

My Master's Thesis Journey in the South

Endemic–Epidemic Modelling of the COVID-19 Pandemic in South Africa

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- Thank you for joining this community talk.
- This is the story of taking what we learn in Belgium and applying it in South Africa.
- Goal: use data and statistics to understand how COVID-19 spread across provinces.

Why I Chose to Do My Master's Thesis *in the South*

- Many students complete their thesis in Europe; I chose a developing context.
- Through the **DSI–South collaboration**, supported by **VLIR-UOS**, I worked in South Africa.
- **Broaden knowledge back to Africa:** apply advanced methods in real-world, resource-limited settings.
- Show that methods that seem complex in class are **doable and useful** in low- and middle-income countries.
- Give back by supporting public-health systems with **evidence from data**.



My Journey to the South

- Travelled to **Durban, South Africa**, hosted at the **South African Medical Research Council (SAMRC)**.
- The UHasselt-SAMRC partnership provided mentorship, data access, and practical research exposure.
- Adapting to a new environment deepened my appreciation for collaborative research in developing contexts.

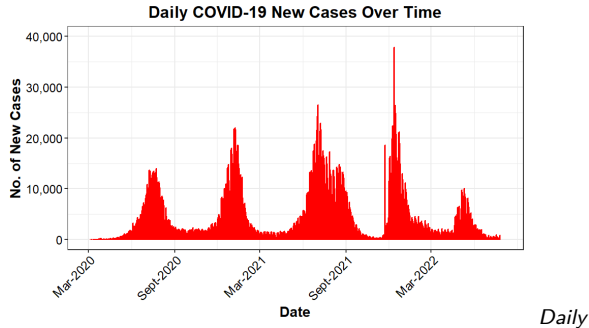


What I Worked On

- Daily COVID-19 cases from **9 provinces** (Mar 2020 - Jul 2022).
- Added: vaccination coverage, government restrictions (stringency), variants (Beta, Delta, Omicron), weekend/reporting effects, and seasonality.
- Aim: understand spread **within** and **between** provinces across time.



How the Model Works (Simple View)



COVID-19 cases showing multiple epidemic waves (2020–2022).

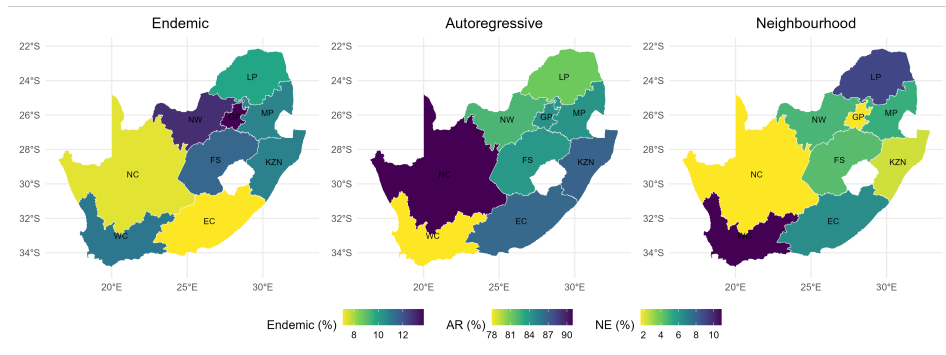
- The observed waves motivated the use of a dynamic model.
- We decompose total infections into:
 - **Local (AR)** - within-province spread.
 - **Neighbour (NE)** - spillover between provinces.
 - **Background (END)** - imported or unexplained sources.
- This **spatio-temporal model** captures both regional and temporal dynamics.

What I Found

- Most infections came from **local transmission**: $\approx 79\%$.
- **Neighbourhood spread**: $\approx 9\%$, provinces influence one another.
- **Background spread**: $\approx 12\%$, imported/unknown sources.
- **Delta** drove faster local spread; **Omicron** spread widely with milder local impact.
- **Vaccination and policy measures** helped reduce transmission over time.

Component Contribution (Local, Neighbour, Background)

- **Local (AR)** dominates in most provinces ($\approx 79\%$).
- **Neighbour (NE)** spillover from nearby provinces ($\approx 9\%$).
- **Background (END)** imported/unknown sources ($\approx 12\%$).



Why It Matters

- Helps governments **predict and prepare** for new waves.
- Applicable beyond COVID-19: **influenza, measles, tuberculosis**, and future variants.
- Especially valuable for **developing countries** strengthening public-health systems.
- Turns data into **actionable decisions**: where to focus, when to act, how to save lives.



Travel and Conference Experience

- The project opened doors for **international exposure**.
- Presented at the **IBS Uganda 2025 Conference**.
- Met biostatisticians from across Africa; exchanged ideas.
- A truly **great travel experience** : proud to represent UHasselt, SAMRC, and VLIR-UOS.



Personal & Professional Impact

- Grew academically and personally; learned independence and teamwork.
- Built lasting research friendships and collaborations.
- Inspired to keep contributing to data-driven health research in Africa.
- Saw how statistics can make a difference beyond the classroom.



Impact of the VLIR-UOS Scholarship

- Made this journey **possible**: travel, data collection, focused research time.
- Opened doors to **new research collaborations** and **statistical opportunities**.
- Beyond funding, it built bridges between North and South.
- **Thank you** for investing in potential, and helping it become purpose.



Thank You

- Supervisors: Dr. Tarylee Reddy (SAMRC) & Prof. Niel Hens (UHasselt).
- Funded by the **VLIR-UOS Scholarship**.
- My gratitude to everyone who supported and believed in me.

