the developing economies such as South Africa, are always ill-prepared. This manifests the slackness in government planning and priority setting. As pointed out earlier, COVID-19 caught us at our weakest point when our economy is already struggling in terms of growth, unemployment, and soaring sovereign debt. One way of ensuring that a country is better prepared for any economic shock is to have fiscal space. Unfortunately, South Africa and nearly all other African countries, do not have space, and their response to shocks is constrained (Nzimande, 2020; Nzimande and Ngalawa, 2019). The lack of fiscal space could partly be ascribed to the 'rigid' and in most cases, 'politically motivated' government programmes. After the realisation of the importance of fiscal space to respond to a crisis, most economies, adopted fiscal rules whose aim is to enforce numerical restrictions on fiscal aggregate, thus controlling government finances. This adoption of numerical restrictions has proved useful to create space in other parts of the world (Budina et al., 2012). It is for this reason that South Africa ought to seriously consider the adoption of fiscal rules so that is can always be in a position to efficiently react to future crises and thus keep its economy afloat in challenging times (Siebrits and Calitz, 2004).

Whilst this may seem radical, this could be the right time to resort to the proposal put forth by Wray (1997). He suggests that the government should be the employer of the last resort. This basically implies that instead of relying on implicit policies of employment, the government provides jobs to anyone willing to work at a minimum wage. In this manner, there will be no involuntary unemployment - and those who are not keen to accept the minimum wage can be ignored by the employment policy. Aspromourgos (2000) advises that this should, however, not be regarded as the typical public sector employment but rather residual employment, such as community works, environmental works, etc. contingent on the preferences of the society. In South Africa, this is closely related to the Expanded Public Work Programme (EPWP) - except that this would need to be run more efficiently than the EPWP. This proposal could work better in the country, which has been battling with unemployment for a long period. It will also go a long way in alleviating the expected rise in the unemployment levels. Furthermore, it will absorb the current crop of graduates, who are more likely to be without jobs due to the expected economic slowdown. However, we must caution that such interventions may have an impact on the public wage bill and in turn on government's budget and the allocation thereof to the various sectors. This highlights the need to prioritise the development of an entrepreneurial ecosystem in which schools and universities will play an extremely important role in developing and delivering both short courses and research within the entrepreneurial space. Both the online and residential entrepreneurship short courses for undergraduates and graduates offered by the SATN are good examples of programmes that be rolled out throughout the country in a short period of time to reboot the economy.

Food security

The term 'food security' has been defined by various authoritative international bodies in slightly differing manners, but for the purpose of the current report, the WHO (1996) definition, incorporated from the World Food Summit as part of the Declaration on World Food Security may be appropriate to provide a holistic view of the impact of COVID-19 on food. In terms of

this definition, food security is commonly understood as the state when all people, at all times have physical, social and economic access food to meet their dietary needs and food preferences for an active and healthy life, and that such food should be safe, sufficient, and nutritious.

Furthermore, the WHO (1996) states that the above-mentioned aspects of food safety, nutrition, and food security are inextricably linked. Broader definitions have, however, delineated aspects of accessibility, affordability, and availability of food (Food and Agriculture Organisation - FAO, 2006). In order to delineate the various disciplines and for the purposes of the current report, the mentioned categories are demarcated into food safety, food supply, and nutrition. A number of reports have been published delineating the impact of the COVID-19 pandemic on these sectors, concluding that the impact on these sectors is potentially significant, both in terms of its impact on ensuring sustained food supply, as well as the role of food utilisation and consumption, and as an infection transfer agent.

A critical question that confronts a nation during such a pandemic is how the virus is transmitted, including whether there is direct and indirect transmission. Another question is whether the virus can be transmitted via both food and water, considering that there are many viruses known to be food- and/or waterborne. These include Norovirus, Hepatitis A (HA), and Hepatitis E (HE) viruses. Some of the food- and/ or waterborne viruses can also be transmitted directly from person-to-person via close contact.

The food industry is of particular concern considering that it relies heavily on extensive human activity throughout the food chain, that is, from farm to fork. Transfer, either amongst individuals or between handlers and foods, may potentially occur through infected food handlers at any stage of the food chain, ranging from farm and agricultural practices to processing, logistics, storage, and ultimately retail and foodservice (FAO, 2020a). Water safety cannot be ignored, considering that water is used extensively in the food industry for irrigation of crops and further down the supply chain, for food processing. Its role in potentially contaminating food must, therefore, be considered against the backdrop of the broader epidemiology.

Food Safety

Food as a vector of transmission

The COVID-19 pandemic has resulted in a number of countries conducting an early risk assessment on whether food, food contact materials, and food packaging pose a potential food safety risk. Considering that much was unknown about COVID-19 on its survival in food, on food contact materials, or food packaging at the beginning of the pandemic, scientists typically turned towards what is known about similar viruses. These included SARS-CoV-1, MERS and human coronaviruses that cause the common cold (Lai et al., 2005; Otter et al., 2016; Azhar et al., 2019; Food Standards Agency of the United Kingdom - FSA, 2020; French Agency for Food, Environmental and Occupational Health and Safety - ANSES, 2020). Whilst it is acknowledged that there are significant data gaps, a conservative estimate of risk can be made, using a team of experienced food safety experts. Such a risk assessment allows for intensive perusing of literature and interrogation of that information, in order to develop an important interim and pragmatic guidance to both policymakers and the public. It is fully accepted and expected that such guidance is updated as novel information emerges.

Thus far, the general consensus, according to authoritative literature, is that no evidence exists that COVID-19 is a food safety risk (ANSES, 2020; Food and Drug Administration of the USA - FDA, 2020; FSA, 2020; Food Safety Authority of Ireland - FSAI, 2020; Food Standards

Australia New Zealand - FSANZ, 2020). It is, therefore, not regarded as a foodborne virus and remains primarily a respiratory virus, which can also enter the bloodstream via mucosa in eyes (Colavita et al., 2020). ANSES (2020) was one of the first food safety agencies to conduct a risk assessment on the potential food safety risk associated with COVID-19, the first version of which was published on 9th March 2020. A number of questions were posed to the expert panel, including the likelihood of contracting COVID-19 from ingesting the virus and inhaling the virus while eating food. The former consideration was based on the fact that researchers in China found viral genetic material in anal swabs and blood taken from 178 patients, even after the virus was no longer detected in oral swabs (Zhang et al., 2020). Furthermore, a less frequent symptom that some patients may experience is diarrhoea. Both these matters raised the question as to whether the virus could be transmitted via the faecal-oral route. However, there are currently no reports of infection via this route, therefore, the conclusion arrived at is that whilst such transmission is possible, it is highly unlikely in practice considering that persons in the food industry have been practicing washing and sanitising hands for decades within Food Safety Management Systems. In addition, it is widely accepted that diarrhoea is caused by the virus infiltrating the body during the severe stage of the illness, rather than the virus being contracted from ingestion of contaminated food, via the intestines (Amirian, 2020; Lamers et al., 2020; Wadman et al., 2020; Wang et al., 2020; Xiao et al., 2020).

Although there is little authoritative evidence that COVID-19 can be transmitted by food or food packaging, recent research on different surfaces reported that the virus can remain viable for up to 72 hours on plastic and stainless steel, up to four hours on copper, and up to 24 hours on cardboard (Van Doremalen et al., 2020). Therefore, the greatest risk remains person to person transfer, both amongst processing plant workers, between customers purchasing food and between the customer and retail worker. Transfer via contaminated surfaces is possible considering survival rates of the virus, particularly when one touches mouth, nose, and eyes without washing hands.

Processing parameters and effects

Whilst authoritative data on cooking temperatures that kill SARS-CoV-2 are lacking, previous studies on SARS-CoV-1 showed that 60°C for 30 minutes killed the virus in a protein-rich environment (Rabenau et al., 2005). ANSES (2020) considered this matter in their risk assessment and concluded that a temperature of 63°C for 4 minutes would be effective to kill the virus in food. Furthermore, the FSA (2020) acknowledges that exposure to heat, particularly temperatures used for cooking should be sufficient to inactivate any virus present in food.

On refrigeration and freezing and whether either of these storage conditions would destroy the virus, Rabenau et al. (2005) found that for SARS-CoV-1, there was no loss of infectious titre at 4°C, which is generally considered refrigeration temperature. Kampf et al. (2020) showed that endemic human coronavirus strain 229E, can remain infectious from 2 hours up to 9 days, whilst a higher temperature such as 30°C or 40°C reduced the duration of persistence of the highly pathogenic MERS coronavirus and veterinary coronavirus. Furthermore, the veterinary coronavirus could survive on surfaces for over 28 days at 4°C. Considering that generally, freezing is not regarded as a destruction step for viruses in food, it is likely that COVID-19 would not be readily destroyed in food at refrigeration temperatures and would survive freezing.

Food Supply

It is broadly acknowledged that any similar crisis, whether due to a biological agent, such as the COVID-19 crisis or due to a financial crisis, such as the recession in 2009, sends a shockwave

through food systems (FAO, 2020a; FAO, 2020b). These shocks are manifested in different ways, but they all ultimately affect the health and wellbeing of a population. A protracted pandemic crisis could rapidly put a strain on food supply chains, which are a complex web of interactions involving farmers, agricultural inputs, processing plants, shipping, retailers and more (FAO, 2015; FAO, 2019a; FAO, 2020a).

The COVID-19 pandemic has already seen some trends that are likely to impact both the formal and informal contexts. The primary challenge with food and COVID-19 is that labour issues from farm to fork may culminate in absenteeism, lower production, price hikes, and loss of income. As a result, the food sector is increasingly resorting to negative coping strategies such as dumping, panic buying, stocking lower grade products, or re-allocating resources toward primary risk mitigation rather than quality assurance. The food industry also has to mitigate adaptive consumer trends such as avoiding gatherings - these culminate in online buying and doorstep-delivery, avoiding restaurants and events, reverting to informal supply rather than retail in rural and marginal-urban settings. The sector has also seen reduced movement and trade between countries and sectors. Countries should, therefore, strike a balance between the need to keep production going to avoid food shortages and the need to protect the workers (FAO, 2020a). This necessitates a novel way of food risk categorisation and resource allocation.

Some reports have claimed that COVID-19 may disrupt formal and informal food chains, logistics and supplies, potentially doubling global food insecurity and chronic hunger by the end of 2020. At 135 million, the number of people in crisis or worse in 2019 was the highest in the four years of the existence of the Global Report on Food Crises (World Food Programme - WFP, 2020a). WFP (2020b) reported that an additional 130 million people face acute hunger by the end of 2020 due to the COVID-19 pandemic, bringing that total to 265 million people. The death toll due to acute hunger as an indirect consequence of COVID-19 may exceed that of direct COVID-19-related deaths.

Food security and agricultural policies are key to enabling countries to fight viral epidemics and the impact on food supply chains, by ensuring the normal functioning of the international and national agricultural and food supply chains (Committee on World Food Security - CFS, 2020). In addition to saving lives and meeting immediate needs through emergency responses, countries need to start planning for longer-term solutions to support recovery, strengthen preparedness, build resilience in the food supply chain and promote sustainable socio-economic development (CFS, 2020).

Vulnerable populations

The poorest and most vulnerable populations are more seriously affected by such shocks in the food system as they have fewer resources to cope with the loss of jobs and incomes, the increase in food prices, and the instability of food availability (FAO, 2020c). The most vulnerable groups include the urban poor, inhabitants of remote areas, migrants, the informally employed, people in conflict areas, with co-morbidities and compromised health. The COVID-19 pandemic is already affecting food supply systems to such populations directly through impacts on food supply and demand, and indirectly through decreases in purchasing power and the capacity to produce and distribute food. While food producers may still see demand for their production, disruptions to agri-food supply chains and markets may make their livelihoods less secure. These declines in income have direct implications for people's access to food (FAO, 2020c). Additional trends that have emerged that impact supply chains to vulnerable communities, in particular, include the reduction or halting of feeding schemes, limiting aid worker assistance, and regulators being under-staffed and under-resourced.

FAO (2020a) states that the immediate needs of vulnerable populations must be met in pandemics such as the one we are currently facing, as follows:

1. Provide emergency food assistance and nutrition interventions;
2. Enhance safety nets and make them more accessible;
3. Ensure urgent increases in food availability from smallholder farmer food production;
4. Make temporary adjustments to trade and tax policies to improve the efficiency of trade facilitation; and
5. Manage macro-economic implications.

Nutrition

Reports agree that poor nutrition weakens the immune system and jeopardises the body's ability to fight the COVID-19 infection. In a recent study by Guan et al. (2020), the authors concluded that patients with comorbidity of malnutrition (under and over), in addition to hypertension, diabetes, smoking status, and malignancy, yielded poorer clinical outcomes than those without. The research aligns with similar reports that COVID-19 is especially lethal to people suffering from chronic or acute hunger or malnourishment. This is especially prudent in Africa with the highest percentage of undernourishment globally affecting over 20% of the population (FAO, 2019a). Similar outbreaks of coronavirus, such as in Ebola, has seen the survival rate of patients affected by the preceding nutritional status (baseline nutritional health) of patients.

Food distribution programmes are often the only meals available to poor communities, but the usual systems of handing out food parcels and supplies have increased the risk of spreading coronavirus among such particularly vulnerable populations (FAO, 2019b). Although reports suggest that children generally present milder symptoms; research is lacking on the effect on cases of prevalent child stunting, wasting, and micronutrient deficiencies. This predicament is also expected to deteriorate further in the coming months due to the socio-economic impacts of COVID-19 (UNICEF, 2020). A decline in dietary quality in low- and middle-income countries due to halting of school feeding programmes and the implosion of food markets is furthermore expected due to the COVID-19 pandemic, exacerbated by healthcare failures, as already-strained healthcare systems are required to divert resources from nutritionally important functions toward combating COVID-19. These include antenatal care, micronutrient supplementation, and prevention and treatment of childhood diarrhoea, infections, and acute malnutrition.

Diet-wise, the COVID-19 pandemic is likely to cause declining demand for vegetables, fruits, and animal-sourced foods, which are the main sources of essential micronutrients in diets. Declining purchasing power will inadvertently cause poor people to buy the cheapest calories they can find to feed their families. The fact that most nutrient-rich foods are perishable leads to attempts to deliver and acquire products with simpler supply chains, increasing availability to non-perishable staple foods and further compounding the tendency toward poor-quality diets. Another trend that has been developing is the switching of mothers to breastmilk substitutes due to concerns about passing the coronavirus to infants through breast milk, and reversing years of awareness programmes on breastfeeding promotion.

Responsive strategies

Headly and Ruel (2020) suggest the following approaches to curb the role of malnutrition, as part of the larger food system, in the COVID-19 predicament. Under the normal South African food supply chain, these strategies were, without exception attended to with varying successes. For example, prior to lockdown the country has had quite well-developed school feeding

schemes attending to approximately 4 million learners daily. Also, water and sanitation have received notable attention with attempts to establish running, clean water, and adequate sanitation infrastructure in recent years, especially in rural areas. However, going forward the listed strategies should be seen as a value chain rather than optional priorities, and an innovative reconsideration of these strategies is required:

1. Keep agri-food systems functioning;
2. Facilitate food system innovations;
3. Support enhanced homestead and informal food production to increase access to nutrient-rich vegetables, fruits, and eggs and improve diet quality;
4. Find innovative ways to stimulate demand for nutrient-rich foods;
5. Use social safety net programmes to improve dietary quality, not just quantity;
6. Prevent the collapse of basic maternal and child health services;
7. Invest in water, sanitation, and hygiene (WASH) programmes;
8. Ramp-up support to community-based management of acute malnutrition;
9. Protect women and children;
10. Set up or scale up food and nutrition surveillance systems.

