

Essential facts about

COVID-19

**The disease,
the responses and
an uncertain future**

**For South African Learners,
Teachers and
the General Public**



Commissioned by the Academy of Science of South Africa (ASSAf)



The **Academy of Science of South Africa** (ASSAf)

was inaugurated in May 1996. It was formed in response to the need for an Academy of Science consonant with the dawn of democracy in South Africa:

activist in its mission of using science and scholarship for the **benefit of society**, with a mandate encompassing all scholarly disciplines that use an **open-minded** and **evidence-based** approach to build **knowledge**. ASSAf thus adopted in its name the term 'science' in the singular as reflecting a common way of enquiring rather than an aggregation of different disciplines. Its Members are elected on the basis of a combination of two principal criteria, **academic excellence** and **significant contributions to society**.

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PREFACE

The first cases of a new coronavirus (SARS-CoV-2) were identified toward the end of 2019 in Wuhan, China. Over the following months, this virus spread to everywhere in the world. By now no country has been spared the devastation from the loss of lives from the disease (Covid-19) and the economic and social impacts of responses to mitigate the impact of the virus. Our lives in South Africa have been turned upside down as we try to make the best of this bad situation. The 2020 school year was disrupted with closure and then reopening in a phased approach, as stipulated by the Department of Education.

This booklet is a collective effort by academics who are Members of the Academy of Science of South Africa (ASSAf) and other invited scholars to help you appreciate some of the basic scientific facts that you need to know in order to understand the present crisis and the various options available to respond to it. We emphasise that the threat of infectious diseases is not an entirely new phenomenon that has sprung onto the stage out of nowhere. Infectious diseases and pandemics have been with us for centuries, in fact much longer. Scientists have warned us for years of the need to prepare for the next pandemic.

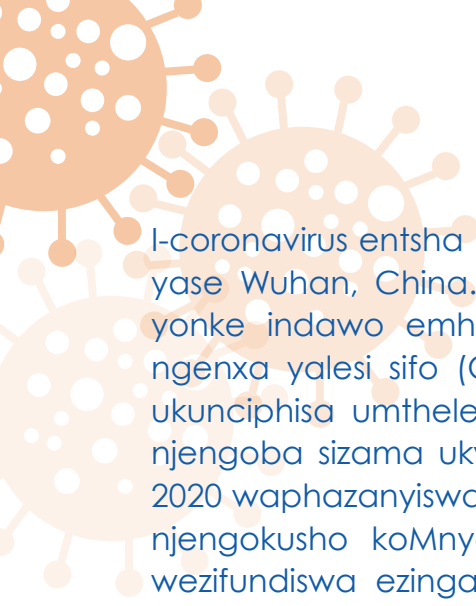
Progress in medicine in the course of the 20th century has been formidable. Childhood mortality has greatly decreased almost everywhere in the world, thanks mainly, but not only, to the many vaccines that have been developed. Effective drugs now exist for many deadly diseases for which there were once no cures.

For many of us, this progress has generated a false sense of security. It has caused us to believe that the likes of the 1918 'Spanish flu' pandemic, which caused some 50 million deaths around the world within a span of a few months, could not be repeated in some form in today's modern world.

The Covid-19 pandemic reminds us that as new cures for old diseases are discovered, new diseases come along for which we are unprepared. And every hundred or so years one of these diseases wreaks havoc on the world and interferes severely with our usual ways of going about our lives. Today's world has become increasingly interconnected and interdependent, through trade, migrations, and rapid air travel. This globalisation makes it easier for epidemics to spread, somewhat offsetting the power of modern medicine.

In this booklet we have endeavoured to provide an historical perspective, and to enrich your knowledge with some of the basics of medicine, viruses, and epidemiology. Beyond the immediate Covid-19 crisis, South Africa faces a number of other major health challenges: highly unequal access to quality healthcare, widespread tuberculosis, HIV infection causing AIDS, a high prevalence of mental illness, and a low life expectancy, compared to what is possible with today's medicine. It is essential that you, as young people, also learn about the nature of these new challenges, so that you may contribute to finding future solutions.

