Examining Impacts to Delays in Screening on Tumour Size and Treatment

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Cancer Institute NSW

13 March 2024

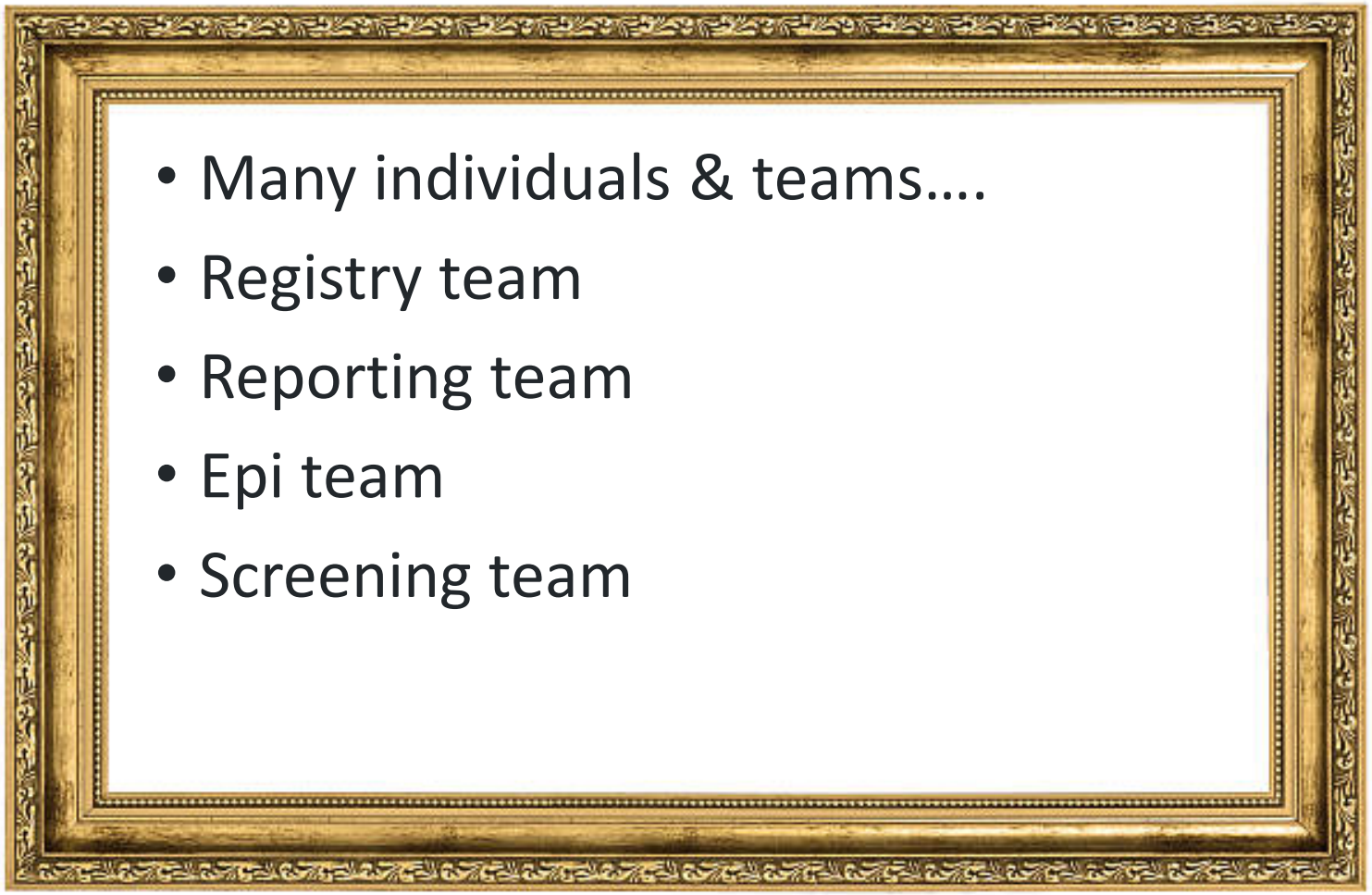
NSW GOVERNMENT

Some background

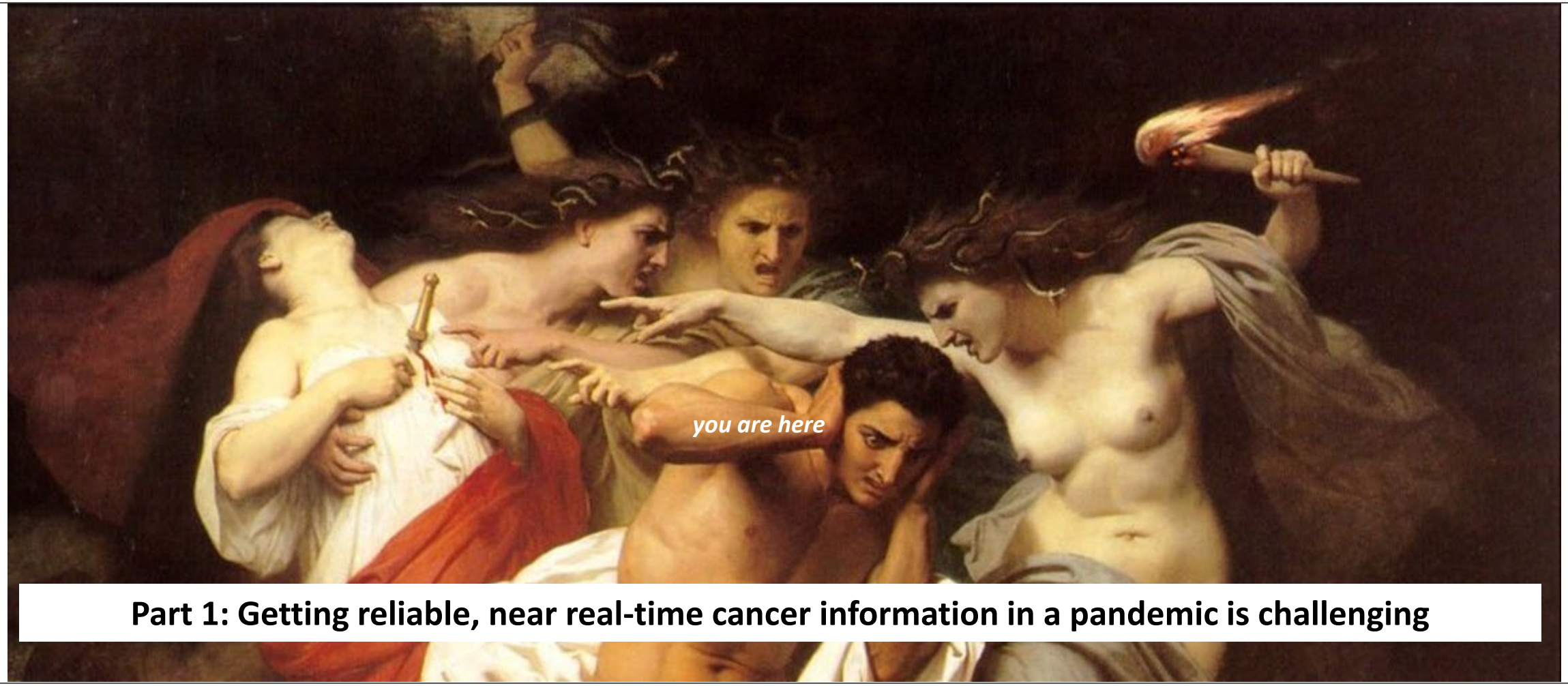
During Covid disruptions

Looking back at 2020-21

Acknowledgements



Background



Part 1: Getting reliable, near real-time cancer information in a pandemic is challenging

Background

- Huge demand for information and certainty
- Novel virus, novel situation
- Little cancer data available
- Situation was dynamic and evolving rapidly
- Shortage of expertise
- Surplus of armchair expertise

Who's at risk? What *is* risk?