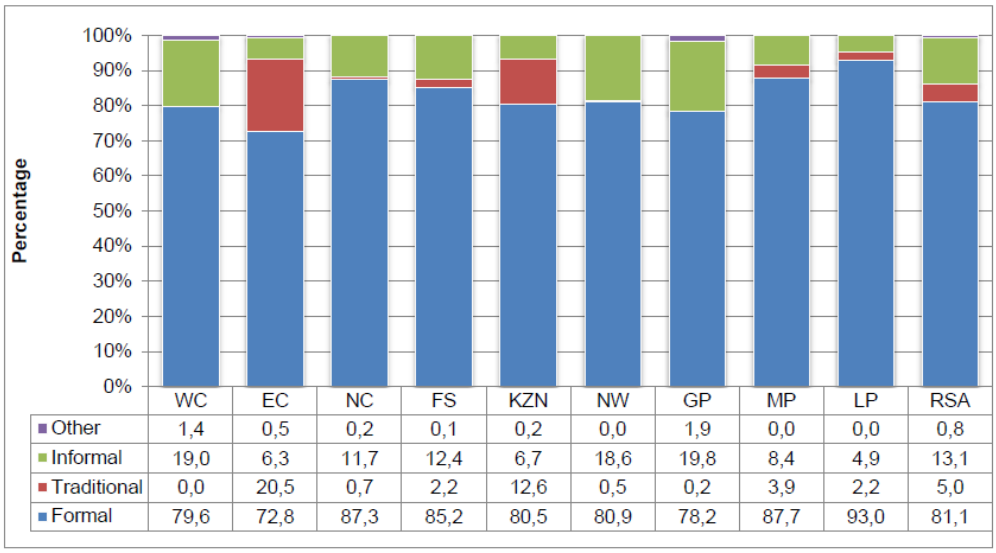
Living/ housing conditions

Earlier discussions have revealed that in the South African context, and this is certainly the case in most developing countries, housing densities (specifically in informal settlements that do not have proper services and facilities) pose serious challenges to curb the spread of the virus. Specifically, South Africa has a backlog in a range of services (including energy, water and sanitation, refuse and waste removal, and housing structures) for residents in communities that differ considerably in relation to socio-economic status and geographical location. Several researchers have highlighted service delivery challenges (discernible in relation to the spate of service delivery protests in the country) which are attributed to a number of factors including (Chikulo, 2016; Kumar and Reddy, 2019; Olojede et al., 2019):

- Persistent widespread poverty and increasing demand;
- Lack of resources and financing;
- Disjointed coordination to ensure successful project implementation;
- Mismanagement and corruption.

Housing densities and environmental factors are important to consider since they create the conditions for COVID-19 (and other illnesses) to spread. The population density challenges have been a key factor in imposing restrictions to attempt to reduce person-to-person contact. Government also seems to have prioritised security personnel to 'high risk' areas to ensure social distancing protocols are adhered to where higher levels of non-compliance are discernible.

In terms of housing types and ownership, Statistics South Africa (2018) indicates that 81.1% reside in formal dwellings, 13.1% in informal dwellings, 5% in traditional structures and 0.8% in other types as shown in Figure 5 below. Slight differences among the provinces are noticeable. The information gathered by Statistics South Africa which includes tenure status is inadequate given that it fails to unpack the densities in specific communities. The types of housing structures need to be further disaggregated to provide the type of information required to effectively plan for the pandemic and similar disruptions in the future.



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Other	1,4	0,5	0,2	0,1	0,2	0,0	1,9	0,0	0,0	0,8
Informal	19,0	6,3	11,7	12,4	6,7	18,6	19,8	8,4	4,9	13,1
Traditional	0,0	20,5	0,7	2,2	12,6	0,5	0,2	3,9	2,2	5,0
Formal	79,6	72,8	87,3	85,2	80,5	80,9	78,2	87,7	93,0	81,1

Figure 5: Percentage of households that lived in formal, informal and traditional dwellings per province in 2018 (Statistics South Africa, 2018). WC: Western Cape, EC: Eastern Cape, NC: Northern Cape, FS: Free State, KZN: Kwa-Zulu Natal, NW: North West, GP: Gauteng, MP: Mpumalanga, LP: Limpopo Province, RSA: Republic of South Africa.

Service delivery has remained a challenge in South Africa despite several policies that have been geared towards the provision of low-income housing as well as providing basic services to all which is enshrined in the Freedom Charter and The Constitution: "everyone has the right to have access to adequate housing". Additionally, The Constitution indicates that "the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of this right". The intentions are commendable, however, as is the case in relation to most policies, implementation poses several challenges. The pandemic has highlighted that the service delivery and housing backlogs/ provision types have created the ideal conditions for the spread of the virus. Additionally, current responses (specifically the increase in water provision and sheltering the homeless) may have the unintended consequence of creating conditions for the spread of the COVID-19 virus and other diseases as well as discussed in this section.

Most people in South Africa live in high-density environments, both in relation to the close proximity of homes in informal settlements, townships and multiple dwelling structures (flats/ apartments) which as highlighted earlier makes it impossible for social distancing protocols to be complied with in many contexts which include communities/ neighbourhoods as well as within homes. Statistics South Africa (2018) indicates that there are 16 671 000 households in South Africa, with 37.9% of these households being female-headed. The gender vulnerabilities therefore also need to be considered. Furthermore, Statistics South Africa (2018) notes that household projects are not reducing the percentage of households in informal dwellings which are deemed to be extremely vulnerable spaces. This could be attributed to population growth and migration to urban areas that are perceived to have greater economic opportunities.

In relation to housing, it is important to examine the impacts of the pandemic on housing demand and homeownership. Lockwood (2020) from the Centre for Affordable Housing Finance in Africa notes that the housing construction sector can have positive impacts in response to the COVID-19 pandemic in South Africa linked to the economic value chain for residential construction associated with the dire need to increase government's subsidised housing

programmes as well as urgently upgrade informal settlements, which are viewed as major breeding grounds for the spread of the virus. Numerous municipalities advocate for high-density low-income housing provision to deal with the housing backlogs. This approach may need to be revisited post the pandemic since it creates higher vulnerabilities among already susceptible populations. Additionally, many poor South Africans reside under insecure tenure conditions, including rental arrangements. Relief income packages and increases in social grants are likely to assist vulnerable populations that are beneficiaries. In terms of South Africa's response, however, there has been general silence on how to assist the many international migrants and illegal immigrants who we know reside in South Africa. As Ekambaram (2020) states, thousands of people in South Africa are excluded from the COVID-19 government relief programmes because of their legal status. There seems to be no legislation that guides responses when persons cannot travel back to their countries and therefore they require assistance in South Africa.

Our response to the pandemic is an opportunity to rethink housing provision strategies that have generally failed to meet the demands of the poor and have placed many in vulnerable residential environments. There is therefore an urgent need to review housing as well as urban and rural policies to improve the living conditions and livelihoods of the poor. Even developed contexts are looking at more equitable housing policies and safer environmental living conditions for the poor and marginalised, including the homeless. Housing the homeless has also emerged as a major challenge in South Africa with thousands being housed in shelters, stadiums, makeshift/ temporary facilities, etc. Concern is raised over the number of people in these facilities as well as whether the living conditions are conducive to the spread of the virus. Thousands of rooms are empty in accommodation facilities due to travel restrictions yet we do not have a legislative mechanism to mandate a more humane response in how we deal with and perceive the homeless in society. Many accommodation facilities are willing to house health workers as part of their philanthropic response but few have made their facilities available for the homeless.

While the part of the pandemic management strategy is to identify and manage 'outbreak hotspots', it is important to recognise that this can only be effective if mobility in and out of these 'hotspots' are controlled. The structure of households in South Africa (where persons can belong to multiple homes) can pose serious challenges in this regard which are already being experienced in relation to managing travel associated with funerals in the country. Thus, in the context of the COVID-19 pandemic, another housing aspect that needs to be considered is membership in multiple households (generally where people work in urban areas but have family members that reside in rural areas) and high levels of population mobility in sub-Saharan Africa. As Cassels (2020) states, mobility in sub-Saharan Africa is complex and includes circular migration, rural-urban migration, and counter-urbanisation. This has been a major source of transmission of HIV/AIDS in South Africa and will likely be a greater challenge in relation to the COVID-19 pandemic given how much easier the virus spreads. Highly mobile populations tend to be at a higher risk of acquiring the virus and transmitting it. Mobility associated with work patterns and household structures needs to be carefully managed as lockdown restrictions are eased.

Of concern for the future, as highlighted by Statistics South Africa (2018), is that household growth is outpacing population which is an important consideration since households are the basic unit of service delivery. Thus, the increased number of households are likely to worsen service delivery backlogs. It is also important to note that while water provision may have increased substantially, these are generally in the form of water tanks for more remote areas which are not a long-term, sustainable solution to address the backlogs. Additionally, in relation to service delivery, specific types of services (mainly water and sanitation provision) have gained

prominence and future research is required to examine what the impacts were on other types of services such as road and transport infrastructure as well as energy provision where persistent problems prevail.

The pandemic has triggered massive efforts to ensure service delivery, especially to provide water to unserviced areas. This is the primary focus linked to ensuring hygienic conditions to curb the spread of the virus, especially having water and soap available to wash hands regularly. However, there seems to be a limited focus on understanding the value chain in its entirety, especially where water tanks are being used and the proper facilities for waste and sanitation management are not in place. The improper disposal of waste (including wastewater and solid waste) results in fostering unhygienic conditions with a concomitant increase in waterborne diseases. Water and sanitation are examined in greater detail later in the report.

The COVID-19 pandemic has highlighted in starkly visible ways the inequalities evident in the housing sector and the environmental conditions under which many South Africans are forced to live and work in. It is important to note that people do not only live in conditions that make them vulnerable to contracting the virus, but this is also the case in relation to working conditions, especially associated with the informal sector and dense townships. Effective development planning in relation to housing provision and delivery of basic services, therefore, is key to create the conditions for the effective management of any disaster and should be the main post-pandemic lesson.

While South Africa's Disaster Management Act (2002) integrates disaster risk reduction to different spheres of government by advocating for a decentralised approach, several limitations emerge when examining the legislation and guidelines from a housing and environment perspective, which include:

- Challenges to implementing policy into practice. This aspect is also indicated by Van Niekerk (2014) who argues that the "implementation of the policy and legislation has not been successful" in the South African context.
- The capacity of local governments to enforce regulations and guidelines.
- Insufficient allocation of resources.

Additionally, the decentralised approach for plans to be developed at provincial and municipal levels further reinforces the assumption that disasters would occur at more localised level rather than at a national (and certainly not a global) level as is the case in relation to the COVID-19 pandemic. The Act does, however, note the importance of adopting a multi-sectoral and multi-disciplinary approach that South Africa has correctly embraced in dealing with the pandemic.

Natural environment

One aspect when considering environmental conditions that need to be examined is the natural resource base itself. South Africa has an impressive conservation track record, underpinned by laudable policies aimed at conserving and protecting the country's biodiversity. Additionally, nature-based tourism is an important contributor to the GDP in many developing countries, including South Africa (Kim et al., 2019; Rogerson and Rogerson, 2020). While the impacts on tourism have been foregrounded in the media, especially with travel worldwide being severely disrupted, these have centred on specific sub-sectors including sport/ events tourism and cruise tourism. As indicated by Dinarto et al. (2020), several tourist locations depend on the tourism sector for job creation and economic growth which is the case in many small towns and suburbs in South Africa.

As discussed earlier, improper disposal of waste can have serious health impacts. Impacts are likely to be felt in relation to the natural environment as well, especially in relation to illegal dumping. The increased consumption of PPE, which is critically important for the frontline workforce, as well as the shift to using products that can be discarded, will also increase waste that needs to be properly managed. Additionally, the widespread and increasing use of hand sanitisers and spraying of disinfectants can have several adverse health effects for humans and the natural environment. Thus, the management of medical and other waste streams during this time is of grave concern. Additionally, there needs to be monitoring in relation to impacts associated with disruptions in waste removal, stopping of recycling programs, increased consumption of single-use plastics and other materials that can be discarded, and online purchases that need to be packaged and transported.

There are three levels of impacts that are associated with the COVID-19 pandemic.

- Direct: these are areas and sectors that are directly impacted by the pandemic such as the healthcare sector, workplace disruptions, closure of businesses, and cancellation/ suspension of events and activities.
- Indirect/ induced: these include impacts that are related to the direct impacts; for example, income or job losses associated with the cancellation/ suspension of an event. Some indirect impacts can be positive; for example, increased opportunities for industries positioned to respond to the demand for PPE.
- De-prioritised impacts: these are impacts on specific sectors and activities as a result of shifting resources to fight the pandemic.

De-prioritised impacts are perhaps a new area to consider since disasters of the magnitude of the COVID-19 pandemic refocuses substantial resources and efforts to manage the impacts and disruptions. From an environmental perspective, it is imperative that re-prioritising resources (such as providing increased social grants and grants for SMMEs) do not undermine efforts to protect the natural resource base and ensure proper management of waste in South Africa. While budgetary re-allocations are required for priority areas, adequate attention needs to be paid to other sectors as well which supports livelihoods and economic growth. The pandemic is wide-ranging in its impacts and therefore a comprehensive strategy to respond to the current crisis and prepare for the future is required. This should include supporting the green economy in relation to green energy provision and PPE production (for example, using recycled materials), as well as waste management adopting the circular economy approach which government advocates. Thus, the current context can generate opportunities for a range of innovations that can have long-term sustainable impacts.

South Africa, and the world in general, need to exercise caution in celebrating the positive impacts of the pandemic on the natural environment. The media has focused almost exclusively on air pollution reductions, unrestricted movement of wild animals, improved quality of waterways, etc. However, scientists have been quick to caution that these gains are likely to be short-lived and levels will revert to normal once disruptions cease. Furthermore, negative impacts are more likely to be prolonged, and consequences dire for numerous households whose livelihoods are tied to the economic activities associated with natural areas (such as ecotourism) and/ or linked to extracting resources (including food) from nature if the integrity of ecological systems are compromised, which can include increases in invasive species and degradation of the resource base if not properly managed.

Water, sanitation and hygiene

Successful pandemic management demands stringent hygiene management. WASH are critical aspects to any community, irrespective of whether they are faced by a pandemic or not. As mentioned earlier, WHO has for some time now urged every country to develop or maintain a national influenza preparedness plan and has provided guidance on the content of such plans (WHO, 2005a). These guidelines focus on a variety of areas, ranging from surveillance and communications to prioritisation of vaccines but do not deal explicitly with sanitation and water management. This may be related to the fact that even though several recent high profile outbreaks such as SARS-CoV-1, MERS, Ebola, and avian influenzas point towards the risks of a deadly viral pandemic, enveloped viruses such as COVID-19 are not considered a major threat for the wastewater and water industries. This is because they are assumed to be present in low concentrations in municipal wastewater and exhibit high susceptibilities to degradation in aqueous environments (Wigginton et al., 2015). Furthermore, while the virus that causes COVID-19 has been found in anal swabs of some patients (Zhang et al., 2020) diagnosed with COVID-19, it is unclear whether the virus found in faeces is capable of causing COVID-19. To date, there are no confirmed reports of the virus spreading from faeces to a person. It is also unclear how much risk there is that the virus could be spread from the faeces of an infected person to another person but this risk is likely to be low based on data from previous outbreaks of diseases caused by related coronaviruses (for example, SARS-CoV-1 and MERS). Certain enveloped viruses are excreted in human faeces during infection and many of these viruses are capable of retaining infectivity for days to months in aqueous environments (Wigginton et al., 2015) and infective human viruses have been detected in wastewater (Hot et al., 2003; Petrinca et al., 2009; Hewitt et al., 2011; Wigginton et al., 2015).

