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
Country level epidemic trajectories
SA’s SARS-CoV-2 epidemic - 1
Cumulative number of cases
SA’s SARS-CoV-2 epidemic - 2

Trends in cumulative cases

# COVID-19 cases

0 500 1000 1500 2000 2500 3000 3500 4000

19-Feb 29-Feb 10-Mar 20-Mar 30-Mar 09-Apr
SA’s SARS-CoV-2 epidemic - 3
Trends in new cases

COVID-19 cases

0 50 100 150 200 250 300
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

Absolute number cases
Moving average
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
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
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
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 $R_o \sim 1$ 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?
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
So what’s next?

Unlikely scenario

Likely scenario
Delayed exponential curve

Predicted lockdown impact in India and Wuhan

India

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
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
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

Stage 1: Preparation
Stage 2: Primary prevention
Stage 3: Lockdown
Stage 4: Active case-finding
Stage 5: What’s next
What should we do this week?

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

State of Disaster

Lockdown

Average daily Covid-19 cases last week = 67
(95% Confidence interval: 45-89)

Next week?
Community transmission levels to guide next steps & the lockdown

• By 18\textsuperscript{th} April, will know if community transmission interpretation accurate (~67 cases/day; CI: 45 - 89)

• Epidemiological ($R_0$) 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

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

Field hospital in Central Park, New York
Stages of SA’s COVID-19 response

Stage 1: Preparation
Stage 2: Primary prevention
Stage 3: Lockdown
Stage 4: Active case-finding
Stage 5: Hotspots
Stage 6: Medical care
Stage 7: Death, bereavement and aftermath
Stage 8: Vigilance

# COVID-19 cases

0 200 400 600 800 1000 1200 1400 1600 1800 2000

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
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
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