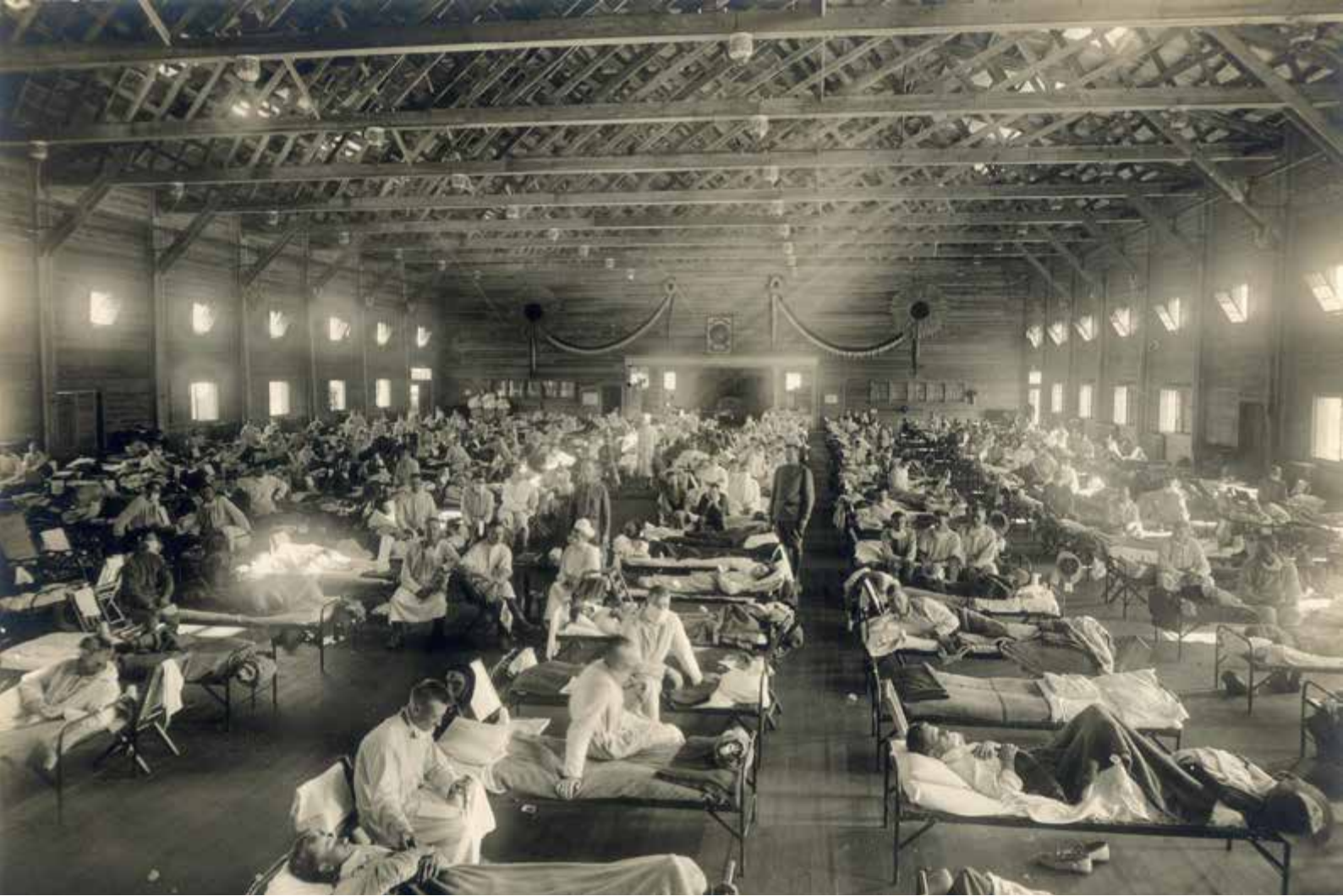
The Editors



I-coronavirus entsha (i-SARS-CoV-2) ikhonjwa ngasekupheleni kuka-2019 endaweni yase Wuhan, China. Ezinyangeni ezilandelayo, leli gciwane lasakazeleeka kuyo yonke indawo emhlabeni. Okwamanje alikho izwe elisindile ekufenikwabantu ngenxa yalesi sifo (Covid-19), kanye nemithelela kwezomnotho, nakwezenhlalo ukunciphisa umthelela wegciwane . Izimpilo zethu eNingizimu Afrika zibebucayi njengoba sizama ukwenza okusemandleni kulesi simo esibi. Unyaka wesikole ka-2020 waphazanyiswa ukuvalwa wabe uvulwa ngaphansi kwemigomo enezigaba, njengokusho koMnyango Wezemfundo. Le ncwajana iwumzamo ohlanganyelwe wezifundiswa ezingamalungu e-Academy of Science ENingizimu Afrika (ASSAf) nezinye izifundiswa ezimenyiwe ukukusiza ukuthi wazi ezinye zezinto eziyisisekelo, namaqiniso esayensi odinga ukuwazi ukuze uqonde ubunzima obukhona njengamanje.