Irrespective of the biological nature of the virus, it is unclear how infection scenarios will play out in informal settlements (slums), which exhibit a number of infrastructural, socio-cultural, and environmental peculiarities in South Africa (Mels et al., 2009). The provision of water and sanitation facilities in informal settlements in South Africa has increased significantly over the last decade but remains basic and largely shared. The high user:toilet and user:washbasin ratios, the frequent failures associated with these facilities and high levels of greywater production within community ablution blocks (CABs) installed in many of these settlements also place community members and the caretakers of these facilities at risk of exposure to potentially contaminated water. Furthermore, open defecation, the absence of infrastructure to direct stormwater and standing water are common features of informal settlements in South Africa. This, together with the lack of water safety practices, education in general health and wellbeing concepts, and overall hygiene will exacerbate the risks posed by COVID-19. Greywater channels, streams of wastewater which in some cases can include sewage waste, run through many low-income communities. Shared toilet facilities are poorly managed and unclean, creating an unsafe and unsanitary living environment. Government has made an effort to make water available to informal settlements (via tanks and trucks) but the irregular and inadequate availability of clean water and sanitising agents (for example, soap and alcohol-based hand sanitiser), particularly within CABs which have been installed in many of these settlements, is a serious concern in the face of COVID-19 or any pandemic.

As alluded to above, a major public health concern in many of these informal settlements which have yet to come to the fore in the context of the COVID-19 pandemic is the inadequate drainage of stormwater, wastewater, and sewage in informal settlements (Jiusto and Kenney, 2016). Informal settlements are also characterised by extremely high household densities, high levels of people movement and contact, shared sanitation, and largely uncontrolled/ unregulated wastewater generation and disposal. The challenges associated with the installation of proper

water and sanitation systems in many of these settlements arise from their location, with many being located on private land, wetlands, and flooding prone areas, having a non-permanent status and/ or are not in close proximity to existing sewerage and wastewater networks (Mels et al., 2009). While at-source domestic wastewater quality assessment methods (Almeida et al., 1999) and decentralised wastewater treatment technologies (Massoud et al., 2009) have been explored for some time now, their suitability to informal settlements particularly in the context of pandemic prevention and management remains under-researched.

The use of wastewater from a range of sources for domestic purposes in informal settlements has also been reported (Kotzé, 2018) but the lifecycle of these wastewater streams and the risks they potentially expose residents of these settlements to are largely unknown. Indirect effects on residents of these settlements can also arise as a consequence of the release of wastewater polluting surface water, which has been reported for South Africa (Edokpayi et al., 2017). The use of wastewater in South African informal settlements for crop irrigation in home gardening and group gardening initiatives (Van Averbeke, 2007) is another potential route of infection (Angelakis et al., 2003). Changes in personal sanitisation practices during a pandemic can lead to a rapid increase in waste generation and if proper disposal routes are not in place it can lead to the potential accumulation of pathogens and organic chemicals in informal settlements (Oron, 2014).

In the event of a major virus pandemic, the authorities responsible for the provision of basic services (water and sanitation), disposal of wastewater and treatment of drinking water would be under increased scrutiny since water in urban environments can represent a potential means of transmission (Hot et al., 2003; Petrinca et al., 2009; Hewitt et al., 2011; Wigginton et al., 2015). These authorities, therefore, need to respond rapidly and make decisions that minimise occupational and public health risks based on the cumulative available evidence. The fate of infective viruses in the urban water cycle and locations of potential human exposure has been relatively well described for the built environment and formal housing settlements (Wittington et al., 2015). However, a large proportion of South Africa's poor resides in informal, non-traditional, dwellings (South African, Housing Development Agency - HDA, 2012). The National Department of Human Settlement's 2009/2010 Informal Settlement Atlas indicates there are 647 informal settlement polygons in KwaZulu-Natal alone, which may explain why many believe this province and informal settlements, in general, could develop into a COVID-19 'hotspot'. Given the alarmingly high levels of poverty and unemployment within these settlements (Muzondi, 2014), it is certain that the number of informal settlements is likely to increase further in the years ahead.

Human and environmental health are inextricably linked and the COVID-19 pandemic is presently showing us that preventing infection can have severe and wide-ranging impacts on the natural environment, which include increased wastewater generation and increased pressure on water resources. Little attention is being paid to the widespread and increasing use of hand sanitisers and spraying of disinfectants, which research shows can have several adverse health effects on people, animals, and the environment. There are also preliminary reports that some of these sanitisers may contain methanol, which represents a threat to human and environmental health. Additionally, the management of medical and general solid waste within informal settlements during this time is of concern as this can impact on natural water bodies that provide ecosystem services. For example, there has been a dramatic increase in the use of PPE for health and essential service workers. These items are generally made of single-use materials (including plastics) that can eventually enter water and land-based ecosystems. Furthermore, key

environmental and recycling programmes and 'waste picking' initiatives that operate within these settlements have been suspended or abandoned.

Concluding remarks and recommendations

We are acutely aware that improved early warning systems, preparedness, and responses will help to limit the impact of future outbreaks and pandemics. This will not prevent outbreaks from occurring, but with improved systems in place, the potential impact on the lives, health, and futures of people across South Africa and perhaps Africa can be reduced.

This Position Paper has identified the areas in which further work is needed to improve the intricate web of systems, coordination, communications, and governance needed to ensure that South Africa and the continent are better prepared to respond to the next pandemic. An area, not dealt with in this paper that requires urgent and detailed attention is education. An Education, Research and Innovation Think Tank must be established to develop and shift capabilities towards greater self-reliance and improved resilience. This requires,
(1) rethinking curricula and modes of teaching and learning to enhance skills development; and
(2) encouraging more policy-relevant research.

Governments worldwide, have learned the hard way that it can be dangerous to depend on foreign trade for items that make or break a crisis response, such as COVID-19 testing kits, PPE's and ventilators, etc. The development of a culture of innovation and entrepreneurship can revitalise the manufacturing sector and enhance scientific capabilities in areas that help the country deal with pandemics and disasters while creating jobs and contributing to the knowledge economy. During this pandemic, we saw how our home-grown innovation capability, the growing patriotism, and opportunities for creating sustainable jobs for our citizens, through the university sector, was valued by our government. This sector can benefit from higher economic and regulatory support and will serve to make a better life for all post-COVID-19.

Based on the gaps identified and the authors' inputs on the various thematic areas covered, we put forward a set of recommendations in respect of **planning, priority setting, and coordination** efforts needed to manage the current and future pandemics below.

General recommendations

1. **Leadership, governance, advance planning, communications, and engagement** to build trust and resilience. In this regard, there is a need to establish and activate Command Councils for the priority sectors: Health, Socio-economic, Legal, Education, and Monitoring and Assessment. The National Command Council must develop the National Priority Plan and the implementation thereof after input from the sectoral command councils. This plan/s must be reviewed annually.

2. **Situational awareness and decision-making** through the installation of state-of-the-art surveillance systems, detection, and prediction tools that the Command Councils will require for decision-making. This will include having the capacity and trained staff to:
   - Assess capacities and identify priorities for pandemic preparedness planning and response at national and sub-national levels;
   - Advise provincial governments on best practices in pandemic planning, and monitor and evaluate the operability and quality of their plans;

- Develop, exercise, and periodically assist to revise national and sub-national pandemic preparedness and response plans in close collaboration with human and animal health sectors, and other relevant public and private partners with reference to WHO guidelines;
- Provide full legal support and authority, regulations and legislation for all proposed interventions;
- Predict the resources required to implement proposed interventions at national and sub-national levels including working with humanitarian, community-based, and non-governmental organisations;
- Develop an ethical framework to govern pandemic policy development and implementation;
- Develop mechanisms to minimize social and economic disruption.

3. **Workforce capacity, training and networking** involving Command Council members and staff will be essential in order to promote knowledge-sharing, multi-sectoral learning and cross-sectoral simulation exercises to maximise operational preparedness and response. Crisis management training and capacity are necessary to integrate pandemic preparedness into national emergency preparedness frameworks. Training manuals to support the preparedness plan must be developed.

4. **Managing pre- and post-pandemic crises** will require conflict resolution and crisis management training for the Command Councils. More importantly, a Crisis Monitoring System must be put into place as soon as is possible

Specific Recommendations to be considered in Priority Setting Plans:

Human Rights and Governance

- Prepare human rights guidelines that will not only provide ethical guidance during this period of the pandemic but will set the foundation for how countries should respond to public health crises and other types of disasters of this magnitude going forward. These guidelines must ensure, that constitutional democratic norms, values, and safeguards, such as the rule of law, freedom of expression, and human dignity, are honoured in the implementation of the COVID-19 strategy and the enforcement of lockdowns.
- Core obligations must include effective access to public services, social grants, justice and legal remedies.
- Mechanisms and strategies adopted must involve the private health sector.
- In relation to Emergency Economic Stimulus, oversight mechanisms must be put in place to monitor spending and prevent corruption. Measures and regulations must be adopted to prevent profiteering on foodstuff, hygiene products and essential medical supplies during pandemics.
- Advanced and real time communication plans and strategies to ensure that factual information is available on a regular basis, including in local languages need to be put in place.
- Enhance and sustain gains achieved during COVID-19 towards a coherent, robust and equitable national health system that is pandemic-ready through the implementation of effective and appropriate policies, legislative agility and infrastructure maintenance plans.

These above-mentioned key factors can be viewed as a foundation for the proposed governance model for post-COVID-19 measures recommended in Figure 6 below.

Figure 6: Diagram showing a proposed new post COVID-19 governance model

Implications of COVID-19 for social cohesion and public order during and post the pandemic

- Focusing on social cohesion (together with other forms of social and economic resilience) may play a role in softening and absorbing some of the negative effects of the COVID-19 containment measures. Social distancing must not become social exclusion.
- Develop and implement appropriate conflict resolution strategies that are proactive rather than reactive.
- Develop a comprehensive framework to address and mitigate against the vulnerability factors.
- Enhance and sustain the safeguards installed for Women and Children during COVID-19 that is, access to protection orders, help-lines, safe shelters and police protection.
- Develop an Africa wide coordinated social cohesion strategy, especially given the high levels of interconnectedness and economic dependencies, and the recent spate of xenophobic incidents.
- Urgent consideration must be given to the ACCORD (2020) proposal for a Monitor that tracks COVID-19 related conflicts and resilience trends, aimed at contributing to early warning analysis and informing collective response strategies. This is required at country, regional and continental levels. Training of monitoring practitioners, in this regard is urgent, and can be done in partnership with NGO's and the education sector.
- As a global pandemic, the continental strategy needs to be integrated into a global response. Similar to the health impacts of the spread of the virus, conflicts and violence resulting from the pandemic will have local, regional and global ramifications, which need to be anticipated and managed.

Financial/ economic implications

- There is a need for fiscal space in order for government to effectively react to crises or economic shocks. Creation of fiscal space would not only require political will but strong commitment and efficiency from government institutions.

- As done in other countries, the adoption of fiscal rules will require setting of numerical target on fiscal aggregates which would assist a great deal in enforcing the discipline in government finances.
- The expected government economic downturn, and subsequent loss of jobs, calls for government to act as the 'employer of last resort'. The employment created under this programme would, however, not be viewed as the normal public sector employment, but rather residual employment.
- Continuance of the COVID-19 relief grant beyond the crisis period is recommended and will play a crucial role in alleviating the imminent rise in poverty and inequality levels in South Africa.
- The economic response to any epidemic or other crisis must build on and refocus on enhancing the neglected public service areas: provision of housing, water, transport, and education; and prioritise new employment creating industries based on current and future domestic and global needs.
- Encourage entrepreneurship through training of graduates and undergrads and the unemployed.
- The Department of Labour, the Department of Small Business Development, and Department of Trade and Industry in partnership with key education intuitions must support start-up businesses. This will be crucial post this pandemic as large numbers of graduates will be seeking jobs in a poor job market.
- Establish and formalise partnerships and business enterprises with, for example, Technology-focused Universities that have the facilities, capacity, and technical know-how for rapid prototyping.
- Facilities at universities and private sector companies focused on additive and advanced manufacturing, electronics/ mechatronics, and other 4th Industrial Revolution technologies must be mobilised to design, develop and manufacture medical devices and products during pandemics.
- Commercialise these facilities to produce South African medical supplies and equipment; this will create new skills and jobs for the unemployed.
- South Africa must become an exporter of such products rather than an importer.
- Incentivising "Buy South African" and export of local products must be considered to reboot the economy.

Healthcare

- Sustain and enhance the Ministerial Advisory Council on health to include social scientists and bioethicists.
- Sustain and enhance infrastructure that was developed during COVID 19.
- Increase the number of testing facilities and primary health facilities in collaboration with the private sector.
- Support the local manufacturing of PPE and testing interventions in partnership with university innovation hubs and the private sector.
- Formalise the SAMA endorsed guidelines of the Critical Care Society of South Africa in alignment with the HPCSA's regulatory guidance documents.
- Establish a centralised national ethics committee under the NHREC as a matter of urgency; this will ensure all research activities on all aspects of COVID-19 or other such pandemics are fast-tracked and regulated.

- Engage in socio-economic reform to urgently respond to population needs with regard to the social determinants of health.

Food security and food safety

- Review the regulatory framework for Food Security related sectors via the Department Agriculture, Health and Environment, and all stakeholders.
- Review the country's risk assessment strategies related to food safety and quality assurance of products to accommodate for a pandemic related environment and support the immediate needs of vulnerable populations.
- Establish a National and Provincial Multisectoral Committee under the leadership of the Department of Agriculture, to review the agri-food supply chain regulations.
- This multi-sectoral committee (which should include the Departments of Labour, Health, Environment, Social Development, Education, and other relevant stakeholders) must consider supportive labour legislation, cash flow, access, procurement and provision to commercial, small-scale farmers and informal farmers.
- Revisit the national South African school feeding programme to ensure the supply of meals throughout the year (including holidays) through local distribution centres.
- Maintain and sustain all public food safety and nutrition surveillance systems that were initiated during COVID-19 through increased health monitoring by EHPs.
- The Department of Environmental Affairs in partnership with the Education sector must train and review curricula for building of EHP capacity.
- Invest in research and innovation in the agri-food supply chain sector.

