SACEMA

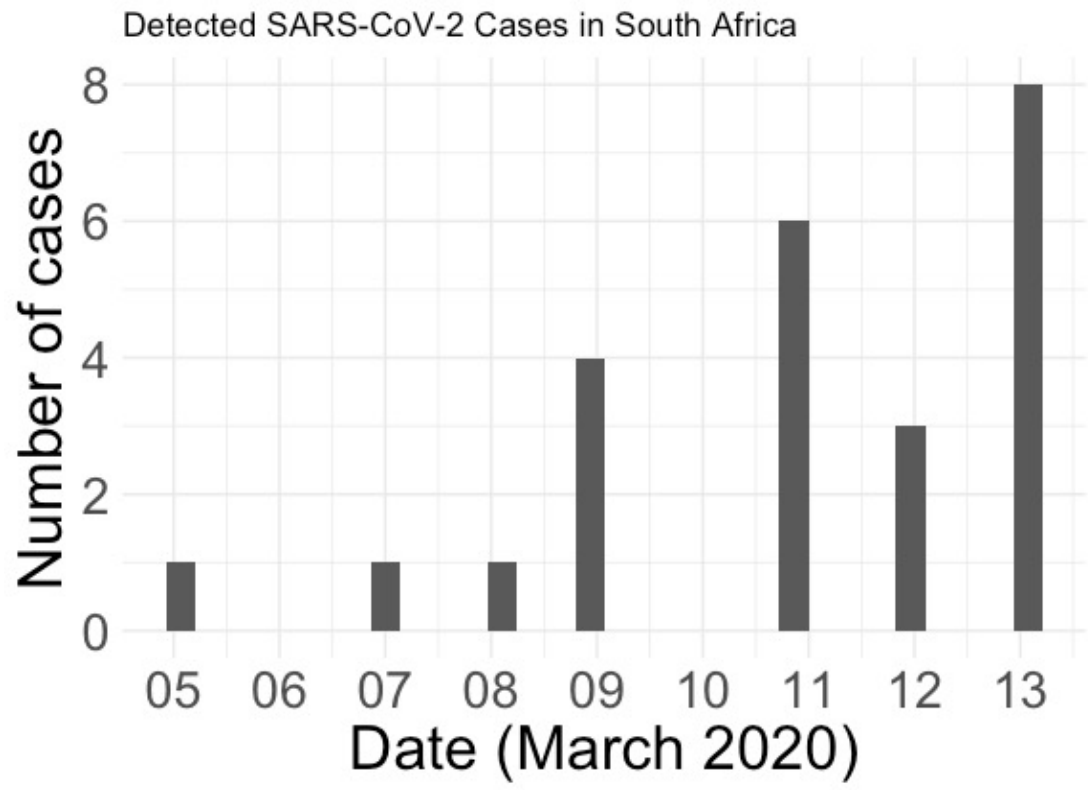
Real-world example: Initial spread of COVID-19 in South Africa