Siyakugcizelela ukuthi usongo lwezifo ezithathelanayo akusiyo into entsha ngokuphelele eye yavela kungazelelwe. Izifo ezithathelanayo nezifo eziwubhubhane bezinathi emakhulwini eminyaka edlule. Ososayensi basixwayisile iminyaka eminingi ngesidingo sokulungiselela ubhubhane olungalandela. Intuthuko kwezokwelapha kwiminyaka engaba yikhulu-namashumi amabili ibe nkulu kakhulu. Ukufa kwezingane kwehle kakhulu cishe yonke indawo emhlabeni, sibonga ikakhulukazi imithi yokugoma ekhiqiziwe. Imishanguzo esebenzayo manje kukhona izifo eziningi ezibulalayo. Kwabaningi bethu, lenqubekela phambili idale umuzwa ongewona wokuphepha. Kusenze sakholwa ukuthi kwakunjani ngobhubhane 'lomkhuhlane waseSpain' lwango-1918, olwabangela ukufa kwabantu abangaba yizigidi ezingama-50 umhlaba kungakapheli isikhathi sezinyanga ezimbalwa, ubungeke uphindwe ngendlela ethile esimweni sanamuhla umhlaba. Ubhubhane lweCovid-19 lusikhumbuza ukuthi njengoba kutholakala ukwelashwa okusha kwezifo ezindala, okusha izifo ziza lapho esingazilungiselele. Futhi njalo eminyakeni eyikhulu noma ngaphezulu eyodwa yalezi izifo zizolimaza umhlaba futhi ziphazamisa kakhulu izindlela zethu ezijwayelekile zezimpilo.