Living/ housing conditions

- Improved basic services delivery needs to be a priority by key implementation departments including municipalities, provincial and national agencies to ensure that the most marginalised citizens are more pandemic resilient in the future as well as that their rights to live and work in healthy and safe environments are realised. This requires intra-governmental and inter-sectoral coordination.
- Some good practices accompanying the 'stay-at-home' orders would be to increase access to water, sanitation, power, emergency shelter and food with the Departments of Human Settlements, Cooperative Governance and Traditional Affairs, Energy, Environmental Affairs, and Water and Sanitation being lead agencies.
- The types of low-income housing provided needs to be seriously reconsidered by the Department of Human Settlements and local municipalities, especially in a context where more densely built housing types are being prioritised to lower costs and increase the number of homes that can be provided.
- National governmental regulations are required to impose moratoriums on evictions due to non-payment of rent or mortgage arrears, and of the homeless, migrants and residents of informal settlements.
- The plight of foreign residents (whether legal or illegal) needs attention as well.
- The ad hoc provision of basic services (such as water and sanitation) and temporary housing arrangements to deal with the pandemic needs to be considered in relation to impacts that can lead to other health and social crises.

Natural environment

- Resources need to be made available by the Department of Environment, Forestry and Fisheries (DEFF) to ensure that South Africa's natural environmental assets are maintained and properly conserved because of the ecosystem services they provide as well as to protect economic activities, especially in relation to the prominence of nature-based tourism that will resume when the pandemic is under control.
- Proper waste management processes need to be in place within municipalities to ensure that responses to deal with the pandemic do not undermine the ecological integrity of the natural resource base.
- A life cycle approach needs to be adopted in relation to how PPE and sanitation goods (sanitisers and disinfectants) needed are produced; how needs of the populace (water and sanitation, food provision, etc.) are being met; and how the different types of wastes generated are disposed of, reused and recycled, if possible. The circular green economy therefore should be encouraged and supported, including driving the development of innovations. Guidelines should be developed by DEFF to inform policies and practices within institutions including health care facilities, government departments, educational and research facilities, etc.

Water and sanitation

- Authorities responsible for the provision of basic services (water and sanitation), disposal of wastewater and treatment of drinking water must respond rapidly and make decisions that minimise occupational and public health risks by consulting scientists and EHPs.
- Establish the fate of infective viruses and sanitising agents (e.g. methanol) in the urban water cycle and locations of potential human exposure, particularly within informal, non-traditional, dwellings.
- Train and use community awareness officers to ensure that people stop using wastewater for domestic and agricultural purposes in informal settlements.
- Put in place proper/ effective disposal routes for domestic/ CAB wastewater within informal settlements to avoid the potential accumulation of pathogens and organic chemicals.
- Residents, local government and other stakeholders must identify and/ or design drainage solutions within informal settlements that address both physical and social challenges.
- Investigate the impacts of the widespread and increasing use of hand sanitisers, spraying of disinfectants, and PPE manufactured from non-biodegradable materials on natural water sources.
- Encourage and fund research on adaptive infrastructure development, particularly in respect of decentralised wastewater treatment solutions.

Final word

As parts of the world emerge from the COVID-19 pandemic and restrictions are tentatively eased, Governments such as our own have to start preparing for the post-COVID-19 phase. Out of this crisis emerges opportunities for reinvention and strategic rethinking for accelerating operational transformation, developing new business models and skills, and overall reengineering of systems that either failed or worked for us. As the Command Council and its advisors deal with the 'here and now' a strategic Think Tank must be installed to prepare a Priority Plan for the 'new normal' in the short term and the future. This Position Paper provides a useful lens for analysing some of the urgent strategic priorities that need to be considered in developing this plan for the future. Finally, it is important to note that when South Africa's

success in managing the current and future pandemics is eventually measured, the government's respect for its people may serve as an even more important indicator than its infrastructural, policy and economic responses.

References

1. Abdool-Karim, S. Report and presentation of South African Ministerial Advisory Committee on COVID 19: SA'S COVID-19 situation. ENCA: 16 April 2020

2. African Centre for the Constructive Resolution of Disputes - ACCORD. Conflict and Resilience Monitor. 13 May 2020. https://www.accord.org.za/conflict-resilience/13-may-2020/

3. Alexander P, Runciman C, Ngwane T, Moloto B, Mokgele K, Van Staden N. Frequency and turmoil: South Africa's community protests 2005–2017. 2018. https://www.ajol.info/index.php/sacq/article/view/170036
4. Almeida MC, Butler D, Friedler E. At-source domestic wastewater quality. 1991. https://doi.org/10.1016/S1462-0758(99)00008-4

5. Amirian ES. Potential fecal transmission of SARS-CoV-2: Current evidence and implications for public health. International Journal of Infectious Diseases. 2020. https://doi.org/10.1016/j.ijid.2020.04.057

6. American Hospital Association – AHA. Updates and Resources on Novel Coronavirus (COVID-19). 2020. https://www.aha.org/guidesreports/2020-04-09-compendium-models-predict-spread-covid-19. (accessed 1 June 2020)

7. Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? The Lancet. 2020. https://doi.org/10.1016/S0140-6736(20)30567-5

8. Angelakis AN, Bontoux L, Lazarova V. Challenges and prospectives for water recycling and reuse in EU countries. Water Science and Technology: Water Supply. 2003. https://doi.org/10.2166/ws.2003.0046

9. Agency for Food, Environmental and Occupational Health and Safety (French) - ANSES. Relatif à une demande urgente sur certains risques liés au Covid-19 [Opinion on an urgent request to assess certain risks associated with COVID-19]. 2020. https://www.anses.fr/en/system/files/SABA2020SA0037-1.pdf (accessed 30 April 2020)

10. Aspromourgos T. Is an employer-of-last-resort policy sustainable? A review article. Review of Political Economy. 2000. https://doi.org/10.1080/095382500406477

11. Azhar EI, Hui DS, Memish ZA, Drosten C, Zumla A. The Middle East Respiratory Syndrome (MERS). Infectious Disease Clinics. 2019. https://doi.org/10.1016/j.idc.2019.08.001

12. Baldwin R, di Mauro BW. Economics in the Time of COVID-19. 2020. https://voxeu.org/content/economics-time-covid-19

13. Bloomberg .South Africa's R40 billion coronavirus fund is not working as it should: unions. BusinessTech. 11 April 2020. https://businesstech.co.za/news/finance/389015/south-africas-r40-billion-coronavirus-fund-is-not-working-as-it-should-unions/

14. Bodhanya, S. CosimPub Covid-19 Simulator. 2020. https://exchange.iseesystems.com/public/shamim/covid19-basic-c/index.html#page1

15. Booysen S. Transitions and trends in policymaking in democratic South Africa. Journal of Public Administration. 2001. https://hdl.handle.net/10520/EJC51244

16. Bosch T. Twitter activism and youth in South Africa: The case of# RhodesMustFall. Information, Communication & Society. 2017. https://doi.org/10.1080/1369118X.2016.1162829

17. Breakfast N, Bradshaw G, Nomarwayi T. Violent service delivery protests in post-apartheid South Africa, 1994–2017-a conflict resolution perspective. African Journal of Public Affairs. 2019. https://journals.co.za/docserver/fulltext/ajpa_v11_n1_a10.pdf?expires=1590522507&id=id&accname=guest&checksum=BDD52996D771B434538A5E39C7656AEA

18. British Medical Association. COVID-19: ethical issues. 2020. https://www.bma.org.uk/media/2360/bma-covid-19-ethics-guidance-april-2020.pdf (accessed 6 May 2020)

19. Budina N, Schaechter A, Weber A, Kinda T. Fiscal Rules in Response to the Crisis: Toward the 'Next-Generation'Rules: A New Dataset. IMF working papers. 2012. https://doi.org/10.5089/9781475505351.001

20. Canelli R, Connor CW, Gonzalez M, Nozari A, Ortega R. Barrier enclosure during endotracheal intubation. New England Journal of Medicine. 2020. https://www.nejm.org/doi/full/10.1056/NEJMc2007589

21. Carroll C, Slacalek J, Tokuoka K, White MN. The distribution of wealth and the marginal propensity to consume. Quantitative Economics. 2017. https://doi.org/10.3982/QE694

22. Cassels S. Time, population mobility, and HIV transmission. The Lancet HIV. 2020. https://doi.org/10.1016/S2352-3018(19)30413-8

23. Committee on World Food Security - CFS. COVID-19 statement from chair of the committee. 2020. http://www.fao.org/fileadmin/templates/cfs/Docs1920/Chair/CFS_Chair_Statement_COVID_EN.pdf (accessed 16 April 2020)

24. Chikulo BC. "The Smoke That Calls": A Review of Service Delivery Protests in South Africa 2005-2014. Journal of Human Ecology. 2016. https://doi.org/10.1080/09709274.2016.11907009

25. Chitsamatanga BB, Rembe NS. School Related Gender Based Violence as a Violation of Children's Rights to Education in South Africa: Manifestations, Consequences and Possible Solutions. J Hum Ecol. 2020. https://www.researchgate.net/profile/Bellita_Chitsamatanga/publication/338888938_School_Related_Gender_Based_Violence_as_a_Violation_of_Children's_Rights_to_Education_in_South_Africa_Manifestations_Consequences_and_Possible_Solutions/links/5e4cde5e299bf1cdb93580bb/School-Related-Gender-Based-Violence-as-a-Violation-of-Childrens-Rights-to-Education-in-South-Africa-Manifestations-Consequences-and-Possible-Solutions.pdf

26. Colavita F, Lapa D, Carletti F, Lalle E, Bordi L, Marsella P, Nicastri E, Bevilacqua N, Giancola ML, Corpolongo A, Ippolito G. SARS-CoV-2 isolation from ocular secretions of a patient with COVID-19 in Italy with prolonged viral RNA detection. Annals of Internal Medicine. 2020. https://doi.org/10.7326/M20-1176

27. Critical Care Society of South Africa. Allocation of Scarce Critical Care Resources During the COVID-19 Public Health Emergency in South Africa. 2020. https://criticalcare.org.za/wp-content/uploads/2020/04/Allocation-of-Scarce-Critical-Care-Resources-During-the-COVID-19-Public-Health-Emergency-in-South-Africa.pdf. (accessed 6 April 2020)

28. Davis, R. Private and public healthcare will have to bridge gulf in event of Covid-19 epidemic. Daily Maverick. 2020. https://www.dailymaverick.co.za/article/2020-03-12-private-and-public-healthcare-will-have-to-bridge-gulf-in-event-of-covid-19-epidemic/ (accessed 6 May 2020)

29. De Coning C. The impact of COVID-19 on the performance of peace operations. NUPI Covid-19 Brief. 2020. https://hdl.handle.net/11250/2653252

30. De Walque, D. Projecting the trajectory of the COVID-19 pandemic: A review of available tools World Bank Blogs. 2020. https://blogs.worldbank.org/developmenttalk/projecting-trajectory-covid-19-pandemic-review-available-tools. (accessed 1 June 2020)

31. Democratic Alliance – DA. Democratic Alliance Statement on South Africa's Covid-19 response. Cape Town. 2020

32. Dhai A, Veller M, Ballot D, Mokhachane M. Pandemics, professionalism and the duty of care: Concerns from the coalface. South African Medical Journal. 2020. http://www.samj.org.za/index.php/samj/article/view/12947

33. Dinarto D, Wanto A, Sebastian LC. Global health security–COVID-19: impact on Bintan's tourism sector. RSIS Commentaries. 2020. https://hdl.handle.net/10356/137356

34. Department of Health - DoH. Epidemiological comments - Public health surveillance system. Pretoria: Department of Health. 2011. www.health.gov.za>index.php>reports>category

35. DoH. Ethics in Health Research: Principles, Processes and Structures (2nd edition). Pretoria. 2015. https://www.commerce.uct.ac.za/Downloads/Ethics%20in%20Health%20Research%20Final%20A%20used.pdf (accessed 3 May 2020)

36. DoH. National Digital Health Strategy for South Africa 2019-2024. 2019. http://www.health.gov.za/index.php/2014-08-15-12-54-26?download=3651:national-digitalhealth-strategy-for-south-africa-2019-2024. (accessed 14 May 2020).

37. DoH. Media Statement: Minister Zweli Mkhize confirms total of 25 937 cases of Coronavirus COVID-19. 2020. https://www.gov.za/speeches/minister-zweli-mkhize-confirms-total-25-937-cases-coronavirus-covid-19-27-may-2020-0000

38. Dzomonda O, Fatoki O. The Role of Institutions of Higher Learning towards Youth Entrepreneurship Development in South Africa. Academy of Entrepreneurship Journal. 2019. https://www.abacademies.org/articles/the-role-of-institutions-of-higher-learning-towards-youth-entrepreneurship-development-in-south-africa-8021.html

39. European Central Bank - ECB. The ECB's response to the COVID-19 pandemic. 2020. https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200416~4d6bd9b9c0.en.html. (accessed 28 April 2020)

40. Edelman. Trust Barometer Survey 2020. New York, Edelman. 2020. https://www.edelman.com/trustbarometer

41. Edokpayi JN, Odiyo JO, Durowoju OS. Impact of wastewater on surface water quality in developing countries: a case study of South Africa. Water quality. 2017. http://dx.doi.org/10.5772/66561

42. Ekambaram, S. Covid-19 is not a reason to hunt down illegal immigrants. The Daily Maverick: Maverick Citizen. 2020. https://www.dailymaverick.co.za/article/2020-04-29-covid-19-is-not-a-reason-to-hunt-down-illegal-immigrants/

43. Food and Agriculture Organisation - FAO. Policy Brief of Food Security. Issue 2. Rome. June 2006. http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf

44. FAO. Committee on World Food Security (CFS): Framework for action for food security and nutrition in protracted crises. 2015. http://www.fao.org/cfs/home/activities/ffa/en/ (accessed 29 April 2020)

45. FAO. The state of food security and nutrition in the world. 2019a. https://docs.wfp.org/api/documents/WFP-0000106760/download/?_ga=2.85403289.1420120195.1588597809-1494065487.1588597809 (accessed 29 April 2020)

46. FAO. New UN report reveals that hunger in Africa continues to rise. 2019b. http://www.fao.org/news/story/en/item/1180443/icode/#:~:text=237%20million%20people%20affected%20in,and%20continental%20hunger%20eradication%20efforts&text=It%20shows%20that%20more%20people,the%20African%20population%20was%20undernourished (accessed 1 June 2020)

47. FAO. COVID-19 and the risk to food supply chains: How to respond?. 2020a. http://www.fao.org/3/ca8388en/CA8388EN.pdf (accessed 30 April 2020)

48. FAO. COVID-19: Channels of transmission to food and agriculture. 2020b. http://www.fao.org/3/ca8430en/CA8430EN.pdf (accessed 16 April 2020)

49. FAO. Committee on World Food Security (CFS): Impact of COVID-19 on food security and nutrition (FSN). 2020c. http://www.fao.org/fileadmin/user_upload/hlpe/COVID-19/HLPE._Impact_of_COVID-19_on_FSN_-_2020-03-24_-_EN4.pdf (accessed 16 April 2020)

50. Food and Drug Administration of the United States of America - FDA. Food safety and Covid-19. 2020 https://www.fda.gov/food/food-safety-during-emergencies/food-safety-and-coronavirus-disease-2019-covid-19 (accessed 1 May 2020)

51. Flanagan, L. Police seeks answers about Natjoints. The Star. 2016. https://www.iol.co.za/news/police-seeks-answers-about-natjoints-1993678

52. Food Standards Agency of the United Kingdom - FSA. Qualitative Risk Assessment: What is the risk of food or food contact materials being a source or transmission route of SARS-CoV-2 for UK consumers? 2020. https://www.food.gov.uk/research/research-projects/qualitative-risk-assessment-on-the-risk-of-food-or-food-contact-materials-as-a-transmission-route-for-sars-cov-2 (accessed 1 May 2020)

53. Food Safety Authority of Ireland - FSAI. COVID-19 (Coronavirus). 2020. https://www.fsai.ie/faq/coronavirus.html (accessed 29 April 2020)

54. Food Standards Australia New Zealand - FSANZ. New coronavirus and food safety. 2020. https://www.foodstandards.gov.au/consumer/safety/Pages/NOVEL-CORONAVIRUS-AND-FOOD-SAFETY.aspx (accessed 29 April 2020)

55. GHS Index. Global Health Security Index. Nuclear Threat Initiative Centre for Health Security, John Hopkins Bloomberg School of Public Health. 2019. https://www.ghsindex.org/wp-content/uploads/2019/10/2019-Global-Health-Security-Index.pdf

56. Gourinchas PO. Flattening the pandemic and recession curves. Mitigating the COVID Economic Crisis: Act Fast and Do Whatever. 2020. http://viet-studies.net/kinhte/COVIDEconomicCrisis.pdf#page=38

57. Government Gazette. Disaster Management Act: No: 57. 2002. http://www.cogta.gov.za/cgta_2016/wp-content/uploads/2016/06/DISASTER-MANAGEMENT-ACT.pdf

58. Government Gazette. National Health Act 61 (2003). No. 26595. Cape Town. 2004. https://www.gov.za/sites/default/files/gcis_document/201409/a61-03.pdf.