Juliet Pulliam, PhD

SMART Meeting

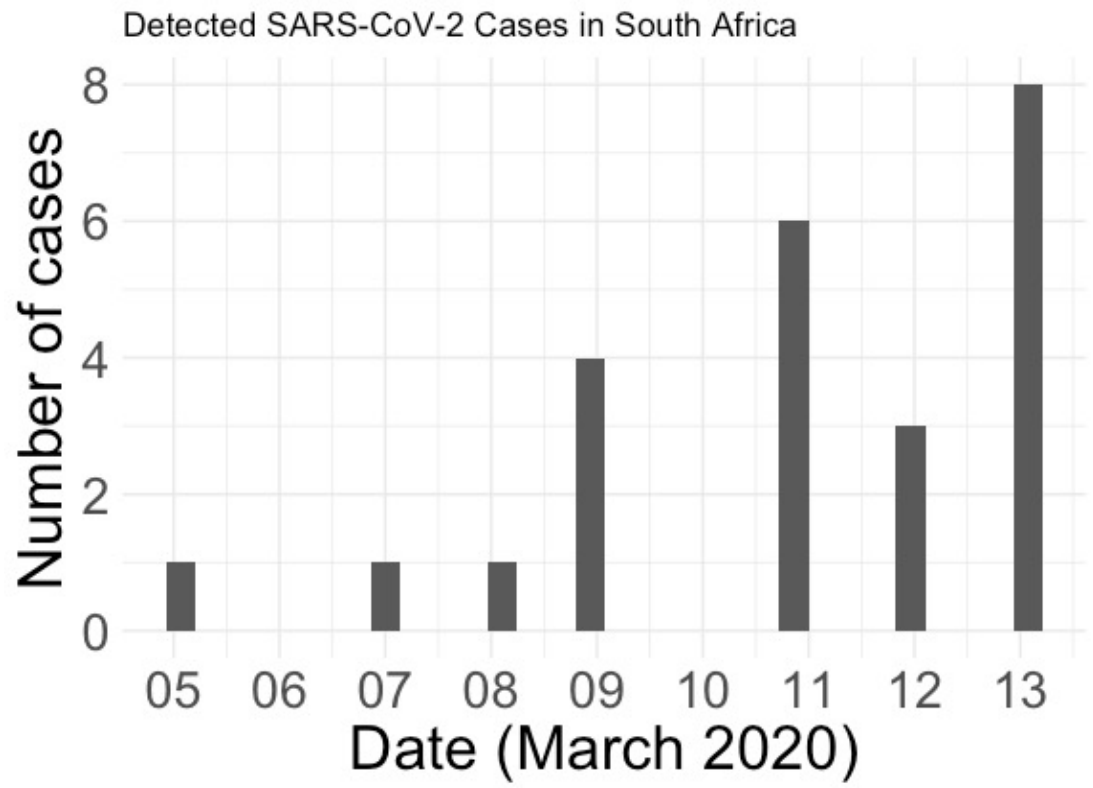
2022-02-15

As of 13 Mar 2020:



Question (13 Mar):

“When do we expect to see the first 1,000 and 10,000 cases?”



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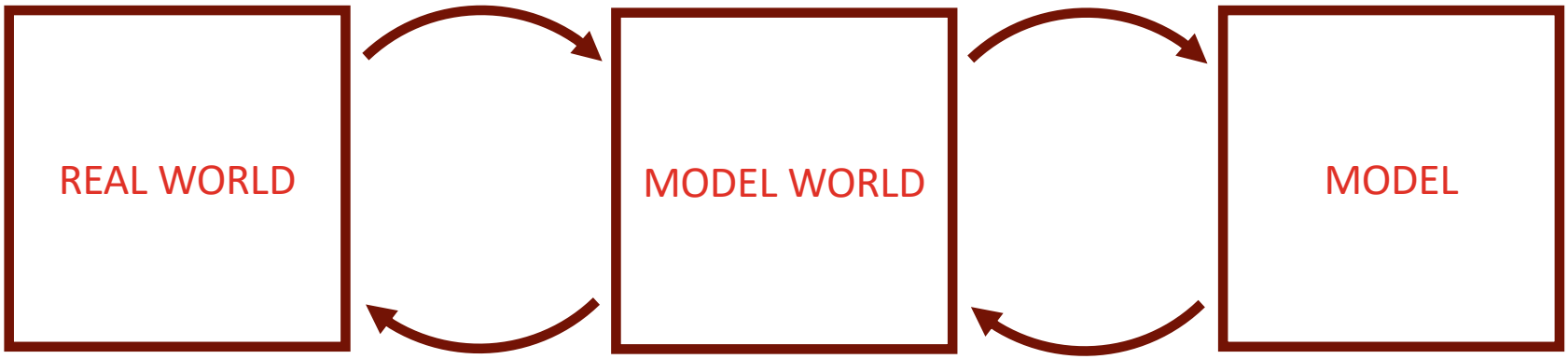

Figure courtesy of the International Clinics on Infectious Disease Dynamics and Data (ICI3D) Program
https://doi.org/10.6084/m9.figshare.5044606.v3

Question (13 Mar):

“When do we expect to see the first 1,000 and 10,000 cases?”