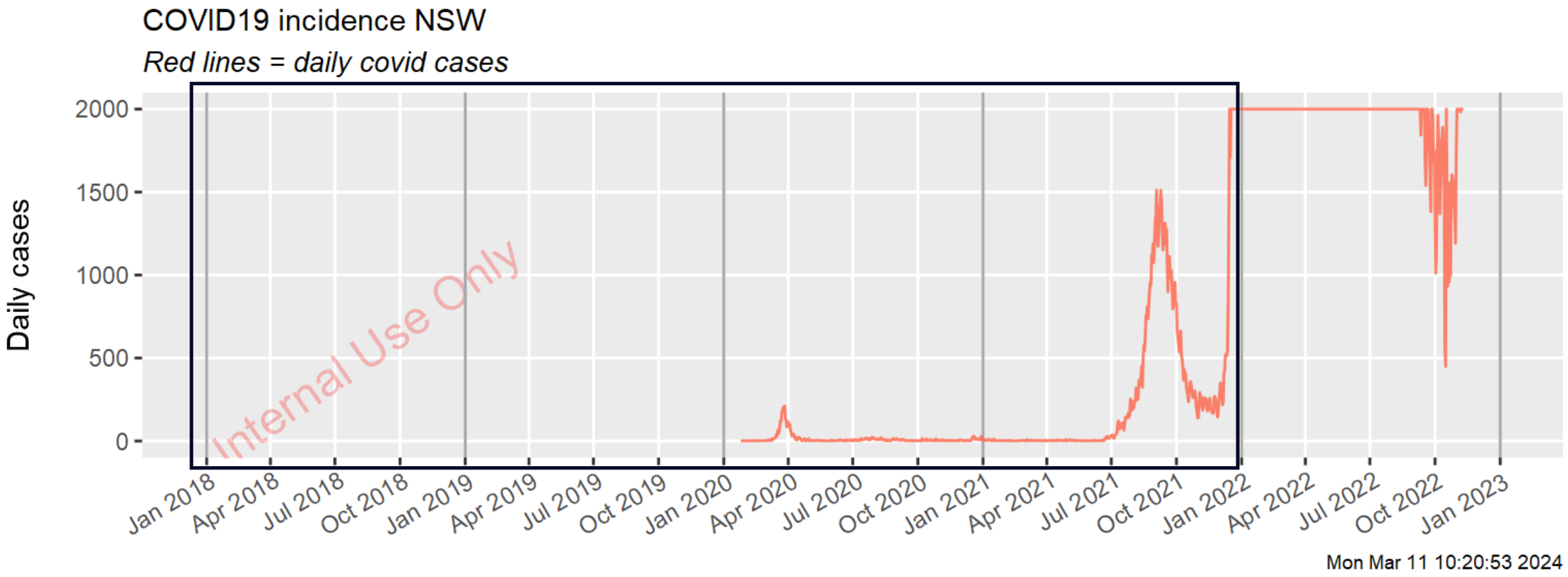
We often hear groups of people described as 'high risk' in the context of COVID. The problem is that this means three different things.

1. People who have a relatively high exposure to the virus, so they are more likely to catch it: nurses, doctors, supermarket staff, police (high probability).
2. People who are more likely to get seriously sick if they do become infected: elderly, immunocompromised, people with chronic lung disease (high consequence).
3. People who are more likely to spread the infection if they get it. Some overlap with the first group, but also migrant workers, prisoners, meat processing workers (high transmission).

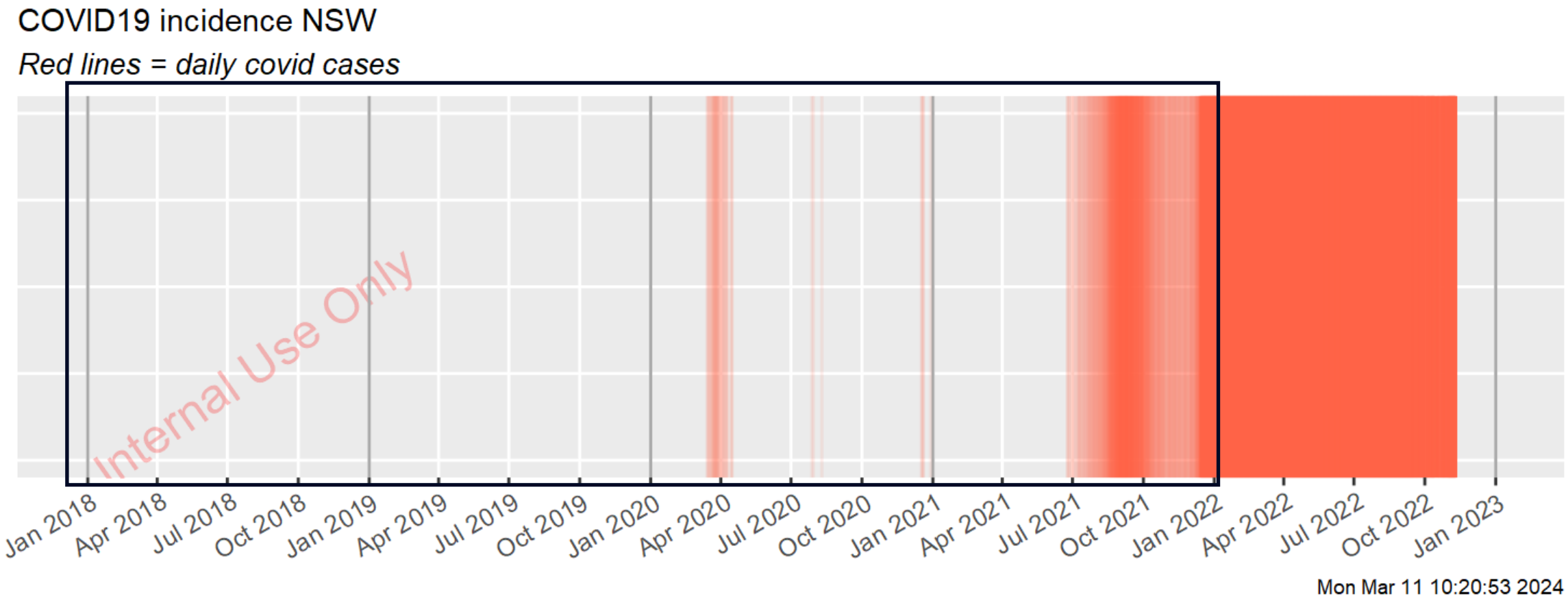
Ref https://www.statschat.org.nz/2020/05/06/at-risk/