59. Government Gazette. National Health Act: No 63. 1997.

60. Government Gazette. National Health Act: Regulations Relating To The Surveillance And The Control Of Notifiable Medical Conditions. No. 41330. 2017. https://fidssa.co.za/Content/Images/41330_15-12_Health.pdf (accessed 14 May 2020).

61. Government Notice. Department Of Co-Operative Governance And Traditional Affairs: Regulations issued in terms of section 27(2) of the Disaster Management Act (2002). 2020. https://www.gov.za/sites/default/files/gcis_document/202004/43258rg11098gon480.pdf (accessed 14 May 2020).

62. Gruber J. The consumption smoothing benefits of unemployment insurance. National Bureau of Economic Research; 1994. https://www.nber.org/papers/w4750.pdf

63. Guan WJ, Liang WH, Zhao Y, Liang HR, Chen ZS, Li YM, Liu XQ, Chen RC, Tang CL, Wang T, Ou CQ. Comorbidity and its impact on 1590 patients with Covid-19 in China: A Nationwide Analysis. European Respiratory Journal. 2020. https://doi.org/10.1183/13993003.00547-2020

64. Gumede W. Restless nation: Making sense of troubled times. Cape Town: Tafelberg. 2012.

65. Housing Development Agency - HDA. KwaZulu-Natal: Informal Settlements Status. Johannesburg, South Africa. 2012.

66. Head, T. Coronavirus: South Africans may soon get 'VAT' refunds during crisis. The South African. 2020 https://www.msn.com/en-za/money/politics/coronavirus-south-africans-may-soon-get-vat-refunds-during-crisis/ar-BB11m4Yq (accessed 8 May 2020)

67. Headly, D and Ruel, Marie. The COVID-19 nutrition crisis: What to expect and how to protect CGIAR Research Programme on Agriculture for Nutrition and Health (A4NH). 2020. https://www.ifpri.org/blog/covid-19-nutrition-crisis-what-expect-and-how-protect

68. Health Professions Council of South Africa – HPCSA. Health Professions Act 56 of 1974. https://www.hpcsa.co.za/Uploads/Legal/legislation/health_professions_ct_56_1974.pdf. (accessed 1 June 2020)

69. HPCSA. COVID-19 Guidelines. 2020a. https://www.hpcsa-blogs.co.za/hpcsa-covid-19-guidelines/?utm_source=HPCSA+eBulletin&utm_campaign=69d1933bcd-The+HPCSA+eBulletin+Newsletter_COPY_01&utm_medium=email&utm_term=0_f2379b87e7-69d1933bcd-56579353. (accessed 1st June 2020)

70. HPCSA. Notice to amend Telemedicine Guidelines during COVID-19. 2020b. https://www.hpcsa-blogs.co.za/notice-to-amend-telemedicine-guidelines-during-covid-19/ (accessed 1 June 2020)

71. Hewitt J, Leonard M, Greening GE, Lewis GD. Influence of wastewater treatment process and the population size on human virus profiles in wastewater. Water research. 2011. https://doi.org/10.1016/j.watres.2011.09.029

72. Hot D, Legeay O, Jacques J, Gantzer C, Caudrelier Y, Guyard K, Lange M, Andreoletti L. Detection of somatic phages, infectious enteroviruses and enterovirus genomes as indicators of human enteric viral pollution in surface water. Water research. 2003. https://doi.org/10.1016/S0043-1354(03)00439-1

73. International Monetary Fund - IMF. World Economic Outlook Reports: The Great Lockdown. 2020. https://www.imf.org/en/Publications/GFSR/Issues/2020/04/14/global-financial-stability-report-april-2020. (accessed 29 April 2020).

74. Institute for Security Studies - ISS. Impact of COVID-19 on Peace and Security in Africa. 2020. https://issafrica.org/events/impact-of-covid-19-on-peace-and-security-in-africa

75. Jiusto S, Kenney M. Hard rain gonna fall: Strategies for sustainable urban drainage in informal settlements. Urban Water Journal. 2016. https://doi.org/10.1080/1573062X.2014.991329

76. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. Journal of Hospital Infection. 2020. https://doi.org/10.1016/j.jhin.2020.01.022

77. Karan A. Responding to Global Public Health Crises. AMA Journal of Ethics. 2020. https://journalofethics.ama-assn.org/article/responding-global-public-health-crises/2020-01?Effort%2BCode=FBB007

78. Kent, J. Machine Learning Tools Predict Impact of Quarantine on COVID-19. 2020. https://healthitanalytics.com/news/machine-learning-tools-predict-impact-of-quarantine-on-covid-19. (accessed 1 June 2020)

79. Kim Y, Kim CK, Lee DK, Lee HW, Andrada RI. Quantifying nature-based tourism in protected areas in developing countries by using social big data. Tourism Management. 2019. https://doi.org/10.1016/j.tourman.2018.12.005

80. Kongolo M. Job creation versus job shedding and the role of SMEs in economic development. African journal of business management. 2010. http://www.academicjournals.org/AJBM

81. Kotzé P. Guidelines pave the way for safe use of greywater. Water Wheel. 2018. https://journals.co.za/docserver/fulltext/waterb_v17_n5_a4.pdf?expires=1590678391&id=id&accname=guest&checksum=0CAA7E46981CA9E8CF72E71384360A55

82. Kumar K, Reddy PS. Metropolitan Financing and Development In South Africa: Quo Vadis?. Ghana Journal of Development Studies. 2019. https://www.ajol.info/index.php/gjds/article/view/188583

83. Lai MY, Cheng PK, Lim WW. Survival of severe acute respiratory syndrome coronavirus. Clinical Infectious Diseases. 2005. https://doi.org/10.1086/433186

84. Lamers MM, Beumer J, van der Vaart J, Knoops K, Puschhof J, Breugem TI, Ravelli RB, van Schayck JP, Mykytyn AZ, Duimel HQ, van Donselaar E. SARS-CoV-2 productively infects human gut enterocytes. Science. 2020. https://science.sciencemag.org/content/early/2020/04/30/science.abc1669.abstract

85. Leamer EE. A flat world, a level playing field, a small world after all, or none of the above? A review of Thomas L Friedman's The World is flat. Journal of Economic Literature. 2007. https://www.aeaweb.org/articles?id=10.1257/jel.45.1.83

86. Lockwood, K. Unpacking the potential impact of the COVID-10 pandemic on the South African economy and the housing sector, Centre for Affordable Housing Finance in Africa. 2020. http://housingfinanceafrica.org/documents/unpacking-the-potential-impact-of-the-covid-19-pandemic-on-the-south-african-economy-and-the-housing-sector/

87. Martin R, Conseil A. Public health policy and law for pandemic influenza: a case for European harmonization?. Journal of health politics, policy and law. 2012. https://doi.org/10.1215/03616878-1813854

88. Massoud MA, Tarhini A, Nasr JA. Decentralized approaches to wastewater treatment and management: applicability in developing countries. Journal of environmental management. 2009. https://doi.org/10.1016/j.jenvman.2008.07.001

89. McKibbin WJ, Fernando R. The global macroeconomic impacts of COVID-19: Seven scenarios. 2020. https://dx.doi.org/10.2139/ssrn.3547729

90. Mels A, Castellano D, Braadbaart O, Veenstra S, Dijkstra I, Meulman B, Singels A, Wilsenach JA. Sanitation services for the informal settlements of Cape Town, South Africa. Desalination. 2009. https://doi.org/10.1016/j.desal.2008.05.072

91. Mkentane, L. Race controversies hang over Ramaphosa's relief programme. Business Day. 2020a. https://www.businesslive.co.za/bd/national/2020-04-29-race-controversies-hang-over-ramaphosas-relief-programme/ (accessed 7 May 2020)

92. Mkentane, L. Cyril Ramaphosa will keep 'hawk's' on R500bn Covid-19 funding. Business Day. 2020b https://www.businesslive.co.za/bd/national/2020-04-24-cyril-ramaphosa-will-keep-hawks-eye-on-r500bn-covid-19-funding/ (accessed 6 May 2020)

93. Mkhize, Z. Health Minister Zweli Mkhize Covid-19 Update Presentation: Media briefing on the sidelines of the 26th Technical Convention of the Association of Municipal Electricity Utilities, Pretoria. 2018.

94. Moore, R., Parker, A., Swift, M. and Maree, G. COVID-19 highlights South Africa's need for local level social data. The Conversation. 2020. https://theconversation.com/covid-19-highlights-south-africas-need-for-local-level-social-data-137804

95. Muzondi L. Urban development planning for sustainability: urbanization and informal settlements in a democratic South Africa. Mediterranean Journal of Social Sciences. 2014. http://dx.doi.org/10.5901/mjss.2014.v5n14p641

96. National Disaster Management Centre - NDMC. Guideline: Development and Structure of a Disaster Management Plan. 2017. http://www.ndmc.gov.za/Guidelines/Guideline%20-%20Development%20and%20Structure%20of%20%20Disaster%20Management%20Plan%20JD.pdf

97. National Institute for Communicable Diseases - NICD. Diseases A – Z Index: COVID-19 Background. Johannesburg: NICD. 2020. https://www.nicd.ac.za/diseases-a-z-index/COVID-19/

98. Nzimande N, Ngalawa H. Fiscal policy sustainability in SADC countries. African Finance Journal. 2019. https://hdl.handle.net/10520/EJC-16fb275d5b

99. Nzimande, N. Editorial Note. African Journal of Business and Economic Research. 2020. https://dx.doi.org/10.31920/1750-4562/2020/15n1a0

100. Olojede OA, Agbola SB, Samuel KJ. Technological innovations and acceptance in public housing and service delivery in South Africa: implications for the Fourth Industrial Revolution. Journal of Public Administration. 2019. https://hdl.handle.net/10520/EJC-1a9fb75007

101. Omarjee, L. Small business dept says coronavirus relief funds may soon be depleted. Fin24. 2020. https://www.fin24.com/Economy/South-Africa/small-business-dept-says-coronavirus-relief-funds-may-soon-be-depleted-20200429-2

102. Oron G, Campos C, Gillerman L, Salgot M. Wastewater treatment, renovation and reuse for agricultural irrigation in small communities. Agricultural water management. 1999. https://doi.org/10.1016/S0378-3774(98)00066-3

103. Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. Journal of Hospital Infection. 2016. https://doi.org/10.1016/j.jhin.2015.08.027

104. Pan American Health Organisation - PAHO and World Health Organisation - WHO. Ethics guidance on key ethical issues raised by the novel corona virus disease (COVID-19) pandemic. 2020. https://www.paho.org/en/documents/ethics-guidance-issues-raised-novel-coronavirus-disease-covid-19-pandemic (accessed 3 May 2020).

105. Patterson KD, Pyle GF. The geography and mortality of the 1918 influenza pandemic. Bulletin of the History of Medicine. 1991. https://www.jstor.org/stable/44447656

106. Petrinca AR, Donia D, Pierangeli A, Gabrieli R, Degener AM, Bonanni E, Diaco L, Cecchini G, Anastasi P, Divizia M. Presence and environmental circulation of enteric viruses in three different wastewater treatment plants. Journal of applied microbiology. 2009. https://doi.org/10.1111/j.1365-2672.2008.04128.x

107. President Cyril Ramaphosa. State of the Nation Address. 2019. https://www.gov.za/speeches/2SONA2019. (accessed 13 May 2020)

108. Rabenau HF, Cinatl J, Morgenstern B, Bauer G, Preiser W, Doerr HW. Stability and inactivation of SARS coronavirus. Medical microbiology and immunology. 2005. https://doi.org/10.1007/s00430-004-0219-0

109. Ramaphosa, C. President Cyril Ramaphosa Comment: Media briefing at presidential walkabout. Nasrec quarantine facility. 2020.

110. Rogers, A and Molteni, M. The Mathematics of Predicting the Course of the Coronavirus. 2020. https://www.wired.com/story/the-mathematics-of-predicting-the-course-of-the-coronavirus/. (accessed 1 June 2020)

111. Rogerson CM, Rogerson JM. Coastal Tourism in South Africa: A Geographical Perspective. InNew Directions in South African Tourism Geographies. 2020. https://doi.org/10.1007/978-3-030-29377-2_13

112. Schaaf HS, du Preez K, Kruger M, Solomons R, Taljaard JJ, Rabie H, Seddon JA, Cotton MF, Tebruegge M, Curtis N, Hesseling AC. Bacille Calmette-Guérin (BCG) vaccine and the COVID-19 pandemic: responsible stewardship is needed. 2020. https://www.theunion.org/news-centre/news/body/IJTLD-0267_Schaaf.pdf.

113. South African Constitution - SAC. South African Constitution: Chapter 2 – Bill of Rights. 1997. https://www.justice.gov.za/legislation/constitution/SAConstitution-web-eng-02.pdf

114. South African Medical Association - SAMA. SARS-CoV-2 (COVID-19): Guidance for Managing Ethical Issues. 2020. https://www.samedical.org/files/covid19/doctor_resource/SAMA_Ethics%20Guidance%20_COVID-19%20Ethics_2020%207%20Apr.pdf . (accessed 25 April 2020)

115. Sands P. From Panic and Neglect to Investing in Health Security. 2017. https://openknowledge.worldbank.org/bitstream/handle/10986/26761/115271-WP-PUBLIC-IWG-FINAL-version-embargoed.pdf?sequence=1

116. South African Reserve Bank - SARB. Prudential Authority: Press release on regulatory relief measures and guidance to the banking sector in response to COVID-19. 2020. https://www.resbank.co.za/Lists/News%20and%20Publications/Attachments/9842/Prudential%20Authority%20Media%20Release%20-%20Regulatory%20relief%20and%20guidance%20to%20the%20banking%20sector.pdf. (accessed 29 April 2020)

117. Saul JS, Bond P. South Africa-the Present as History: From Mrs Ples to Mandela & Marikana. Boydell & Brewer Ltd. Southern Africa: Jacana Media (Pty) Ltd. 2014.