DEVELOPING A MODEL WORLD

Data-limited situations require simple models

What was known?

Initial estimates available of the basic reproduction number and time between successive cases (serial interval)

No interventions had been put in place at the time

The virus was introduced in SA in early March (24 cases detected to date)

Question (13 Mar):

“When do we expect to see the first 1,000 and 10,000 cases?”

DEVELOPING A MODEL WORLD

Data-limited situations require simple models

Approach

Branching process model

Seed introductions on the same timeline as known infections

Assume constant detection probability, with about half of infections being detected

Assume the epidemic trajectory continued without substantial intervention

Question (13 Mar):

“When do we expect to see the first 1,000 and 10,000 cases?”

STRUCTURE OF THE REPORT

Projection of early spread of COVID-19 in South Africa

Prepared by Carl A.B. Pearson (SACEMA, LSHTM), Sheetal Silal (UCT), and Juliet Pulliam (SACEMA)

Last updated: 2020-03-14

Question (13 Mar):

“When do we expect to see the first 1,000 and 10,000 cases?”

STRUCTURE OF THE REPORT

Summary paragraph with results

Figure

Assumptions and parameters

Contact

References

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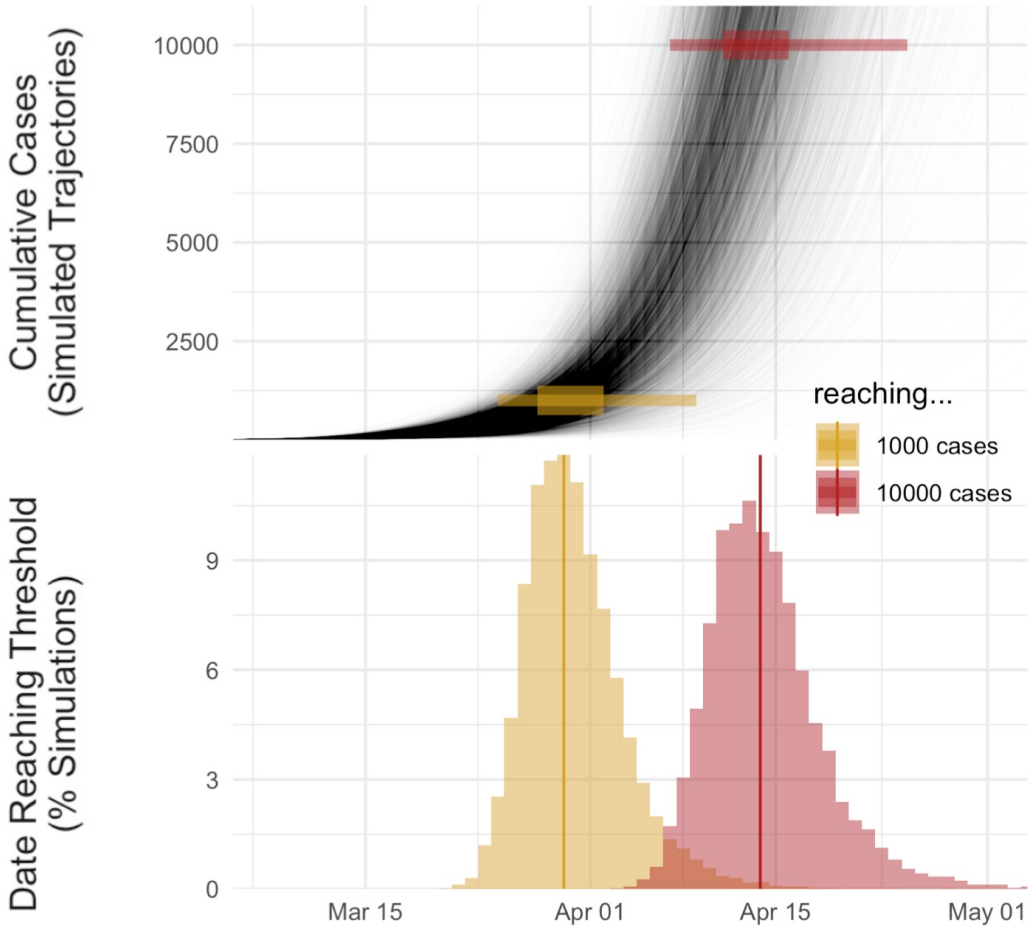