In NSW, events were seldom crisp on/off or open/closed scenarios…

Covid cases within NSW



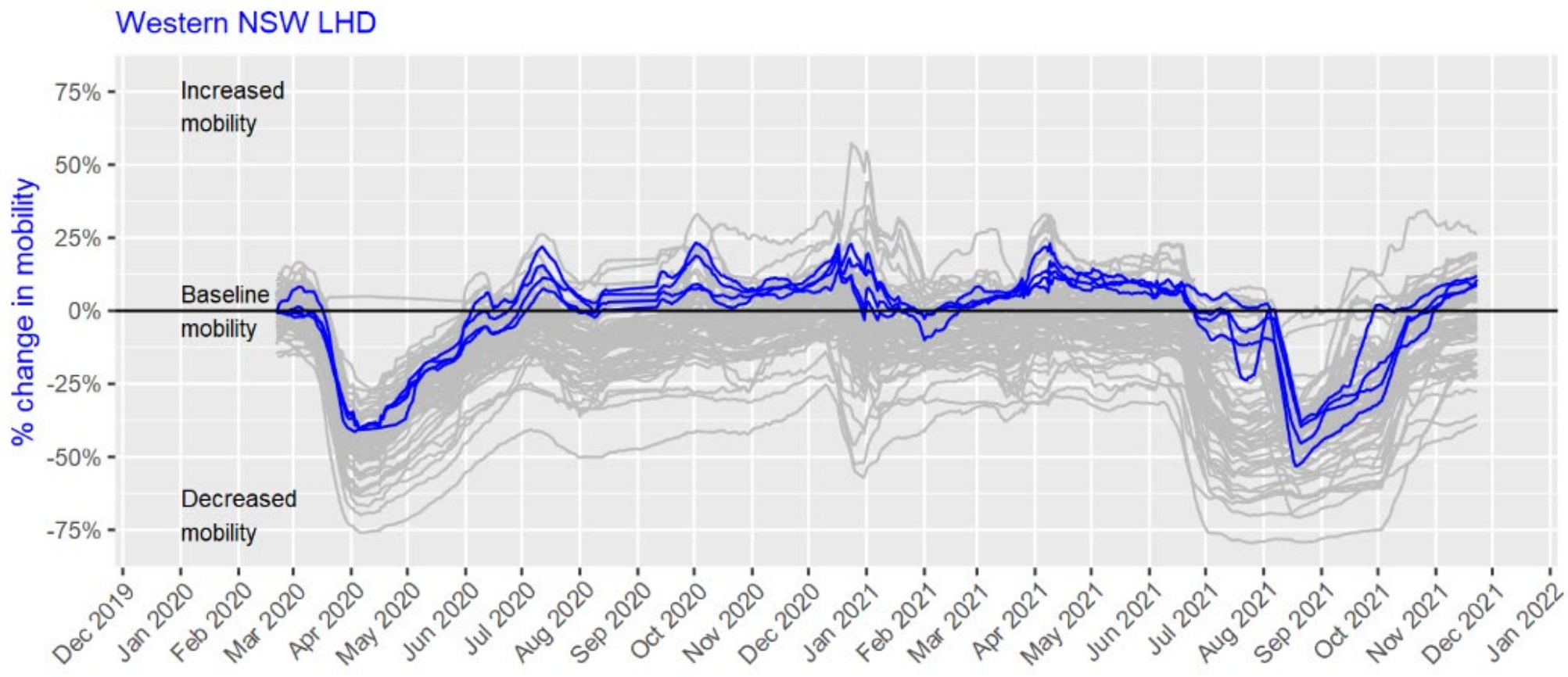
Covid cases within NSW



Mobility within NSW

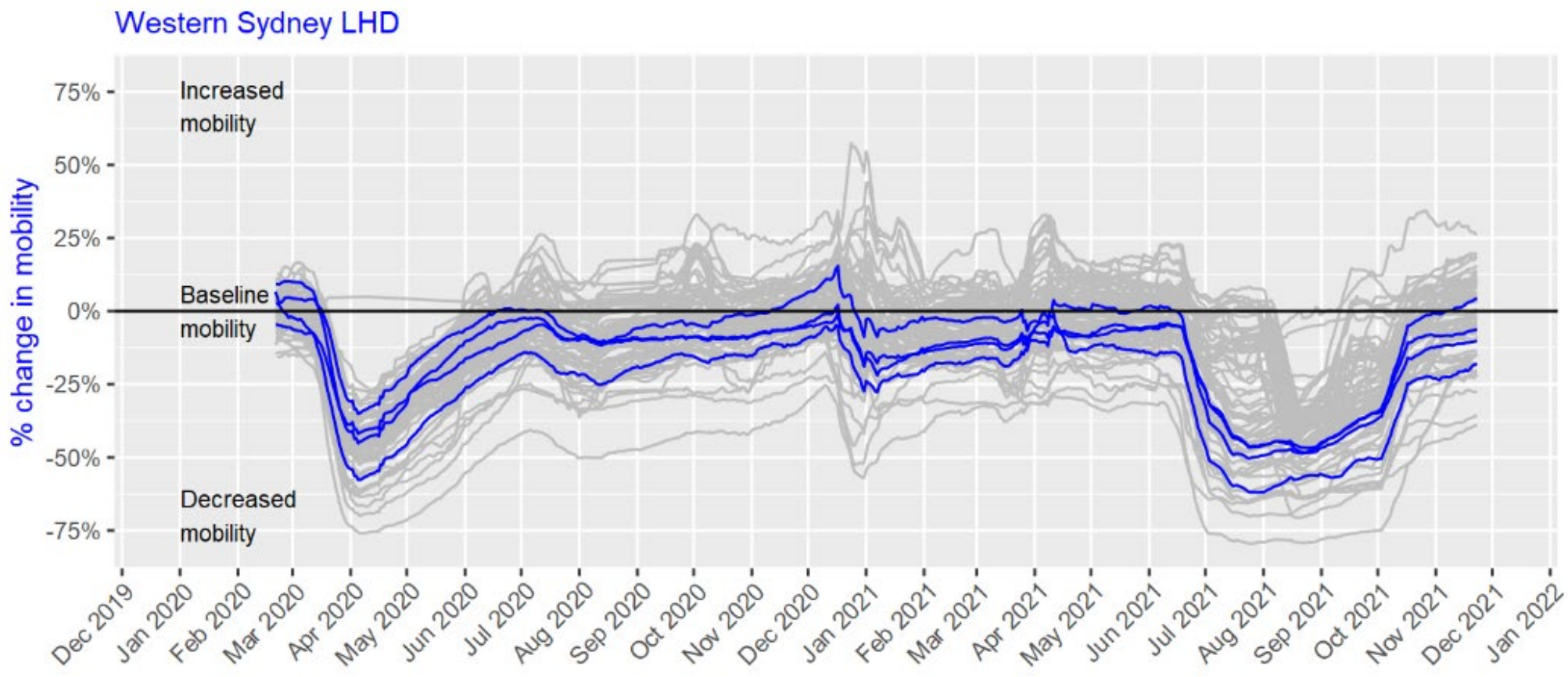
- How to get insights into people's changed behavior?
- Google Mobility Data = computes the % change in visit volume for given location types
- Mobility data was released at LGA level

Mobility in rural areas



https://www.google.com/covid19/mobility/

Mobility in urban areas



https://www.google.com/covid19/mobility/

* Public Service Announcement *

* Public Service Announcement *

International Agency
Research on Cancer

World Health
Organization

occurrence and outcome of cancer in defined population groups (usually the inhabitants of a city, region, or country). For each new cancer case, registries record details of the individual affected, the nature of the cancer, information on treatment, and on follow-up specially with respect to survival from the disease.

Ref http://www.iacr.com.fr/index.php?option=com_content&view=article&id=89&Itemid=294

How Cancer Registries Work

- There are many ways to think about Cancer.
- We need to avoid reductive thinking/definitions.
- In a modern registry “Cancer” is not just a diagnosis...