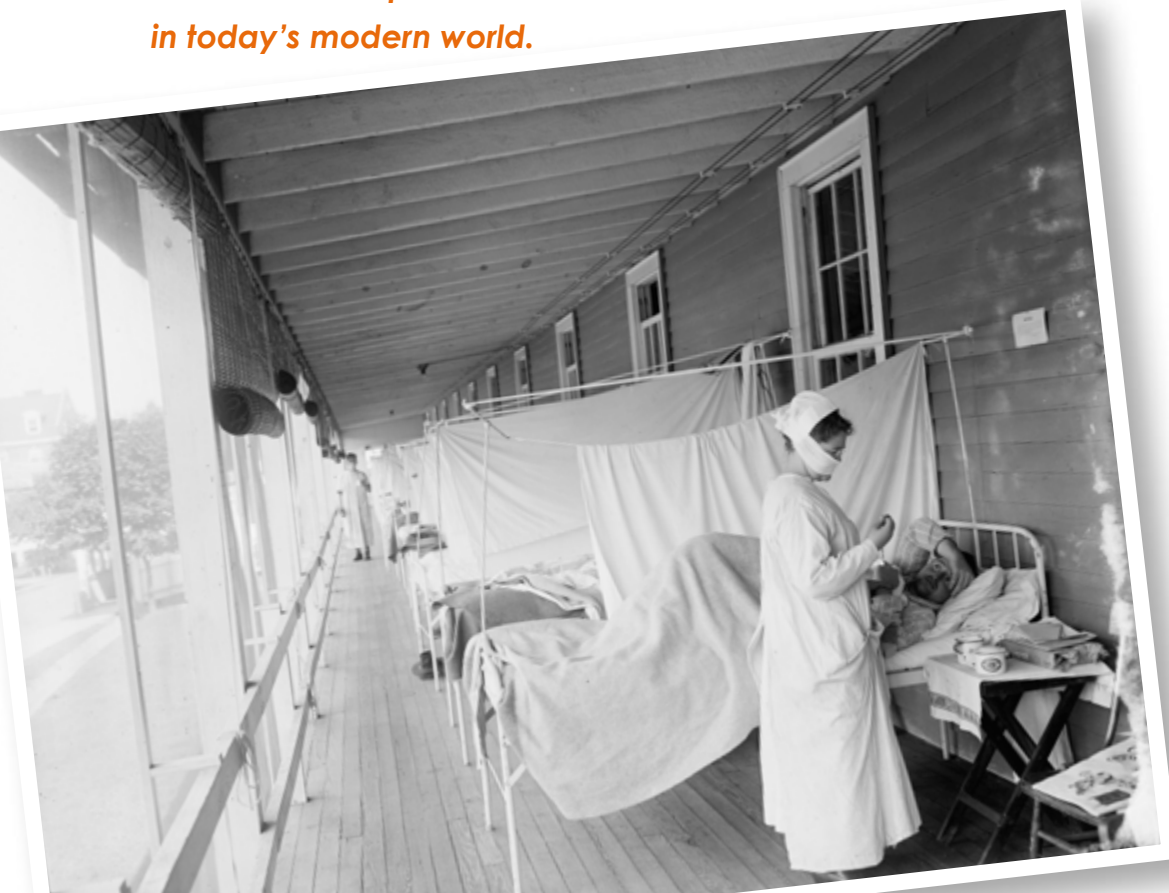
Izwe lanamuhla seliya ngokuya lixhuma futhi lincikene, ngokusebenzisa ukuhweba, ukufuduka, nokuhamba emoyeni okusheshayo. Lokhu kubumbana kwembulunga yonke kwenza kube lula ukuthi ubhubhane lusabalale, ngandlela thile ukucisha amandla ezokwelapha zesimanje. Kule ncwajana sizame ukunikeza umbono womlando, nokunothisa ulwazi lwakho ngezinye izisekelo zemithi, amagciwane, kanye nezifo ezithathelanayo. Ngaphandle kwenkinga esheshayo ye-Covid-19, iNingizimu Afrika ibhekene nezinye izinselelo ezinkulu zezempilo: kakhulu ukufinyelela ngokungalingani ekunakekelweni kwezempilo okusezingeni, isifo sofuba esandile, ukutheleleka ngegciwane lenculazi, Kanye nokwanda kakhulu kwezifo zengqondo. Kubalulekile ukuthi nina, njengabantu abasha, nifunde ngemvelo nezinselelo ezintsha, ukuze nibambe iqhaza ekutholeni izixazululo ngezikhathi ezizayo.



Emergency hospital during influenza epidemic, Cape Funston, Kansas

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1918 Spanish Flu pandemic.

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FOREWORD

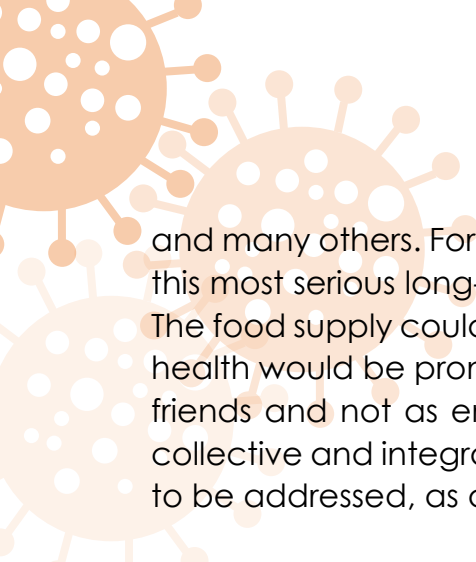
Educators are still divided on the relative merits of systematically imparting the basic principles of established disciplines as opposed to creating favourable conditions in which learners can flexibly explore how the tools of different disciplines can be used in context, to understand one big and highly relevant problem area 'in the round', so to speak.