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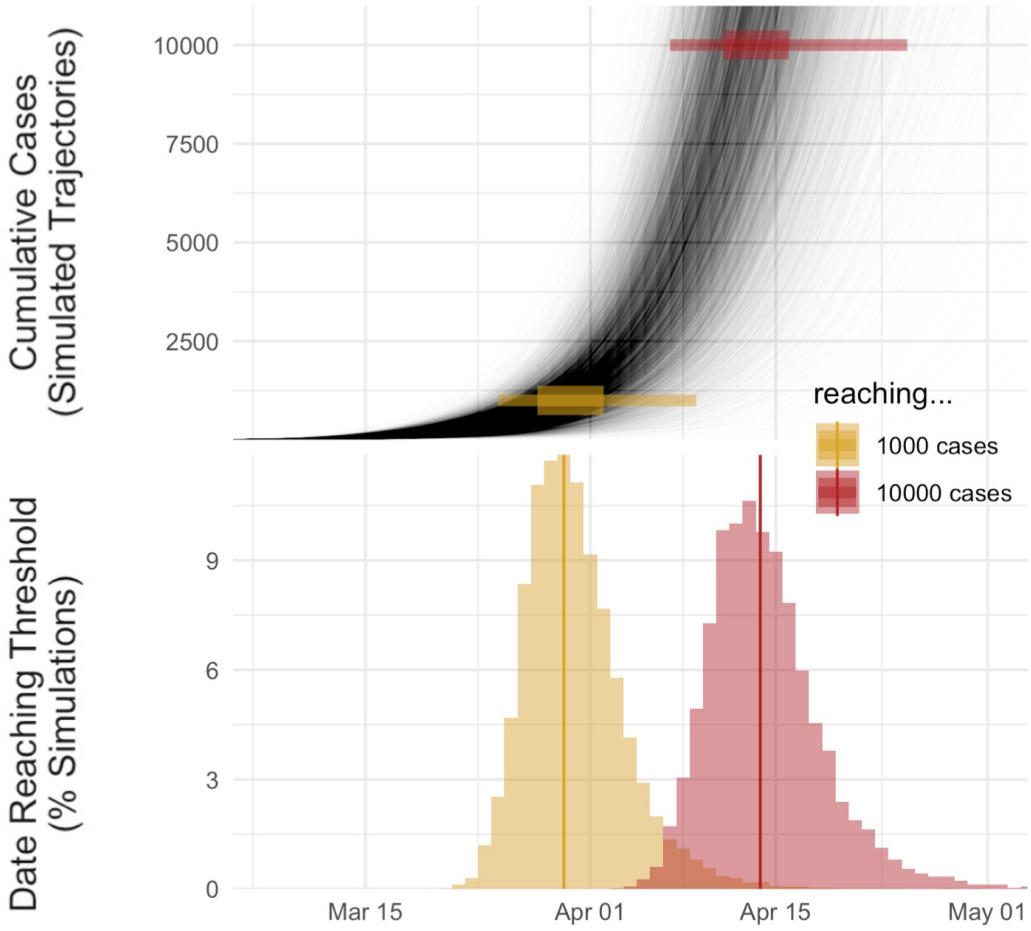

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likely to reach 1,000 cases
between 28 March and 2 April
(95% range: 25 March - 9 April)