Coding cancer cases

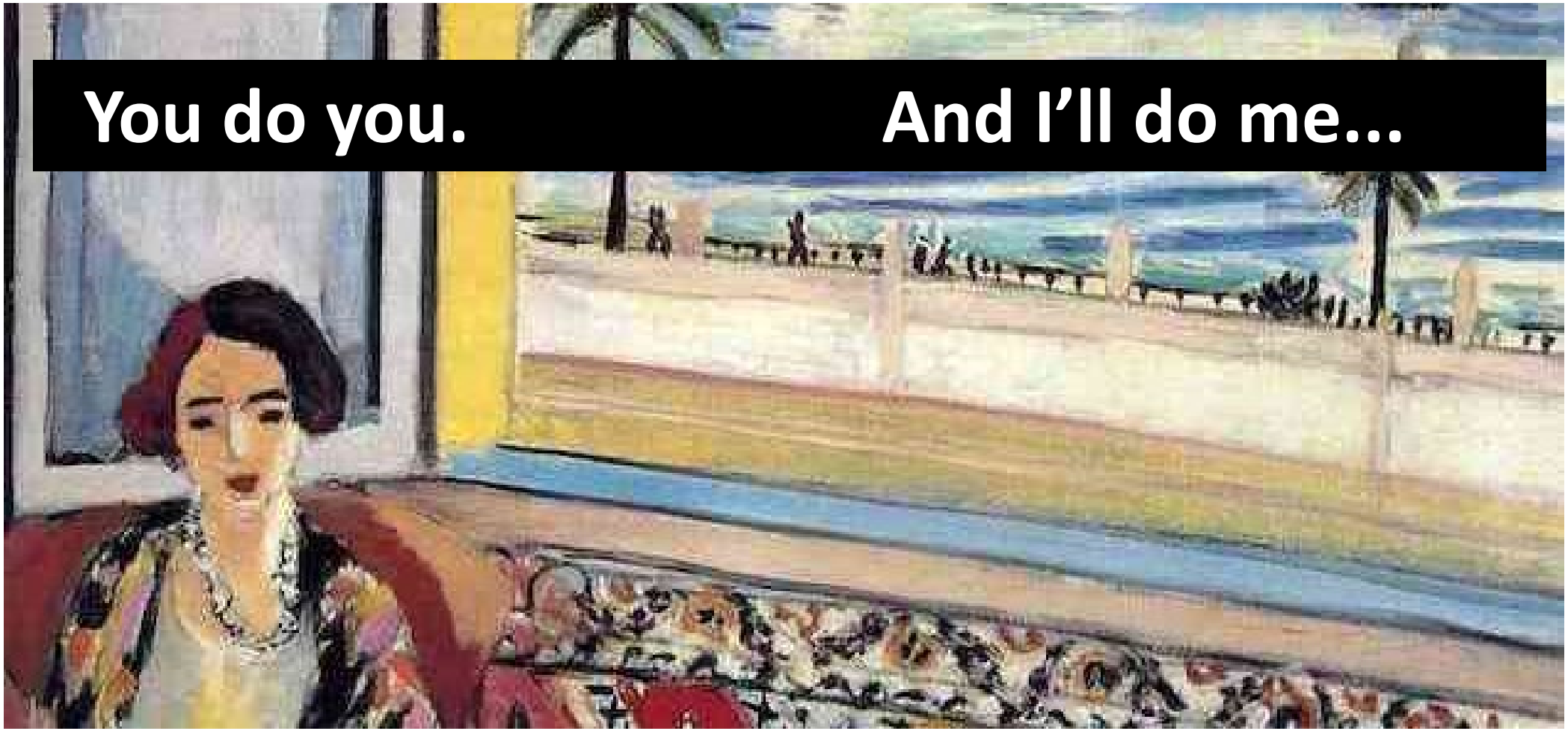
- In 2021 all the chips haven't fallen.

2019 Cases coded

2020 Cases ready for coding

2021 Cases not yet ready for coding

Cancer registries and Surveillance



Using notification data

A cancer registry is not a real-time disease surveillance system.

To bridge this gap we used notifications as a proxy for incidence and treatments.

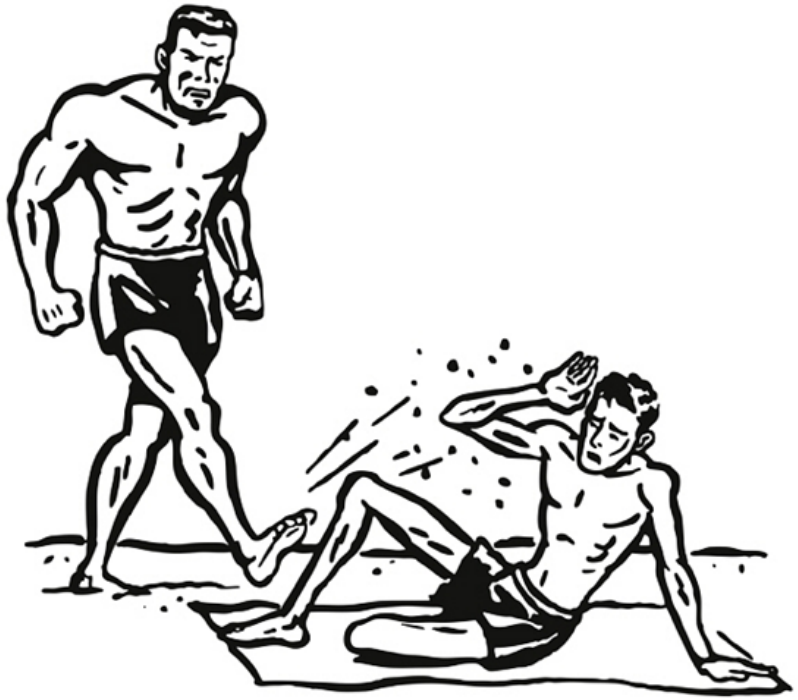
Cancer coders can stick to their core business.

“Surveillance analysts” can get busy and keep out of the way.

During the Disruption

The power of SMALL DATA

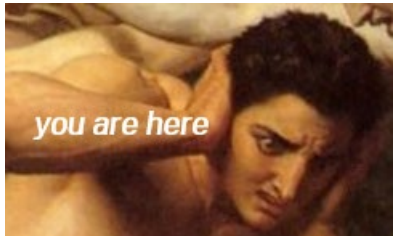
We tend to privilege Big Data, whole of population data, complete coverage, large expensive collections…



For speed we need to think small.

We need to utilise the techniques of survey statistics more.

Dec 2022; You are here…



Breast cancer: Tumour size (NSWCR)

Dots = NSWCR, circles = NSWCR sample data, squares = Breastscreen, Red line = daily covid cases (sep. scale)

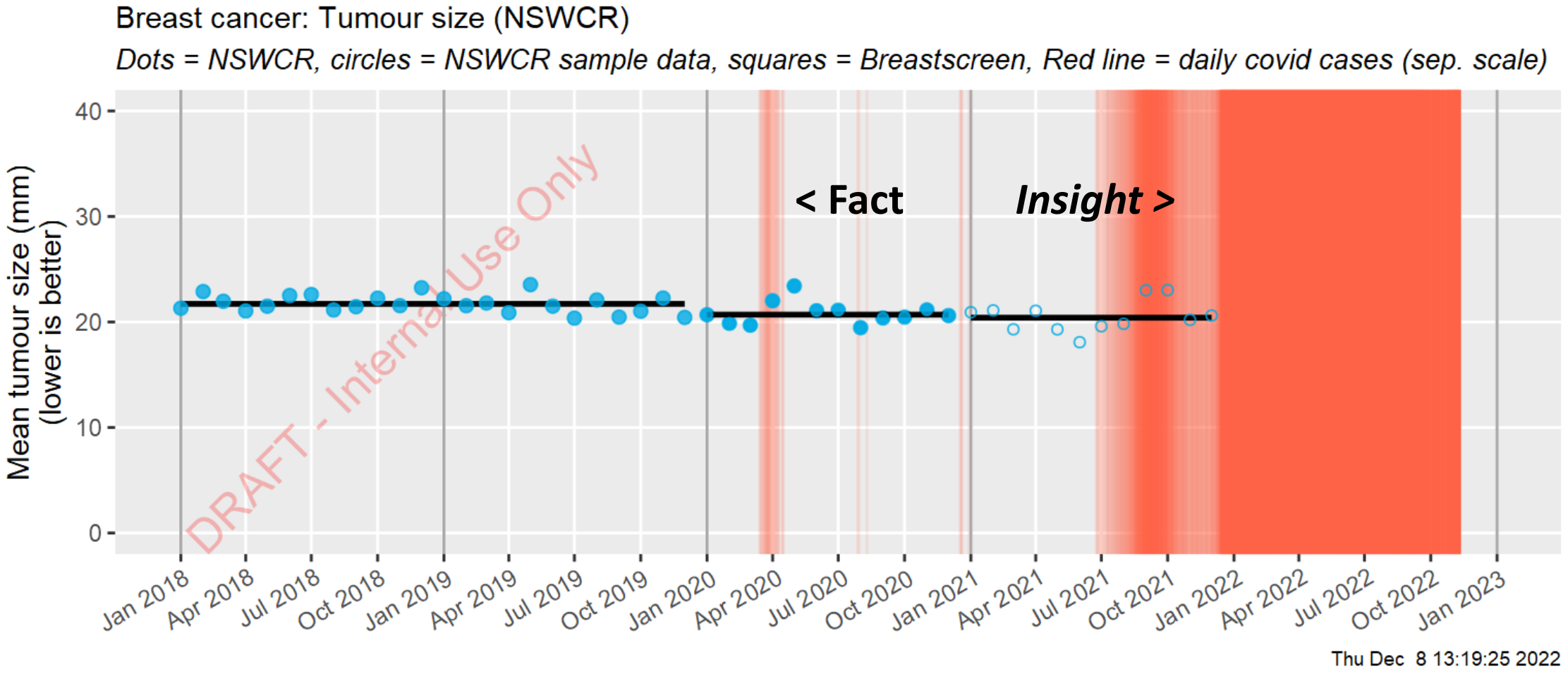
Mean tumour size (mm)
(lower is better)