118. Siebrits FK, Calitz E. Should South Africa Adopt Numerical Fiscal Rules? South African Journal of Economics. 2004. https://doi.org/10.1111/j.1813-6982.2004.tb00133.x

119. Siegfried, K. The UN Refugee Agency: The Refugee Brief. 2020. https://www.unhcr.org/refugeebrief/the-refugee-brief-11-march-2020/

120. Solomon M. Time to overhaul the government's communication department. Mail & Guardian. 2020. https://mg.co.za/article/2020-04-23-time-to-overhaul-the-governments-communication-department/

121. Solomon R. Xenophobic violence and the ambivalence of citizenship in post-apartheid South Africa. Citizenship Studies. 2019. https://doi.org/10.1080/13621025.2019.1584158

122. Statistics South Africa. General Household Survey: 2018. 2018. http://www.statssa.gov.za/publications/P0318/P03182018.pdf

123. UNICEF. Nutrition Information Management, Surveillance and Monitoring in the Context of COVID-19 Global Nutrition Cluster, Global Technical Assistance Mechanism for Nutrition (GTAM). 2020. https://www.unicef.org/media/68301/file/Nutrition-Information-Management-Surveillance-and-Monitoring-COVID19.pdf

124. Uscher-Pines L, Omer SB, Barnett DJ, Burke TA, Balicer RD. Priority setting for pandemic influenza: an analysis of national preparedness plans. PLOS medicine. 2006. https://doi.org/10.1371/journal.pmed.0030436

125. van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. New England Journal of Medicine. 2020. https://www.nejm.org/doi/full/10.1056/nejmc2004973

126. Van Averbeke W. Urban farming in the informal settlements of Atteridgeville, Pretoria, South Africa. Water SA. 2007. https://doi.org/10.4314/wsa.v33i3.49112

127. Van Niekerk D. A critical analysis of the South African disaster management act and policy framework. Disasters. 2014. https://doi.org/10.1111/disa.12081

128. Vivier, E., Betancourt, D.S., Seabe, D. and Wentzel, M. Exploring South African's preferences for government communications. HSRC Review. 2014.

http://www.hsrc.ac.za/en/review/hsrc-review-november-2014/exploring-sa-preferences-for-govt-communications (accessed 6 May 2020)

129. Wadman M, Couzin-Frankel J, Kaiser J, Matacic C. How does coronavirus kill. Clinicians trace a ferocious rampage through the body, from brain to toes. Science's COVID-19 reporting is supported by the Pulitzer Center. 2020. https://www.sciencemag.org/news/2020/04/how-does-coronavirus-kill-clinicians-trace-ferocious-rampage-through-body-brain-toes?utm_source=Nature+Briefing# (accessed 30 April 2020)

130. Wang X, Zhou Y, Jiang N, Zhou Q, Ma WL. Persistence of intestinal SARS-CoV-2 infection in patients with COVID-19 leads to re-admission after pneumonia resolved. International Journal of Infectious Diseases. 2020. https://doi.org/10.1016/j.ijid.2020.04.063

131. Webb C. Asinamali: Aspiration, debt and citizenship in South Africa's# FeesMustFall protests. Area. 2019. https://doi.org/10.1111/area.12489

132. World Food Programme- WFP. Global report on food crises 2020. 2020a. http://www.fao.org/cfs/home/activities/ffa/en/ (accessed 28 April 2020)

133. WFP. Risk of hunger pandemics as COVID-19 set to almost double acute hunger by end of 2020. 2020b. https://insight.wfp.org/covid-19-will-almost-double-people-in-acute-hunger-by-end-of-2020-59df0c4a8072 (accessed 4 May 2020)

134. World Health Organization - WHO. WHO checklist for influenza pandemic preparedness planning. World Health Organization; 2005. https://apps.who.int/iris/bitstream/handle/10665/68980/WHO_CDS_CSR_GIP_2005.4.pdf?sequence=1

135. WHO. Ethical considerations in developing a public health response to pandemic influenza. Geneva: World Health Organization. 2007. https://apps.who.int/iris/bitstream/handle/10665/70006/WHO_CDS_EPR_GIP_2007.2_eng.pdf

136. WHO. Covid-19 Strategy Update. 2020. https://www.who.int/docs/default-source/coronaviruse/covid-strategy-update-14april2020.pdf?sfvrsn=29da3ba0_19

137. Wigginton KR, Ye Y, Ellenberg RM. Emerging investigators series: the source and fate of pandemic viruses in the urban water cycle. Environmental Science: Water Research & Technology. 2015. https://doi.org/10.1039/C5EW00125K

138. Wray, L. Randall. Government as Employer of Last Resort: Full Employment Without Inflation. 1997. http://dx.doi.org/10.2139/ssrn.74942

139. Xiao F, Tang M, Zheng X, Liu Y, Li X, Shan H. Evidence for gastrointestinal infection of SARS-CoV-2. Gastroenterology. 2020. https://doi.org/10.1053/j.gastro.2020.02.055

140. Zhang W, Du RH, Li B, Zheng XS, Yang XL, Hu B, Wang YY, Xiao GF, Yan B, Shi ZL, Zhou P. Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. Emerging microbes & infections. 2020. https://doi.org/10.1080/22221751.2020.1729071

Appendices

Appendix A: Presentation by Chairperson of South African Ministerial Advisory Committee on COVID-19 to the Nation in April 2020

SA's Covid-19 epidemic: Trends & Next steps

Prepared for Minister of Health Zweli Mkhize

Prepared on 13th April 2020 by Salim S. Abdool Karim, *FRS*

Chair: Ministerial Advisory Group on Covid-19
Director: CAPRISA – Centre for the AIDS Program of Research in South Africa
CAPRISA Professor in Global Health: Columbia University
Adjunct Professor of Immunology and Infectious Diseases: Harvard University
Adjunct Professor of Medicine: Cornell University
Pro Vice-Chancellor (Research): University of KwaZulu-Natal
Director: DSI-NRF Centre of Excellence in HIV Prevention

Outline

Part 1: The Coronavirus epidemic

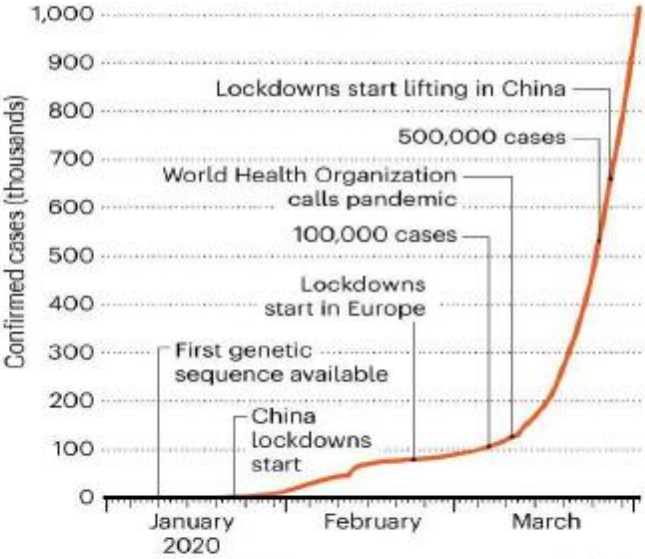
- **The Coronavirus epidemic in South Africa**
- **Why is South Africa not on the expected Covid epidemic trajectory?**
- **How much community transmission in SA?**
- **Some future epidemic scenarios**

Part 2: South Africa's Covid-19 response

- **Stages of the SA Covid-19 response**
- **Next steps: Stopping small flames to reduce the risk of raging fires**
- **Conclusion**

The first million cases of Covid-19

Wuhan seafood market

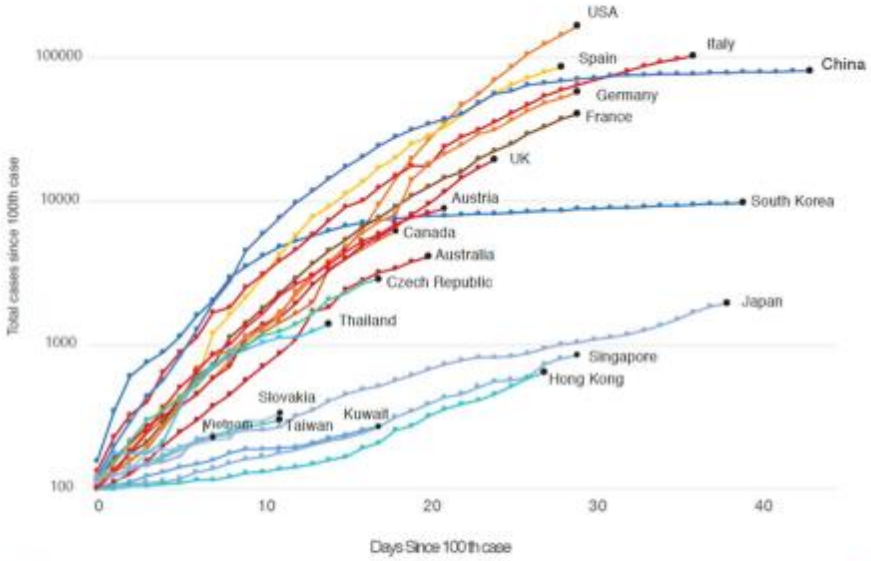


Data correct as of 3 April 2020 *Source*: Nature 2020 ©nature

health

CAPRISA

Country level epidemic trajectories

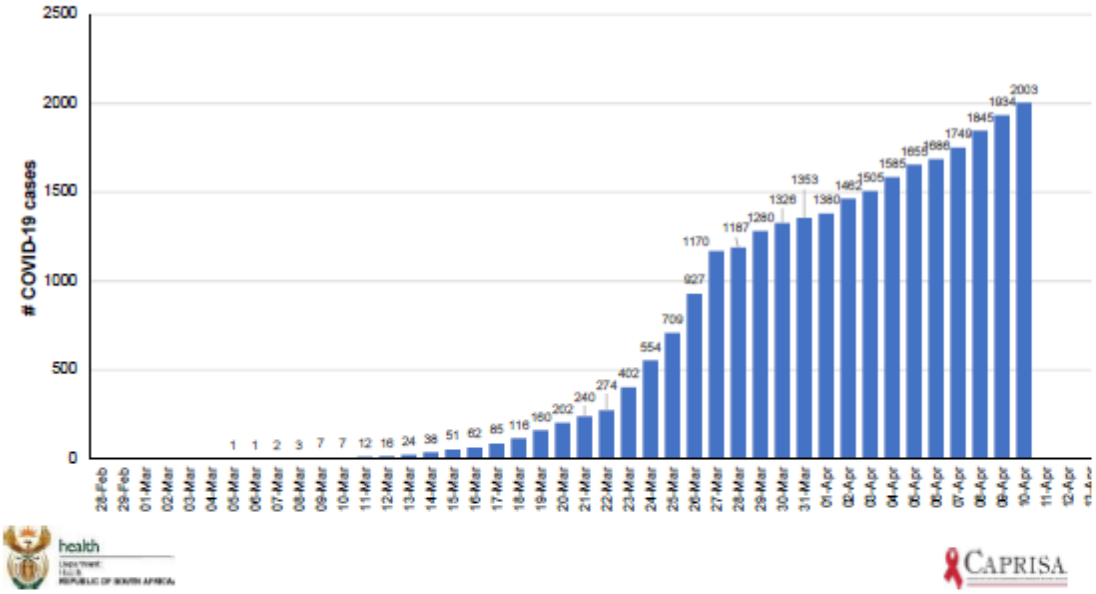


health

CAPRISA

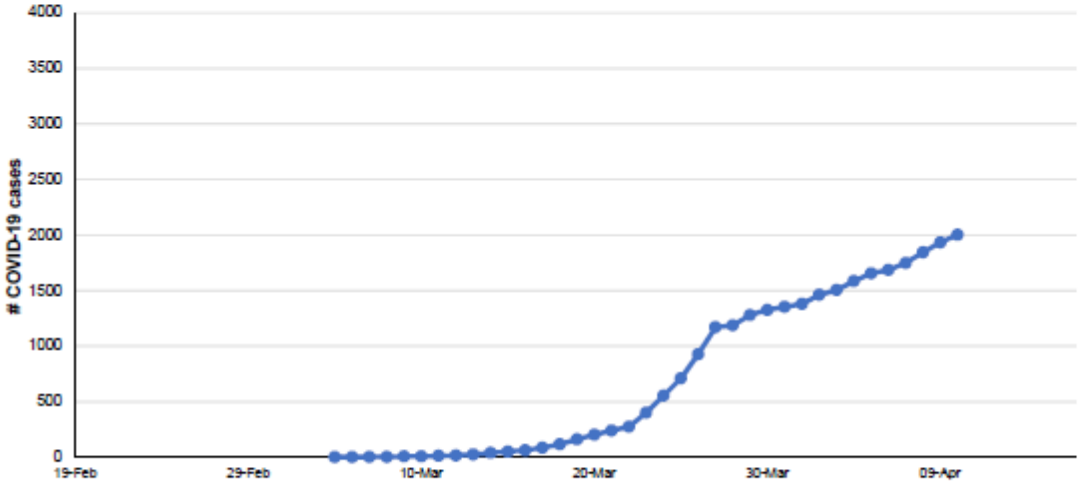
SA's SARS-CoV-2 epidemic - 1

Cumulative number of cases



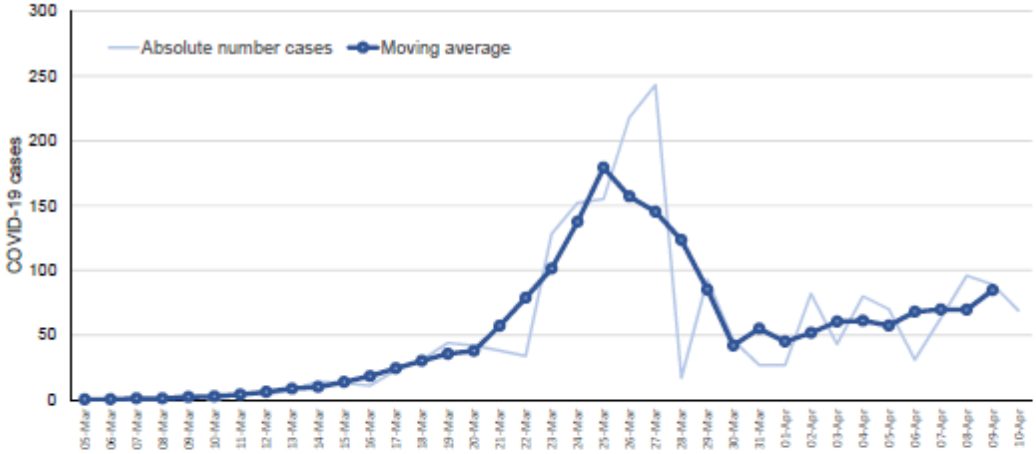
SA's SARS-CoV-2 epidemic - 2

Trends in cumulative cases



SA's SARS-CoV-2 epidemic - 3

Trends in new cases



health

CAPRISA

Outline

Part 1: The Coronavirus epidemic

- The Coronavirus epidemic in South Africa
- **Why is South Africa not on the expected Covid epidenic trajectory?**
- How much community transmission in SA?
- Some future epidemic scenarios