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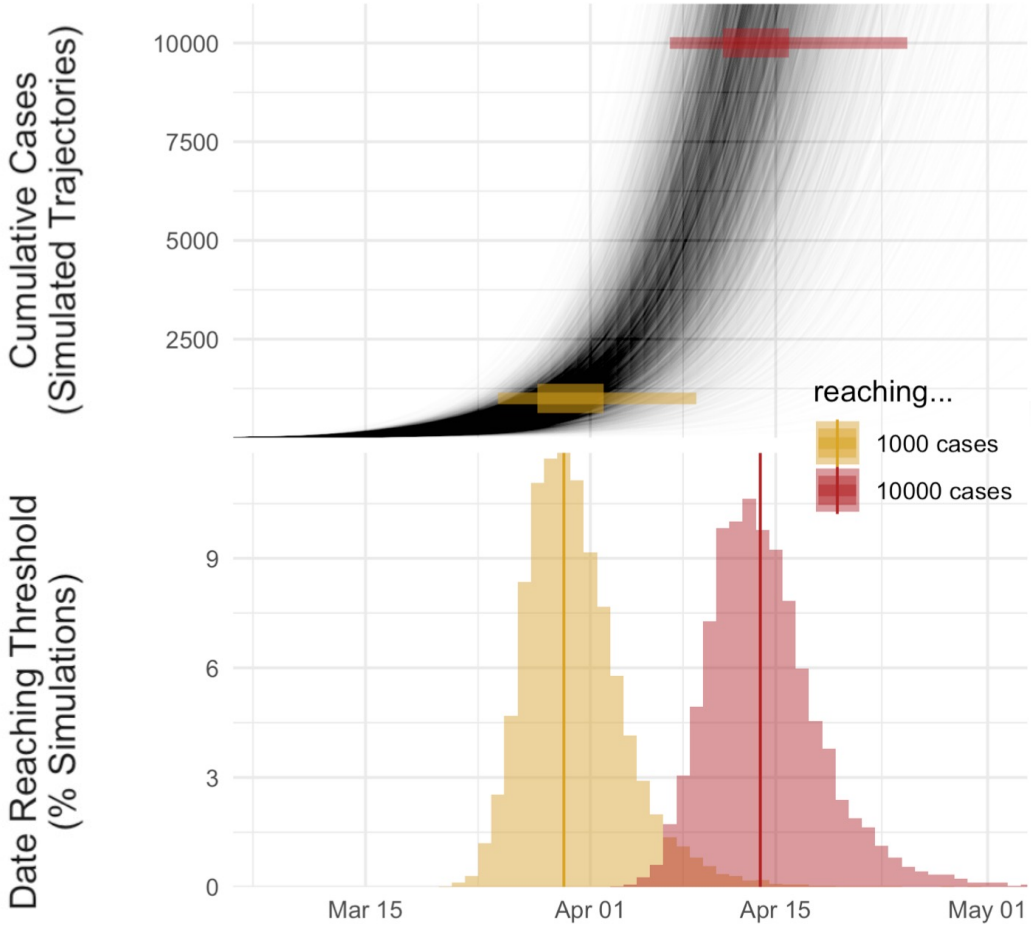

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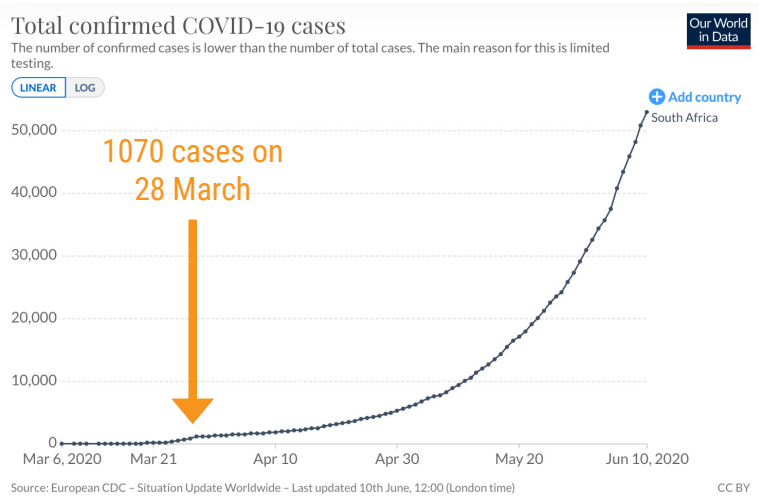