The first approach reflects an older world in which young people were required to undergo formal apprenticeships in trade or craft guilds, a model which then evolved into the kind of discipline (or 'subject')-based schooling that became general in most high schools all over the world. The second is more suited to the modern world, where knowledge is expanding quickly, where adaptability and versatility are essential, where individuals can have many careers in one lifetime, and where most enterprises require teamwork. (I should add that ultimately there is no substitute for specialists being fully trained in their own discipline to be effective practitioners, but it is also helpful if they have already learnt to study things 'in the round' and to work across disciplinary lines.)

This booklet is based squarely on the contextual exploration of a multi-sided topic that is affecting every one of us, the great Covid-19 pandemic of late 2019 onwards to the present time and beyond.

This booklet is based squarely on the contextual exploration of a multi-sided topic that is affecting every one of us, the great Covid-19 pandemic of late 2019 onwards to the present time and beyond. It assumes that motivation amongst learners to explore the topic will be high, as to understand it more fully is actually necessary in order to survive, as individuals, families, communities and as a nation, itself within the community of nations that represents humankind. There is history here, as well as the biology of pathogens and hosts; applied mathematics and epidemiology; human and animal medicine; psychology; economics; ethics; and politics. Everything hangs together and can't be understood in isolation. It is ONE problem, ONE crisis, and the tools of many disciplines have to be applied to all its facets.

When the great 'Cold War' ended in 1989, forty-four years after World War Two had ravaged much of the earth, most people hoped that the 'old world' of mindless nationalism, wars, and destructive competition would be replaced by a cooperative 'new world' of shared, cooperative institutions such as the United Nations, the World Health Organisation, the World Trade Organisation, the International Criminal Court,



and many others. For example, the Paris Accord on Climate Change would address this most serious long-term problem cooperatively, all shoulders to the same wheel. The food supply could be optimised so that few people would be hungry and global health would be promoted. People would get to know 'the other' and see them as friends and not as enemies or rivals. (Strange how these aspirations resemble the collective and integrated way in which a major global disaster such as Covid-19 has to be addressed, as described above.)

A very striking example of 'world cooperation' has been the decision of all science publishers across the globe to make all articles dealing with Covid-19 freely available on the internet to every reader, and to speed up the publication of new findings in various new ways. It has provided a welcome glimpse of the kind of equal open access to knowledge that scientists and the public have long sought.

In recent years, many nations have unfortunately fallen back on outmoded ways of selfishly thinking about themselves in, or rather against, the world and this has also disappointingly surfaced in their responses to their local versions of the pandemic. Yet anybody reading this booklet cannot fail to see how wrong it is to be selfish at any level in a global pandemic caused by a highly infectious and damaging virus that has its own ways of overcoming everything we throw at it. Team Humankind has its work cut out to win this struggle. You, the reader of this booklet, are part of the team. Knowing what you can learn in this booklet will enable you to play an active role and to avoid falling into traps of misinformation, confusion and group hysteria.

Enjoy the read—you will learn a great deal that will be both useful and very interesting. And who knows, in your life ahead, you may have reason to be very thankful that you took the trouble to be well-informed about this pandemic, when the next one strikes the world.

Wieland Gevers

Emeritus Professor of Medical Biochemistry, University of Cape Town;
President of ASSAf, 1998-2004.





Eminyakeni yamuva nje, izizwe eziningi ngeshwa zibuyele emuva ngomcabango, ikakhulu ngokuzicabangela zona zodwa. Kodwa-ke noma ngubani ofunda le ncwajana ngeke ahluleke ukubona ukuthi kubi kangakanani ukuba nobugovu noma yiliphi. Wena, mfundi wale ncwajana, uyingxenywe yeqembu ezodlala indima, igweme nokuwela emgibeni wolwazi olungelona iqiniso, ukudideka kanye ne-hysteria yeqembu. Kujabulele ukufunda - uzofunda okuningi okuzoba wusizo futhi kuthakazelise kakhulu. Futhi ngubani owaziyo, empilweni yakho engaphambili, ungaba nesizathu sokubonga kakhulu ngalokho uthathe isikhala sokwaziswa kahle ngalolu bhuhane, lapho olulandelayo ushaya umhlaba.



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The Parliament of South Africa passed the Academy of Science of South Africa Act (No 67 of 2001), which came into force on 15 May 2002. This made ASSAf the only academy of science in South Africa officially recognised by government and representing the country in the international community of science academies and elsewhere.

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