

## MEDIA RELEASE

### UP academics predict COVID lockdown measures will become increasingly difficult to enforce

**PRETORIA** – A study by a team led by academics at the University of Pretoria (UP) predicts that South Africans’ waning compliance with government lockdown regulations will limit their impact in curbing the COVID-19 pandemic.

A consequence of this is that “strict lockdown measures, as required to limit exponentially increasing infections, may have to be relaxed rather abruptly, as economic losses will become too great,” predicted Professor Ian Craig, of the Department of Electrical, Electronic and Computer Engineering at the Faculty of Engineering, Built Environment and Information Technology (EBIT).

He, along with UP’s Dr Laurentz Olivier of EBIT and process control engineer Stefan Botha, published their study, *Optimized lockdown strategies for curbing the spread of COVID-19: A South African case study*, in the online open-access archive, arXiv. It follows on from an epidemiological model for the spread of COVID-19 in South Africa developed by Prof Craig and Dr Olivier, which they used to predict that South Africa’s COVID-19 infections could exceed 570 000.

The team has now combined that model with a hybrid-model predictive controller to optimise lockdown management under different policy scenarios. According to Prof Craig, the considered scenarios include how to flatten the infection curve to a level that the healthcare system can cope with, how to balance lives and livelihoods, and what impact the population’s compliance with lockdown measures has on the spread of COVID-19.

“To curb the spread of COVID-19, many governments around the world have implemented tiered lockdowns with varying degrees of stringency,” he said. “Lockdown levels are typically increased when the disease spreads, and reduced when the disease abates.” South Africa is now at level 3 of its lockdown, which allows for economic activity, but infection is increasing exponentially. Prof Craig explains that the South African case is one of interest, as the number of confirmed infectious cases has yet to peak, but the government is already reducing the degree of lockdown.

“The early, strict lockdown measures in South Africa have been successful from an epidemiological point of view, but great harm was done to an economy that was already weak before the COVID-19 pandemic started,” the team explains. There was pressure to relax the lockdown measures, despite the fact that the number of infectious individuals was still growing rapidly.

One policy approach to managing lockdown levels is to flatten the curve to prevent overwhelming the healthcare system. Some infected individuals need hospitalisation and intensive care – there are studies that show that roughly 5% of confirmed active infectious cases require admission to intensive-care units. As more individuals are exposed and infected, healthcare systems can easily become overwhelmed, especially in developing countries with fragile and underdeveloped healthcare systems. “The amount of ICU beds available can therefore serve as a high limit for the number of infected individuals needing intensive care.”

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The team's paper shows that when implementing the "flattening the curve" policy the lockdown might end up being extremely long, which has an economic impact. Preventing economic activity, and thereby preventing certain people from earning a living, will likely increase poverty, which in itself leads to lives lost prematurely. To address this, another policy is investigated – the "balancing of lives and livelihoods" policy, under which strict lockdown measures are not imposed for too long, even though the healthcare capacity may be exceeded. This policy therefore reduces lockdown levels to curb economic losses, even though infection rates may be considered to be unacceptably high. This scenario is currently playing out in various countries in the developing world.

South Africa has exceeded 100 days of lockdown but "some residents cannot or will not endure living under continual lockdown regulations, for various reasons," Prof Craig said. The team refers to a *Business Tech* article which states that 230 000 cases have been opened against South Africans for violating lockdown rules by 22 May 2020. A third scenario was therefore investigated, to see what impact compliance with lockdown measures has on the spread of COVID-19. "There is a very delicate balance to be maintained when implementing policy decisions. Consideration should be given to the effect that policies may have on the citizens of the country concerned. If not, compliance may be reduced, and disgruntled citizens may deliberately violate regulations or fail to keep track of which lockdown level is in force."

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## **ABOUT THE UNIVERSITY OF PRETORIA**

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on the Hatfield Campus, Pretoria. This 112-year-old institution is also the largest producer of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country that has a Faculty of Veterinary Science which is ranked top in Africa, and overall has 120 academic departments, as well as 92 centres and institutes, accommodating more than 55 000 students and offering about 1 100 study programmes.

UP is one of the top five universities in South Africa, according to the 2019-2020 rankings by the Center for World University Rankings. It is also ranked among the top 100 universities worldwide in three fields of study (veterinary science, theology and law), and among the top 1% in eight fields of study (agricultural sciences, clinical medicine, engineering, environment/ecology, immunology, microbiology, plant and animal sciences and social sciences).

In May 2020, the annual UK Financial Times Executive Education Rankings once again ranked GIBS as the top South African and African business school. The University also has an extensive community engagement programme with approximately 33 000 students involved in community upliftment. Furthermore, UP is building considerable capacities and strengths for the Fourth Industrial Revolution by preparing students for the world beyond university and offering work-readiness and entrepreneurship training to its students.

As one of South Africa's research-intensive universities, UP launched the *Future Africa Campus* in March 2019 as a hub for inter- and transdisciplinary research networks within UP and the global research community to maximise 4IR innovation and address the challenges and stresses our continent and world is facing. In addition, UP also launched the Javett Art Centre in September 2019 as a driver of transdisciplinary research development between the Humanities and other faculties. In 2020 UP will launch Engineering 4.0. as a hub not only for Smart Cities and Transport, but also to link the vast resources in technology and data sciences to other faculties via Future Africa. These initiatives are stimulating new thinking at the frontier of 'science for transformation'.

For more information, go to [www.up.ac.za](http://www.up.ac.za)