40
30
20
10
0

Jan 2018
Apr 2018
Jul 2018
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019
Jan 2020
Apr 2020
Jul 2020
Oct 2020
Jan 2021
Apr 2021
Jul 2021
Oct 2021
Jan 2022
Apr 2022
Jul 2022
Oct 2022
Jan 2023

Thu Dec 8 13:19:25 2022

Tumour size


Breast cancer: Tumour size (NSWCR)
Dots = NSWCR, circles = NSWCR sample data, squares = Breastscreen, Red line = daily covid cases (sep. scale)
Mean tumour size (mm)
(lower is better)
40
30
20
10
0
< Fact
Insight >
DRAFT - Internal Use Only
Jan 2018
Apr 2018
Jul 2018
Oct 2018
Jan 2019
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Oct 2022
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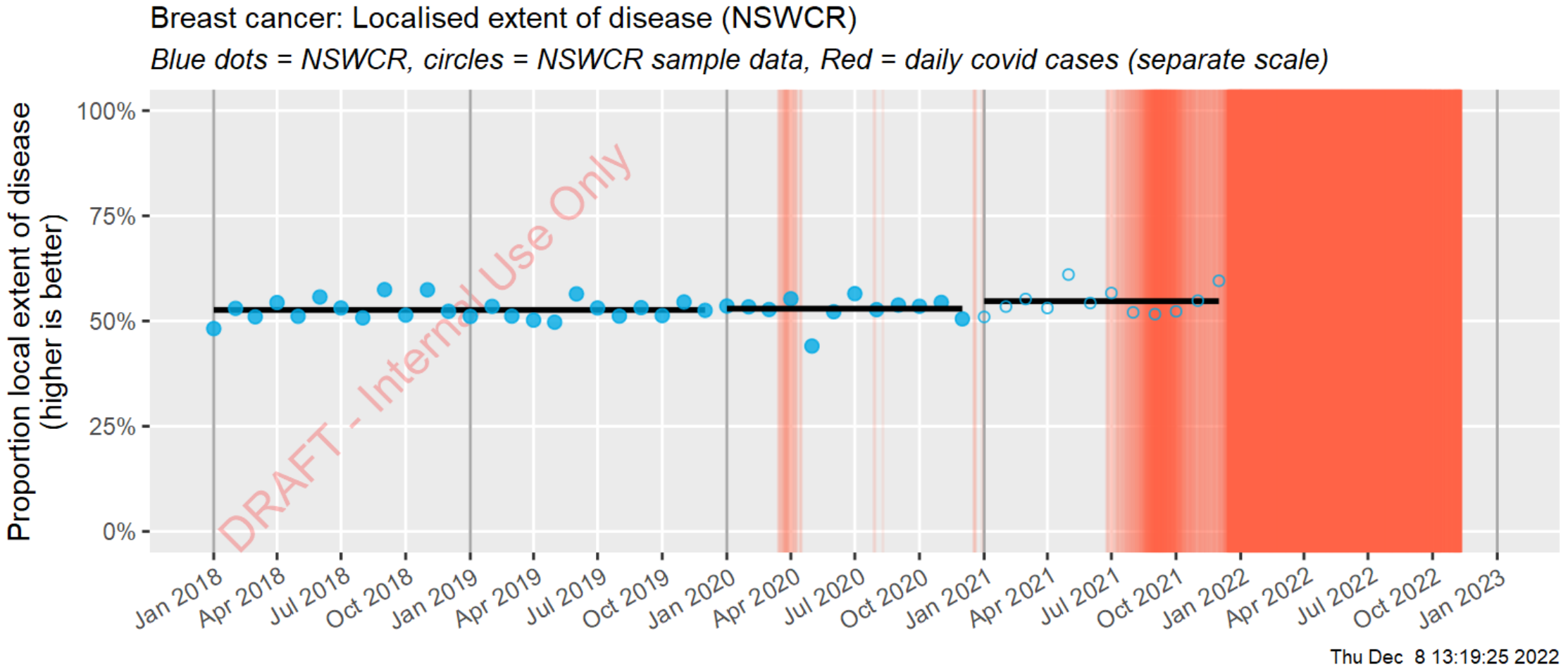
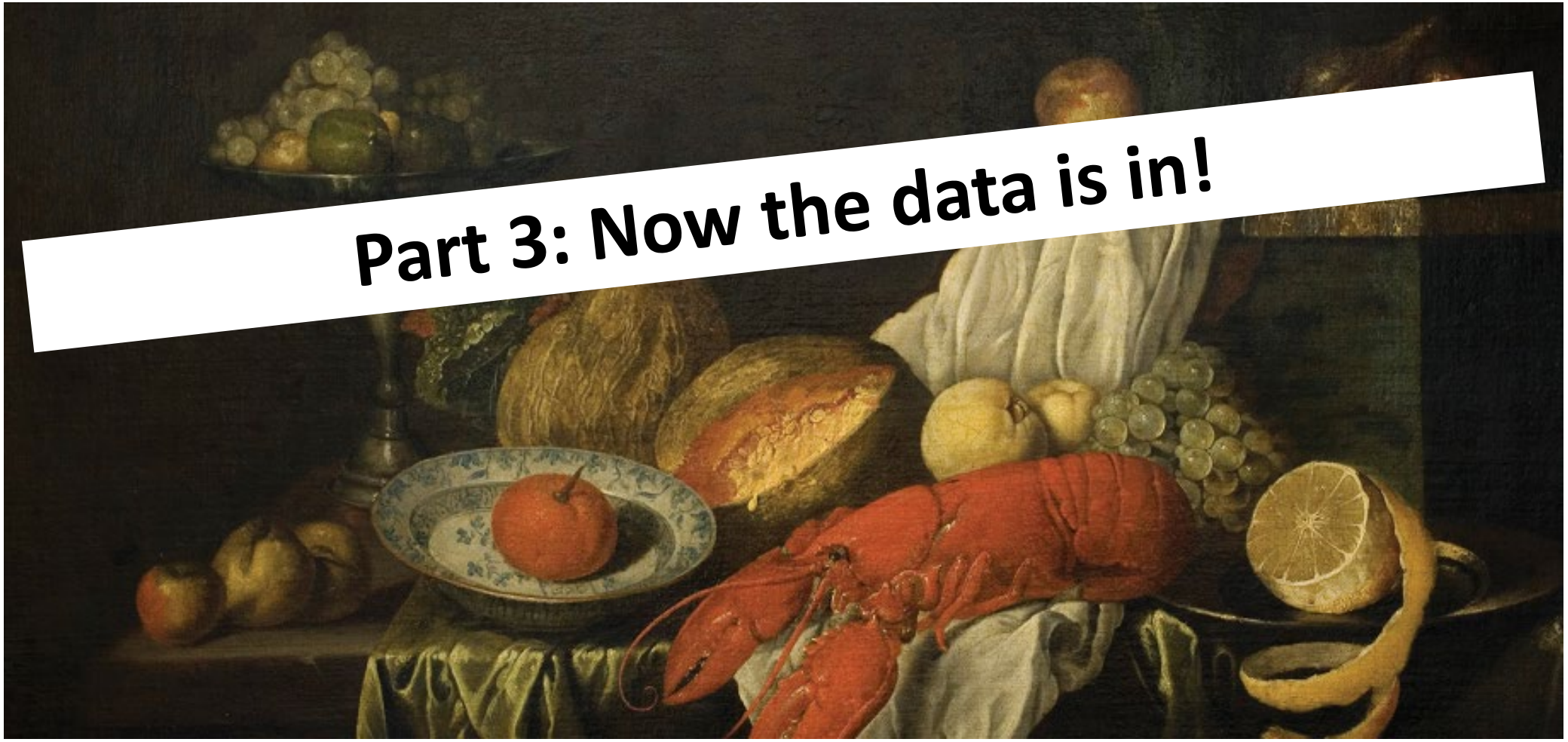
Thu Dec 8 13:19:25 2022