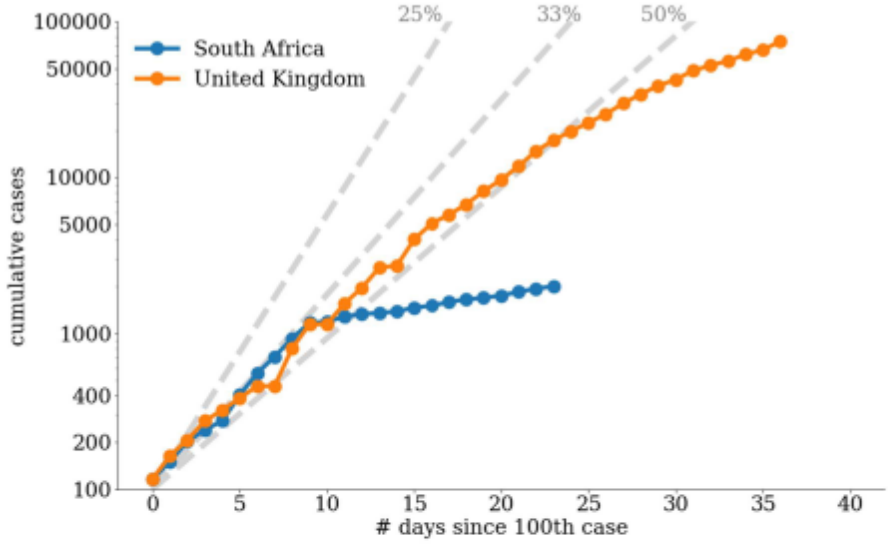
Part 2: South Africa's Covid-19 response

- Stages of the SA Covid-19 response
- Next steps: Stopping small flames to reduce the risk of raging fires
- Conclusion

health

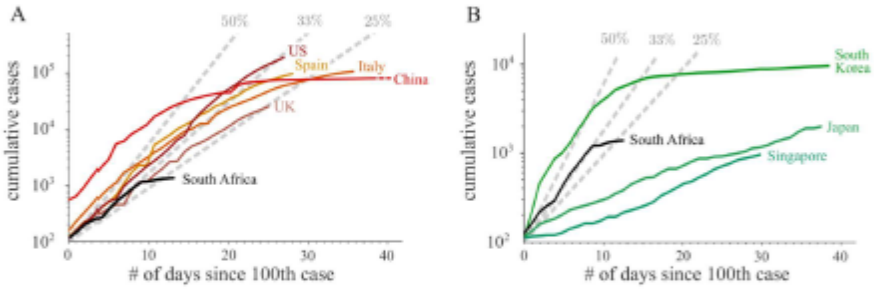
CAPRISA

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



Source: Tulio de Oliveira & UKZN CoV Big Data Consortium

SA's epidemic trajectory is unique…

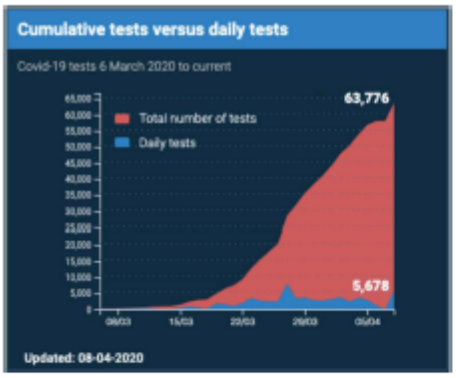


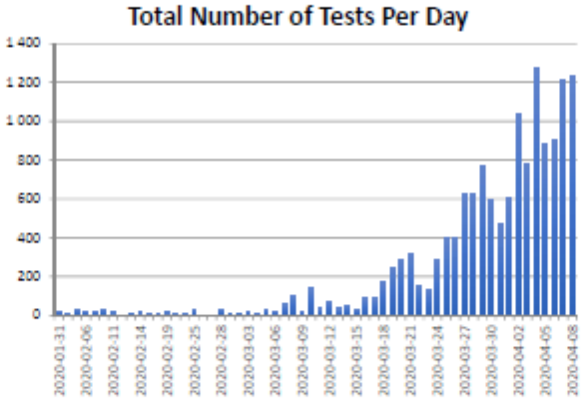
Why is SA different - new cases declining to a plateau:

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

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

Trends in cumulative private & NHLS Covid-19 tests show steady increase





Covid-19 cases have declined in the last 2 weeks while NHLS test numbers increased ie. while testing in people and communities without medical aid increased

Note: Overall testing is still below the target of 10-15,000 / day

CAPRISA

Outline

Part 1: The Coronavirus epidemic

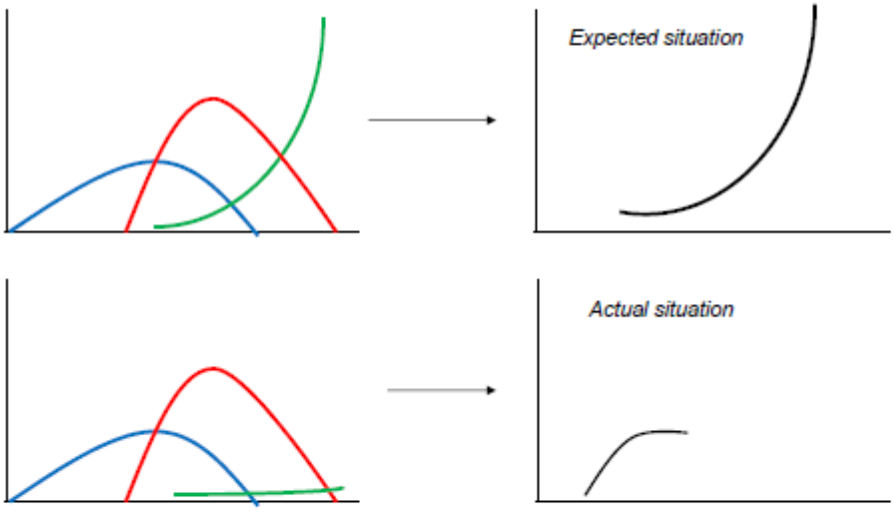
- The Coronavirus epidemic in South Africa
- Why is SA not on the expected trajectory?
- **How much community transmission in SA?**
- Some future epidemic scenarios

Part 2: South Africa's Covid-19 response

- Stages of the SA Covid-19 response
- Next steps: Stopping small flames to reduce the risk of raging fires
- Conclusion

CAPRISA

The 3 waves of the SA epidemic

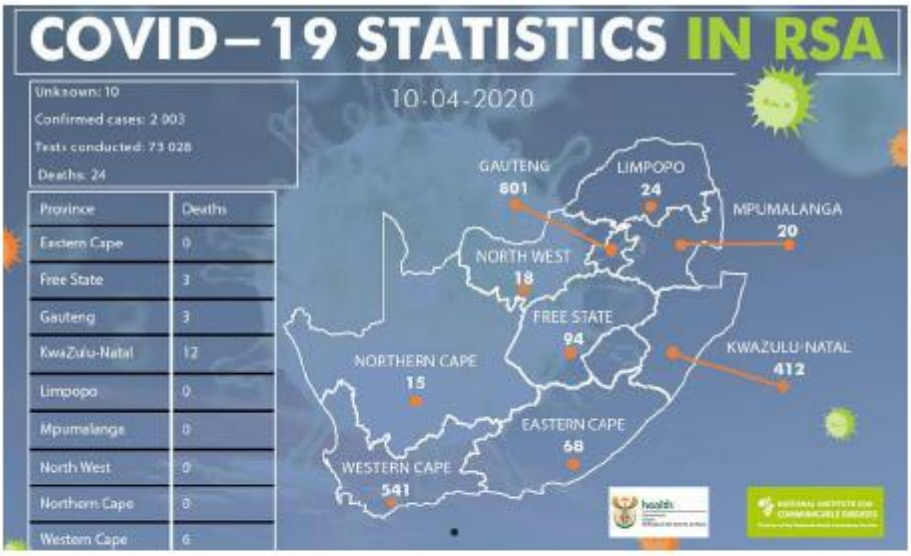


Travelers
Contacts and nosocomial transmissions
Community transmission

Why did SA not follow the expected epidemic curve?

- **First & second waves did not bridge spread effectively into the general community**
  - No exponential increase in cases
  - If $R_o > 1$ daily average cases each fortnight/week would go up
  - Infectiousness is ~2 weeks - fortnight average of 65 cases/day before and 72 cases/day after lockdown suggests R_o ~1 around lockdown (Note: all cases are infections before lockdown)
  - No evident national increases in acute respiratory distress (may have some pockets)
- **If community transmission is low, cases decline**
- **If community transmission is increasing then cases will increase and exponential curve will start again**

Where is the highest risk of community transmissions in SA?



health

CAPRISA

Outline

Part 1: The Coronavirus epidemic

- The Coronavirus epidemic in South Africa
- Why is SA not on the expected trajectory?
- How much community transmission in SA?
- **Some future epidemic scenarios**

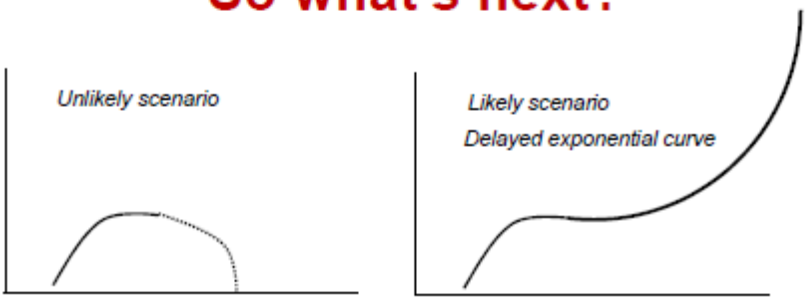
Part 2: South Africa's Covid-19 response

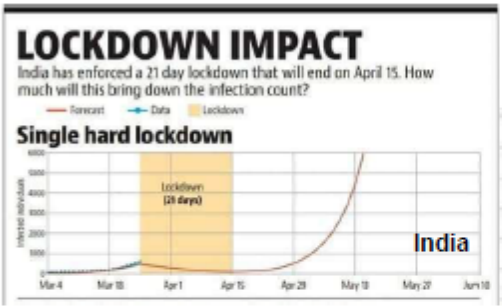
- Stages of the SA Covid-19 response
- Next steps: Stopping small flames to reduce the risk of raging fires
- Conclusion

health

CAPRISA

So what's next?





Predicted lockdown impact in India and Wuhan

A difficult truth…

Can SA escape the worst of this epidemic?

Is exponential spread avoidable?

- No! Not unless SA has a special protective factor (mojo) not present anywhere else in the world
- Our population will be at high risk again after the lockdown
  - Infectiousness period includes 4-7 days before symptoms ie. people can spread it without knowing
  - The virus spreads too fast normally
- Government interventions have slowed viral spread, the curve has been impacted and we have gained some time

Why the delay is important?

- Time to flatten the curve even more
- South Africa has a unique component to its response, ie. active case finding
- Only South Africa has >28,000 community health care workers going house-to-house in vulnerable community for screening & testing to find cases
- New quicker and simpler diagnostics becoming available
- New treatments become available
- Time to prepare for the medical care needs

CAPRISA

Outline

Part 1: The Coronavirus epidemic

- The Coronavirus epidemic in South Africa
- Why is SA not on the expected trajectory?
- How much community transmission in SA?
- Some future epidemic scenarios

Part 2: South Africa's Covid-19 response

- Stages of the SA Covid-19 response
- Next steps: Stopping small flames to reduce the risk of raging fires
- Conclusion

CAPRISA

Current stages of SA's response

Stage 1: Preparation

- Community education
- Establishing lab capacity
- Surveillance

Stage 2: Primary prevention

- Social distancing & hand-washing
- Closing schools and reduced gathering
- Close the borders to international travel

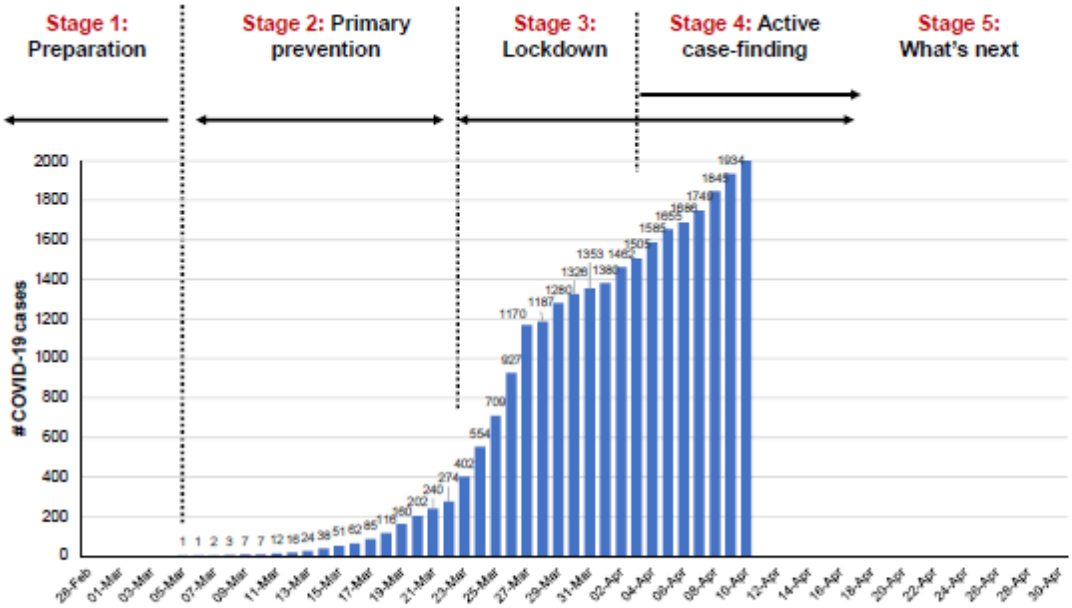
Stage 3: Lockdown

- Intensifying curtailment of human interaction

Stage 4: Surveillance & active case-finding

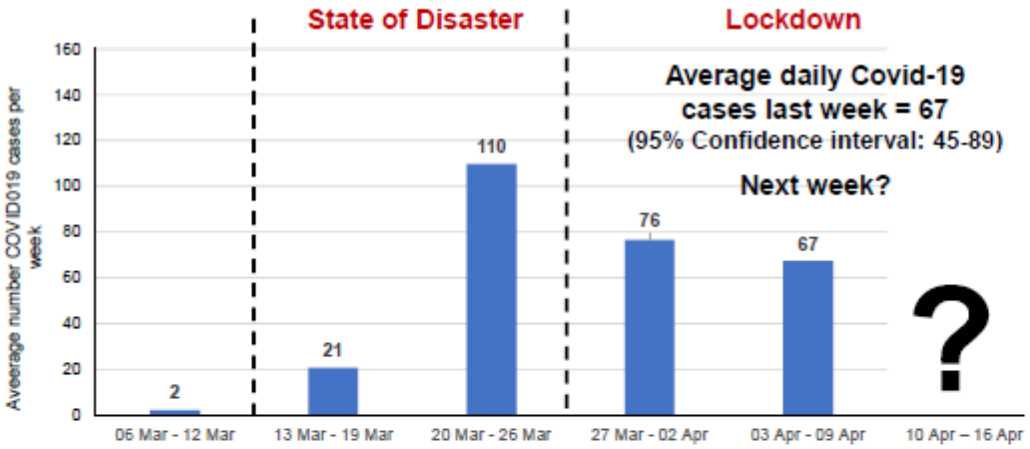
- The Community response: door-to-door screening, testing, isolation and contact tracing

Stages of SA's COVID-19 response



What should we do this week?