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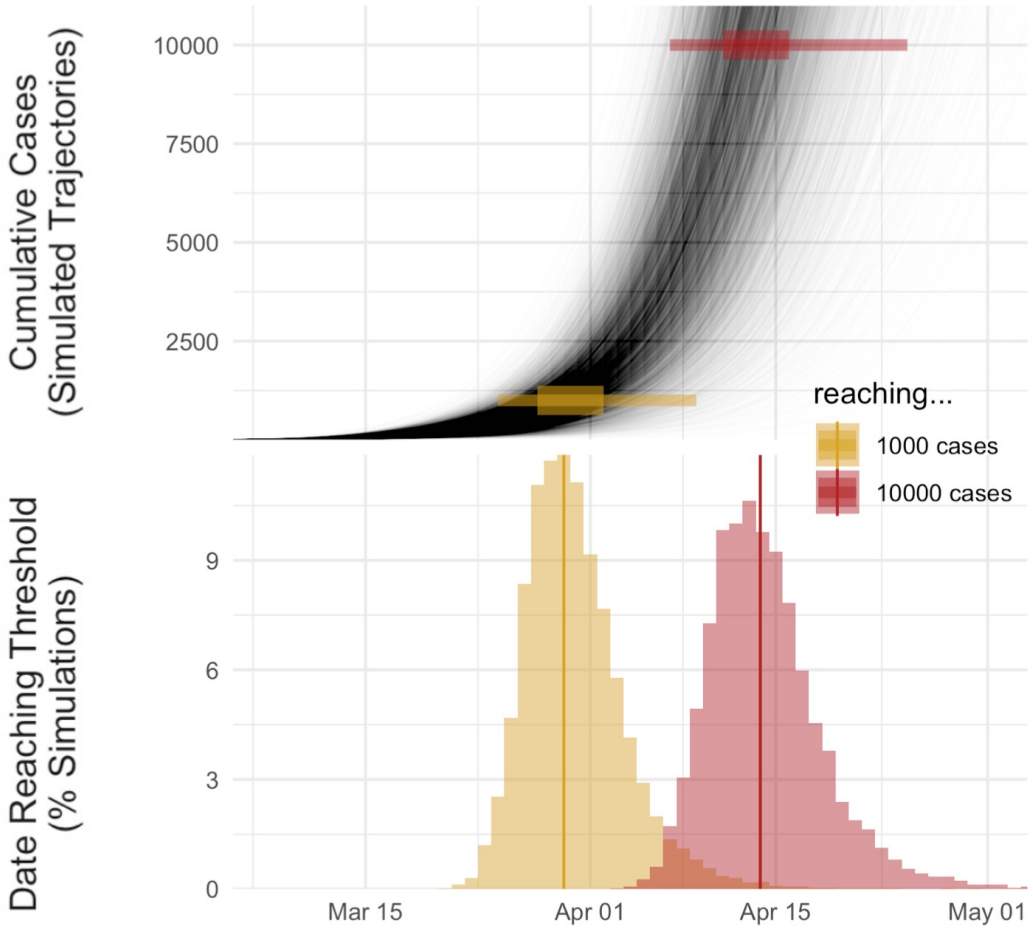

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likely to reach 10,000 cases
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(95% range: 7 April - 25 April)