Proportion localised disease

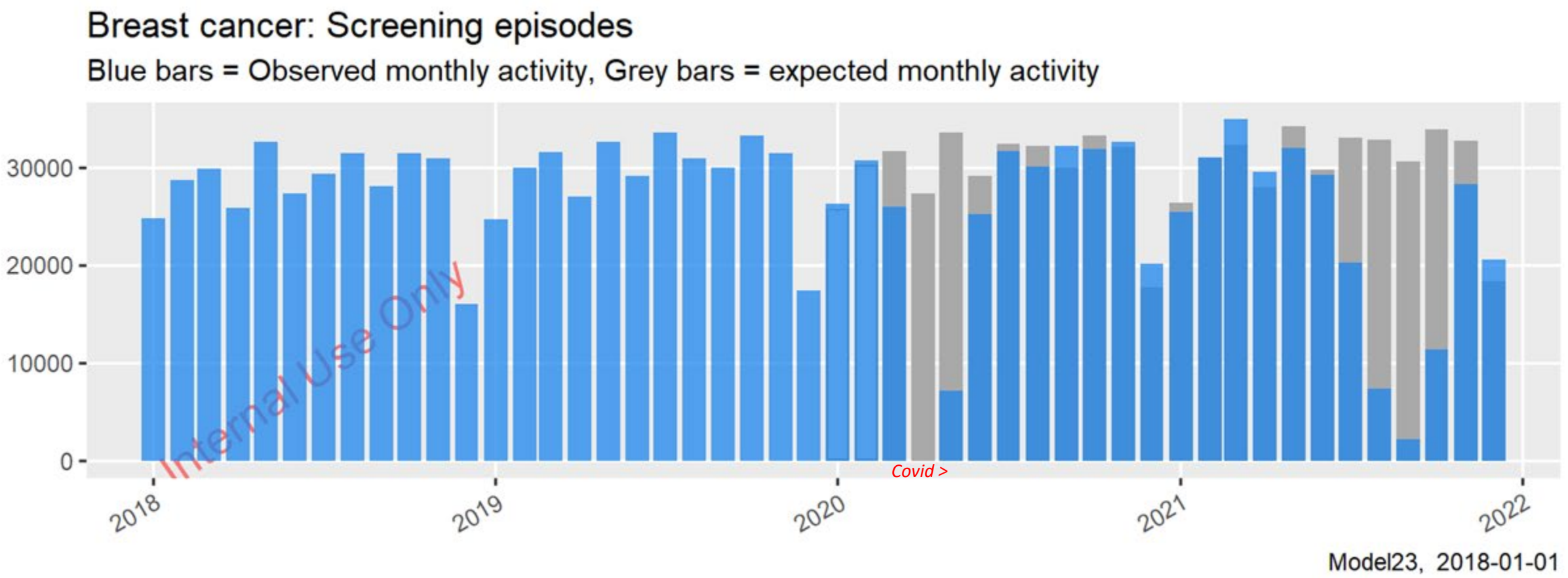



But wait...
Survival bias

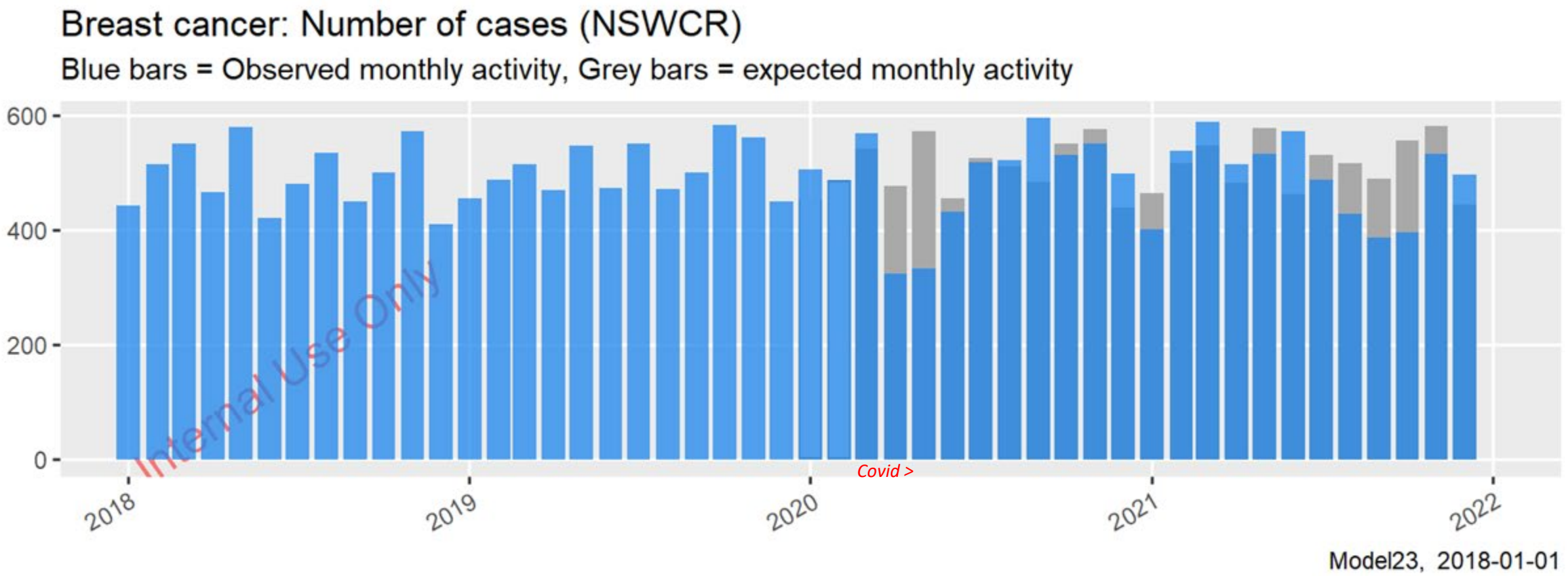
Looking back over 2020-2021



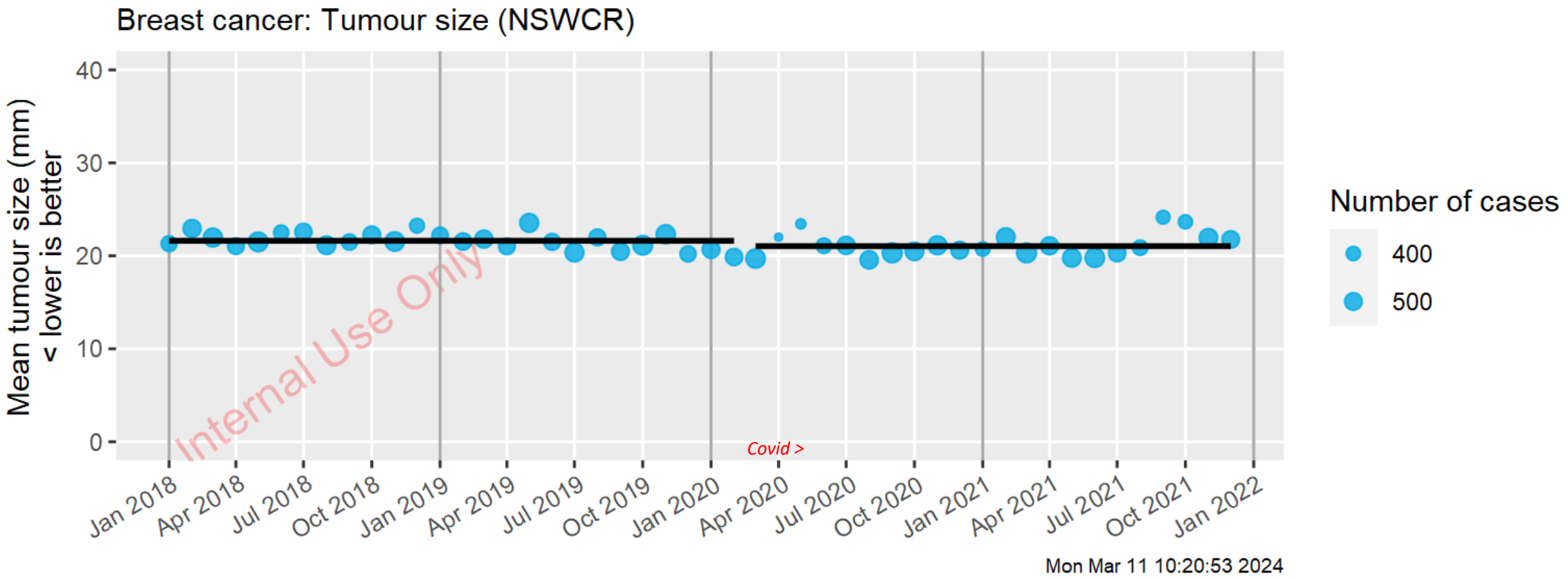
Breastscreen NSW monthly activity



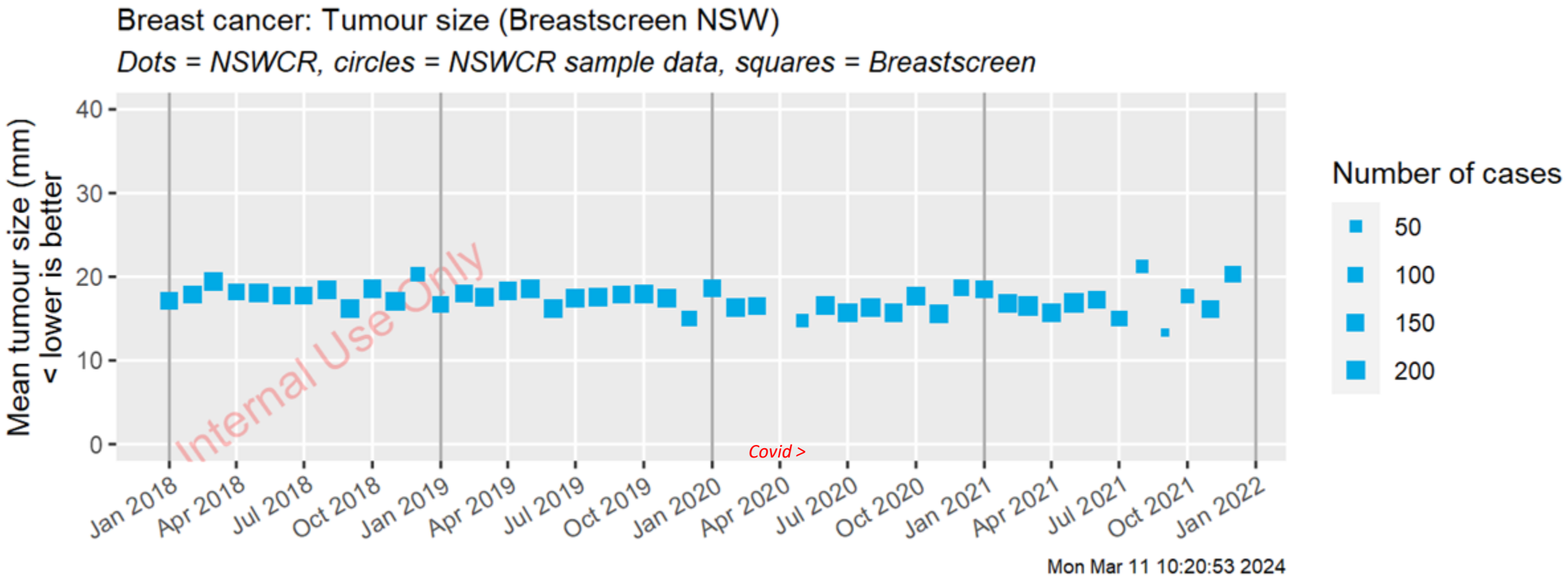
Breast cancer monthly incidence



Tumour size - NSWCR



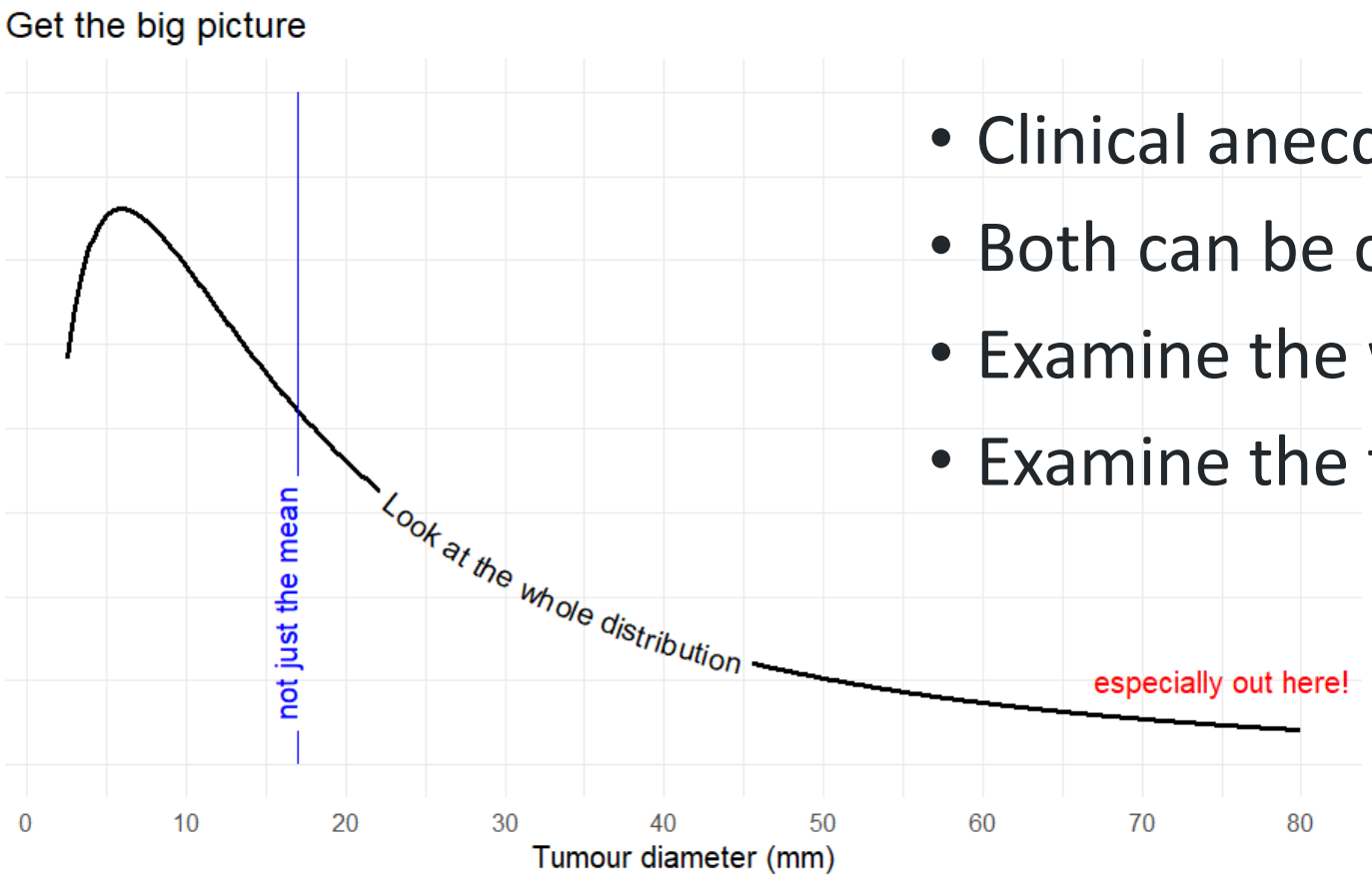
Tumour size – BS NSW



Mind the long tail