Follow the lockdown rules and monitor community transmission by average daily cases & community positivity/screened



Community transmission levels to guide next steps & the lockdown

- **By 18th April, will know if community transmission interpretation accurate (~67 cases/day; CI: 45 - 89)**
- **Epidemiological (R_o) criterion for lockdown - if average daily cases** (- active screening) **from 10 – 16 April is:**
  - **90+, then continue lockdown**
  - **45 - 89 AND CHW rate is >0.1% then continue lockdown**
  - **45 - 89 AND CHW rate is ≤0.1% then ease lockdown**
  - **≤ 44, then ease lockdown**
- **Expect large daily variations & some increases in +ve tests due to active case-finding** (passive vs active cases)
- **Abrupt return may increase spread – plan the systematic easing of the lockdown over several days:**
  - Stepwise approach to reduce risk of rapid transmission taking economic imperatives & social disruption into consideration

Next stages of South Africa's response

Stage 5: Hotspots

- Surveillance to identify & intervene in hotspots
- Spatial monitoring of new cases
- Outbreak investigation & intervention teams

Field hospital in Central Park, New York

Stage 6: Medical Care (for the peak)

- Surveillance on case load & capacity
- Managing staff exposures and infections
- Building field hospitals for triage
- Expand ICU bed and ventilator numbers

Stage 7: Bereavement & the Aftermath

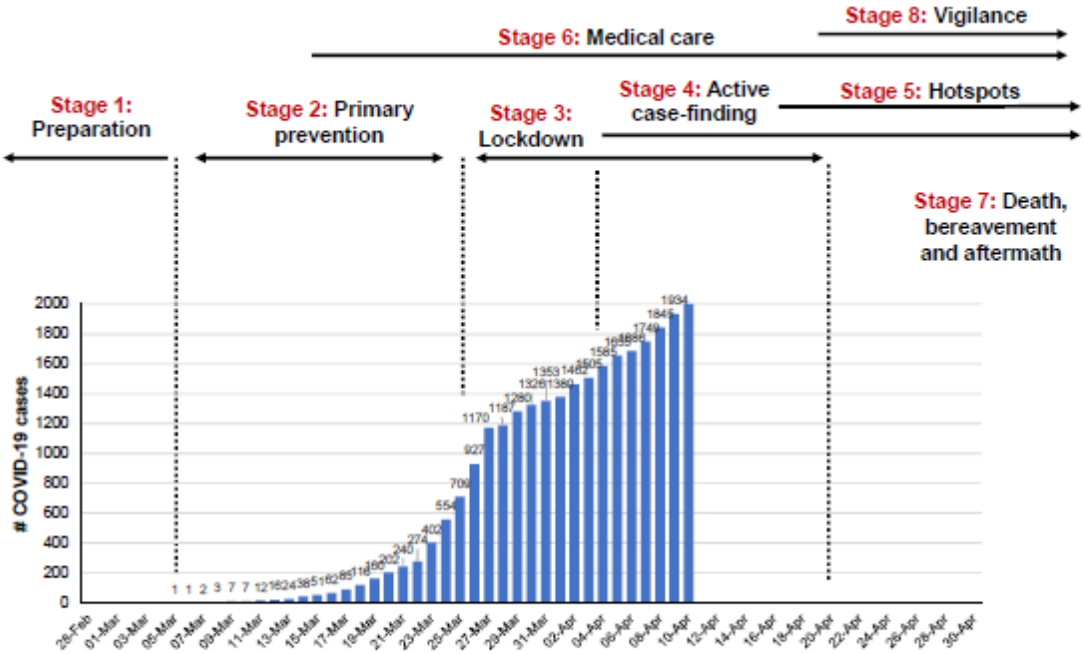
- Expanding burial capacity
- Regulations on funerals
- Managing psychological and social impact

Stage 8: Ongoing Vigilance

- Monitoring Ab levels
- Administer vaccines, if available
- Ongoing surveillance for new cases

CAPRISA

Stages of SA's COVID-19 response



CAPRISA

Outline

Part 1: The Coronavirus epidemic

- The Coronavirus epidemic in South Africa
- Why is SA not on the expected trajectory?
- How much community transmission in SA?
- Some future epidemic scenarios

Part 2: South Africa's Covid-19 response

- Stages of the SA Covid-19 response
- **Next steps: Stopping small flames to reduce the risk of raging fires**
- **Conclusion**

Stage 8: Vigilance / surveillance

- **Need to stay one step ahead of viral spread and not wait for patients to arrive in hospitals to act**
- **3 components to surveillance:**
  - Ongoing CHW house-to-house screening and testing especially in vulnerable communities
  - One day each month – health worker surveillance
  - One day each month - National surveillance day for schools, mines, prisons & big companies
  - For now self-taken swabs (later change to fingerprick) from a small sample of people in each setting

Major concerns for stage 6 – The medical care response

- Poor health care access = ↑ deaths (NY)
- Need an effective ambulance system
- HIV+ (not on ART) & TB patients may ↑ severity
- Both Covid & Flu epidemics intermingled
- Need a voluntary partial lockdown until end September just for old people (>70 or >60) and those with co-morbidities to reduce exposure
- Field hospitals for triage, mainly in big cities
- Getting staff ready for the exponential curve, hospitals with makeshift ICUs, more ventilators & PPE

CAPRISA

Conclusions

- SA has a unique epidemic trajectory
- Current trajectory due to curtailed community transmission from effective early interventions
- The exponential curve is almost inevitable
- Lockdown bought SA some time (about 4 to 6 weeks) and will likely reduce peak case load (flattened curve)
- Systematic approach to keeping infection rates low while easing lockdown in stages
- Focus shifts to Stage 5 of hotspot identification and intervention (fighting flames before they become fires), to Stage 6 – preparing for peak medical care response & Stage 8 – Vigilance & national surveillance

CAPRISA

Acknowledgements

Minister Zweli Mkhize & Professor Abdool Karim thank:

- **Nonhlanhla Yende-Zuma, Quarraisha Abdool Karim & Cheryl Baxter of CAPRISA**
- **Tulio D'Oliviera of KRISP & KZN Big Data CoV Consortium**
- **Yogan Pillay & Anban Pillay of the NDoH**
- **Jane, Janine and Amanda of the secretariat**
- **NatJoints Committee members**
- **The Ministerial Advisory Committee for Covid-19**
- **The National Covid Command Council**
- **All the hard-working people tackling the Coronavirus epidemic, especially health care workers on the frontline**

Appendix B: A detail description of RESCOP

RESEARCH ETHICS SUPPORT IN COVID-19 PANDEMIC (RESCOP): PROPOSED RAPID REVIEW PROCESS FOR SOUTH AFRICAN RECs

Background

The World Health Organization characterized COVID-19 as a pandemic on March 11, 2020. The number of cases and the mortality rate outside its starting point in China have increased exponentially, including in South Africa where the first case was diagnosed on the 5th March. The doubling time in South Africa has been in the region of 3 days, but could very soon reach 24 hours. Its immediate effect amongst vulnerable communities and individuals give rise to grave concerns. Not only must the speed of transmission be reduced, but appropriate scientifically proven therapies are essential to allow for health services in the country to be able to care for people with the disease.

International scientific partnerships leading to multicenter and multinational COVID-19 Research and clinical trials have become necessary. In the face of the COVID-19 public health emergency, the usual timeframes for research ethics review must be reduced without undermining the substantive protections provided by the review process. Mechanisms need to be developed to ensure that urgency is not used to circumvent standards for the ethical conduct of research; safety and respect for human rights of the participants that are to be enrolled in COVID-19 studies. Moreover, research conducted during this time must take into consideration other public health interventions and at no time should these studies compromise the public health response to the pandemic or the provision of appropriate clinical care. Mechanisms will also need to be established to restrict conflicts of interests, in particular those of a political nature; timely and wide dissemination of information including results; and relations with sponsors including drug companies. The research community must comply with established ethics guidelines before, during and after the conduct of this research. Quarantined individuals are particularly vulnerable, hence special care is required when enrolling them in proposed studies. This must reflect in the informed consent procedures and follow-up.

In South Africa, the National Health Act, section 72 mandates the establishment of the National Health Research Ethics Council (NHREC) whose functions include *inter alia* to set norms and standards for the conduct of research in humans [72(c)]. The NHREC has published binding national guidelines, *Ethics in Health Research: Principles, Processes and Structures* (DoH, 2015, 2nd ed.) as the norms and standards for ethical conduct of health-related biomedical and social science research in South Africa.

Section 3.4.1 of these guidelines describes a major incident as any sudden event that occurs where local resources are constrained, making urgent response difficult. Unusual and sudden demands on local resources could have ethical implications for patient care. Research in these contexts could be critical for advancing emergency health care interventions and treatments. While the guidelines emphasise that patients in these contexts would be extremely vulnerable, RECs are cautioned not to be overly restrictive and recommend that the ethics clearance process must occur very rapidly and that related research proposals should be rapidly processed without compromising rigour. For example, minimal risk studies could undergo rapid expedited review, while more than minimal risk studies could undergo rapid full committee review. RECs should innovate in developing such rapid review processes in line with DoH (2015) 3.4.1.

Regarding consent in major incident research the guidelines state that, proxy consent may be ethically permissible "where no statutory proxy is available if the risk of harm to knowledge ratio justifies it." (DoH, 2015, 3.2.4.3). The REC may approve delayed consent in certain circumstances (3.2.4.3).

Section 3.2.4.4 describes the minimum conditions for research involving adults who are incapacitated as follows:

"Research involving incapacitated adults should be approved only if

i. The research, including observational research, is not contrary to the best interest of the individual;
ii. The research, including observational research, places the incapacitated adult at no more than minimal risk (i.e. the 'everyday risk standard' which means the risk is commensurate with 'daily life or routine medical, dental or psychological examinations and in social or education settings activities' – referred to as 'negligible risk' in some guidelines); or
iii. The research involves greater than minimal risk but provides the prospect of direct benefit for the incapacitated adult. The degree of risk must be justified by the potential benefit; or
iv. The research, including observational research, involves greater than minimal risk, with no prospect of direct benefit to the incapacitated adult, but has a high probability of providing generalizable knowledge; i.e. the risk should be justified by the risk-knowledge ratio;
v. Greater than minimal risk must represent no more than a minor increase over minimal risk;
vi. The legally appropriate person (treatment proxies as stipulated in NHA s 7 or s 27(1)(a) of the Mental Health Care Act 17 of 2002) gives permission for the person to participate; and
vii. Where appropriate, the person will assent to participation. Note that the incapacitated person's refusal or resistance to participate, as indicated by words or behaviour, takes precedence over permission by a proxy.

The National Health Act specifies the sequence of legally appropriate treatment proxies as spouse or partner; parent; grandparent; adult child; brother or sister. The Mental Health Care Act provides, in no particular sequence, that legally appropriate proxies are spouse; next of kin; partner; associate (defined as 'a person with a substantial or material interest in the well-being of a mental health care user or a person who is in substantial contact with the user'); and parent or guardian."

RESCOP is of the view that where there is no proxy, and the patient passes on without being able to provide delayed consent, the relevant REC should be provided with motivation for retention and use of the data in the study. It is imperative that all valuable data is utilised in societal interests.

Section 3.2.6 of the guidelines describes the approach to be taken when reviewing research involving patients who are highly dependent on medical care. Because of their medical vulnerability, and the fact that their decision-making and communication skills may be compromised, special attention needs to be paid when considering their participation. The guidelines (3.2.4.3 & 3.2.6) also allow for the REC to approve delayed consent in particular circumstances in this context. However, it is emphasised that this **does not mean that consent is waived**. Clear and full justification for delayed consent must accompany the research proposal. It is also important to carefully consider the individual circumstances of the patient so as to avoid violating personal or cultural values.

The following criteria must be satisfied when approving delayed consent:

- *"the research is based on valid scientific hypotheses that support a reasonable possibility of more benefit than that offered by standard care; and*
- *participation is not contrary to the medical interests of the patient; and*
- *the research interventions pose no more risk of harm than that inherent in the patient's condition or alternative methods of treatment; and*
- *the research is based on valid scientific hypotheses that support a reasonable possibility of more benefit than that offered by standard care; and*
- *as soon as reasonably possible, the participant and her relatives or legal representatives will be informed of the participant's inclusion in the research; be requested to give delayed consent; and advised of the right to withdraw from the research without any reduction in quality of care."*

Section 4.5.1.4 of the DoH (2015) guidelines allow RECs to recognize prior review and approval by another registered REC at their discretion to avoid duplication of effort. Where two or more RECs recognize each other's prior review, this is termed "reciprocal recognition". It is for the REC to determine the nature of the documents to be filed locally. At minimum, this should include a copy of the approval letter from the other REC. The decision to recognize prior review and approval may be revised by the REC if justifying circumstances arise for such revision. The reasons for such reversal of decision will need to be documented.

RECs and RESCOP should also keep abreast of rapidly evolving international guidance documents that address ethical issues and procedures for research in emergency situations, including COVID-19. These are being collated in a shared RESCOP Dropbox folder and in a new WHO open access COVID-19 resources website see (Pending – RESCOP will circulate URL as soon as it goes live).

RESEARCH ETHICS SUPPORT IN COVID PANDEMIC (RESCOP)

RESCOP is an informal, voluntary research ethics support group. Its 'membership' is currently chairs of RECs, members of SAHPRA and other research ethics role players and interested parties with research ethics expertise. RESCOP in principle supports the rapid review and recognition of prior review by another REC as per the NHREC guidelines, provided that the rights and interests of research participants being safeguarded at all times and that National and International ethics norms and standards will be adhered to al all times (RESCOP meeting notes 24 March 2020).

If requested to advise on the ethics of clinical trials and other COVID-19 related research, a possible process to be followed is outlined below.

1. RESCOP could advise on and track the rapid review process.
2. For multi-site, multi-institution proposals, the primary rapid expedited or rapid full review (depending on risk level) will be conducted by the institutional REC of the National PI of the study in question.
3. The rapid review should take at minimum 48 hours for a minimal risk study and ideally no longer than 72 hours for a clinical trial.
4. The primary REC or PI may consult RESCOP for informal advice.
5. The National PI may share the review outcome of the review to RESCOP.
6. The REC's concerns, comments and recommendations may be reviewed by RESCOP and the National PI.
7. On request, RESCOP is available to support and advise the National PI and local PIs and related RECs during this process as and when the need arises.

ACKNOWLEDGEMENTS:

RESCOP meeting minutes 24 March, 2020.

REFERENCE:

Department of Health (2015). *Ethics in Health Research: Principles, Processes and Structures (2nd ed.).* Pretoria: Author.

RESCOP CONTACT DETAILS:

Prof Marc Blockman (UCT) Marc.Blockman@uct.ac.za

Prof Doug Wassenaar (UKZN) wassenaar@ukzn.ac.za

Prof Mariana Kruger (US) marianakruger@sun.ac.za (and RESCOP shared DropBox access)

Prof Ames Dhai (SAHPRA) Ames.Dhai@wits.ac.za