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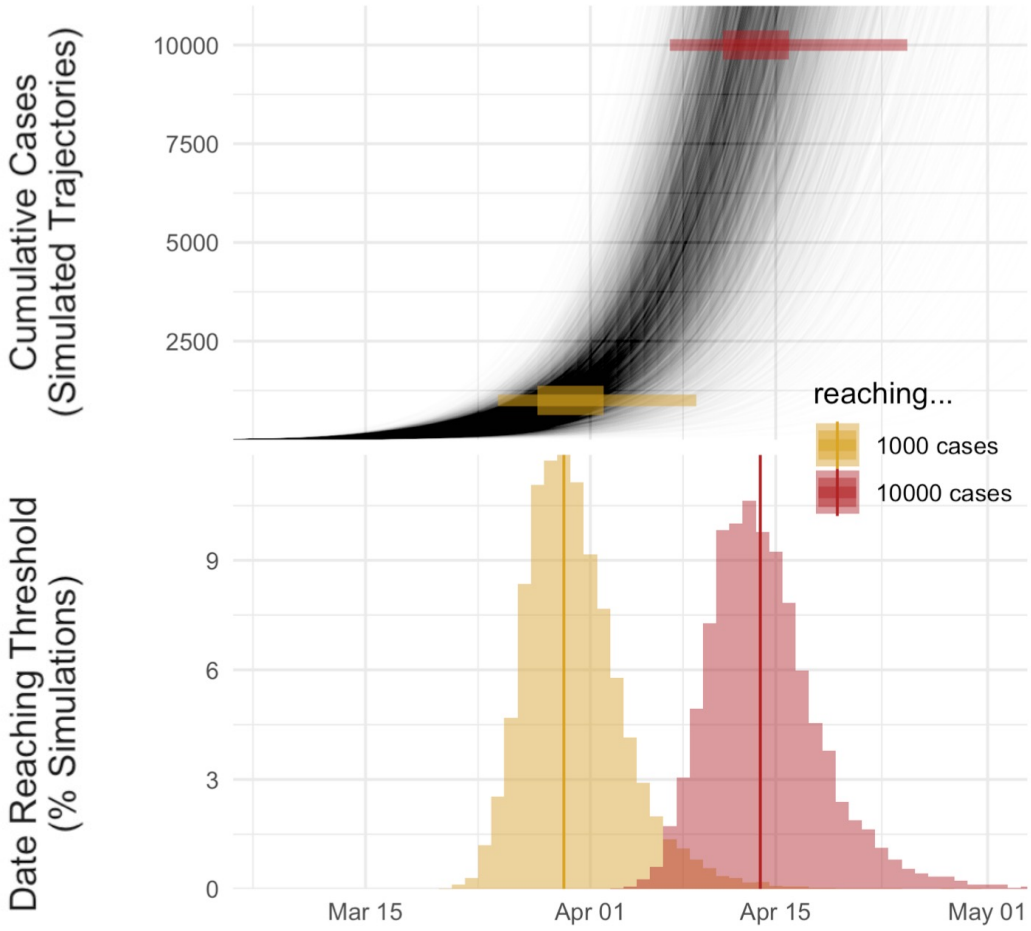

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likely to reach 1,000 cases
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likely to reach 10,000 cases
between 11 April and 16 April
(95% range: 7 April - 25 April)

10,015 on 11 May

(lockdown from 27 March)

Question (13 Mar):

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PACKAGE USED

https://github.com/sbfnk/bpmodels

CODE

https://github.com/SACEMA/COVID10k

SPECIFIC COMMITS FOR REPORTS

Projection of early spread of COVID-19 in South Africa:
328b02b6b841ab742e4a594cd170d2397bc3c24e

Early spread and hospital load for COVID-19 in South Africa:
d92a62d8502f8a7c6eac68f687845d0e5cf16aab

Question (13 Mar):

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STRENGTHS

Provides probabilistic view of the likely epidemic trajectory **in the short term**
Clear assumptions and quick implementation

LIMITATIONS

Assumes a constant epidemic trajectory
Does not account for potential interventions or behaviour change
Assumes a constant detection probability

Question (13 Mar):

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LESSONS

Start with a clear question

Build on what others have done (bpmodels package by Seb Funk, parameter estimates from Abbot, Bi, and Nishiura papers)

Decision-makers need clear, concise, and quick results