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## UCT lecture highlights power of mathematical modelling in saving lives

*Academic worked 20 hours a day on modelling as a tool for the national Department of Health during COVID-19*



Professor Sheetal Silal

Photo: Lerato Maduna

[Professor Sheetal Silal](#), director of the University of Cape Town's (UCT) [Modelling and Simulation Hub, Africa \(MASHA\)](#), recently delivered an inspiring and engaging inaugural lecture titled "Models, Policy and People: Predicting Health Impact in a Complex World".

Professor Silal discovered her life's passion when she turned her gift for mathematics to public health and real-life outcomes that impact people and communities. It took a pivot

thanks to a mentor, the late Emeritus Professor Theo Stewart, into a master's in operations research, and the fortuitous reading of a paper on modelling malaria outcomes, that led to a PhD in mathematical modelling of infectious diseases.

"Ultimately it is about human safety. Using mathematical modelling and simulation, we can create a virtual reality of a disease within a population, and then experiment on it and interrogate it in a fraction of the time and cost you could do in reality. In this way, you can draw on the experience of a 100-year history in minutes, and help the government plan and respond better."

As the chair of the World Health Organization's (WHO) Immunization and Vaccines-related Implementation Research Advisory Committee and a member of the WHO Collaboratory Technical Advisory Group, she plays a role in shaping global health strategies and promoting the use of modelling in health policy and planning.

Silal, a professor in UCT's [Department of Statistical Science](#), focuses on unpacking vast, complex models, systems and data in such a way that it creates actionable insights for public-health decision-makers. She has played a pivotal role in promoting the use of modelling as a decision-support tool in enabling a broader understanding of the dynamics of infectious diseases, notably malaria, COVID-19 and other infectious and vaccine-preventable diseases such as measles and rubella.

In 2020, the MASHA research team was thrown into a baptism of fire with the onset of the COVID-19 pandemic. With the world in crisis and a potentially deadly disease on the doorstep, Silal and team created a bubble in which they worked through lockdown, often putting in 16-hour days. Silal worked 20 hours, playing a pivotal role in harnessing modelling as a decision-support tool for the national Department of Health.

"This kind of modelling calls for tenacity and adaptability," said Silal, who was a leader within the South African COVID-19 Modelling Consortium (SACMC), helping guide the government in its pandemic planning and response. Facing unrelenting pressure day after day, they worked with ever-changing data, factoring in fresh evidence while negating newly disproved theories.

In so doing, the SACMC was helping to inform everything from government policy, and the budget needed to fund SA's response and vaccination programme; to national, provincial and district practicalities such as staff, bed, ventilators, oxygen, drugs, testing and mortuary requirements. They also modelled the macroeconomic impact on the country's economy and monitored resurgences of COVID-19.

"It was not just about the immediacy of COVID-19, but what the future held," said Silal.

"Maths modellers were called 'witches'. People wanted predictions, but modelling is so much more useful than just that.

"It all comes down to actionable insights for public health decision makers. Do we need vaccines? Will one dose work? Do we need two? What ages do we start at? What will be the cost? What is the likely morbidity? How many hospital beds? How much oxygen is needed?"

Systems thinking means looking at an entire public health system, leading to excessively complex models. How big will a measles outbreak be? How long will it last? What will be the cost? It takes looking at communities, income and inequalities, behaviours, risk factors such

as diet and pollution, the policy framework and health system, and budgets. How best can available funds be spent?

“We have to take into account what is feasible and implementable, and it must be able to be translated into reality – that is the space in which MASHA thrives,” said Silal.

Today, Silal has 11 doctoral and 13 master’s candidates under her supervision, having supervised four doctoral students and 19 master’s students to graduation.

Professor Elelwani Ramugondo, UCT’s deputy vice-chancellor for People, Culture and Society, said: “Professor Silal’s research speaks to some of the most pressing challenges we face – not only in South Africa, but globally. It’s about people. Behind every data set lies communities and realities faced.”

Jared Norman, a research officer at MASHA, noted: “Sheetal has a rare ability to link mathematical modelling to real-world decision-making. She is a storyteller. She understands that a result nobody understands changes nothing. A result that lands – that reaches the decision-maker, the clinician, the policy maker – changes everything. She has spent her career building that bridge.

“It is not just producing excellent science but making sure it reaches the people who need it most.”

*Story by Lisa Templeton, UCT News*

**ENDS**

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