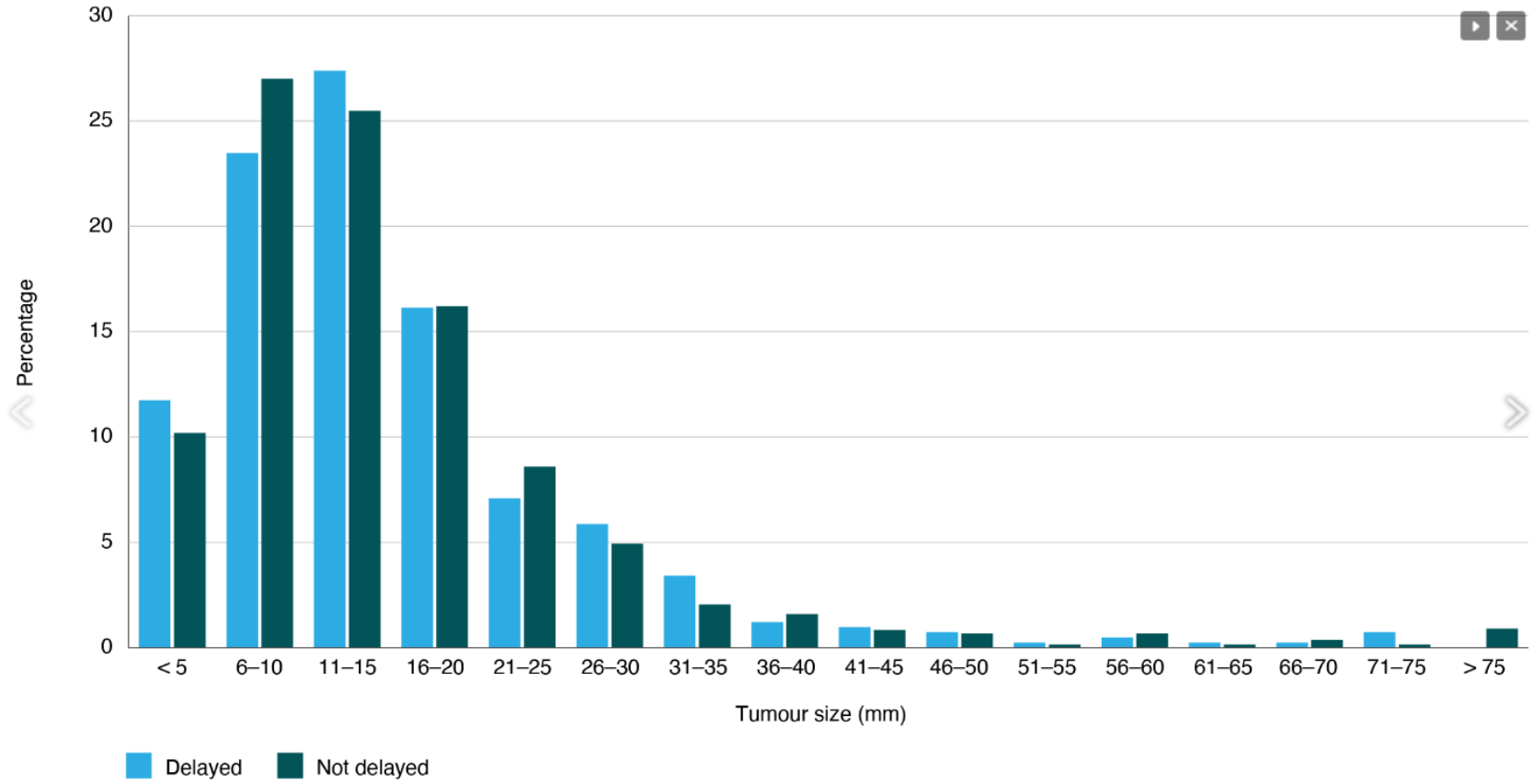
- But these results are focussed on the monthly mean.
- It’s better to look at the whole distribution.

Mind the long tail



- Clinical anecdote & data in conflict?
- Both can be correct
- Examine the whole distribution
- Examine the frequency of tail events

Jayakody et al (pictures)

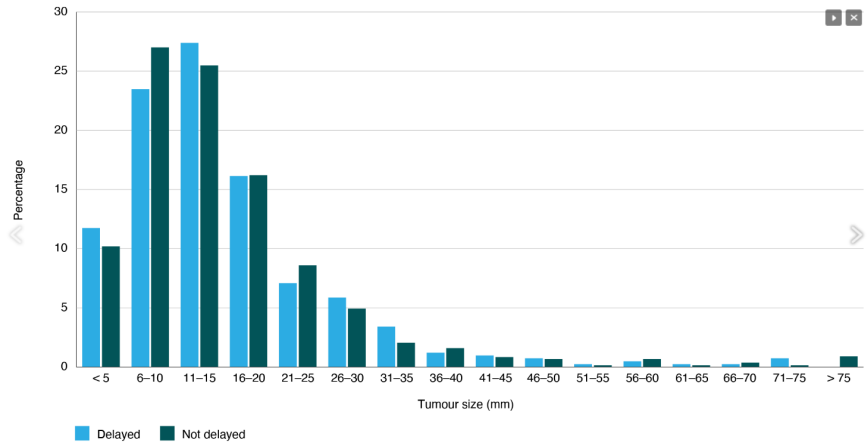


Distributions of tumour size of diagnosed cancers in the BreastScreen NSW service after suspension, for both delayed and non-delayed screeners between 1 June 2020 and 31 May 2021.

https://doi.org/10.17061/phrp32342217

Jayakody et al (words)

- *The mean tumour size for delayed women was 16.2 mm* (median 13.0 mm; **25% = 8.0 mm; 75% = 20.0 mm**)
- *compared to 15.9 mm for women who were not delayed* (median 12.0 mm; **25% = 8.0 mm; 75% = 22.0 mm**)



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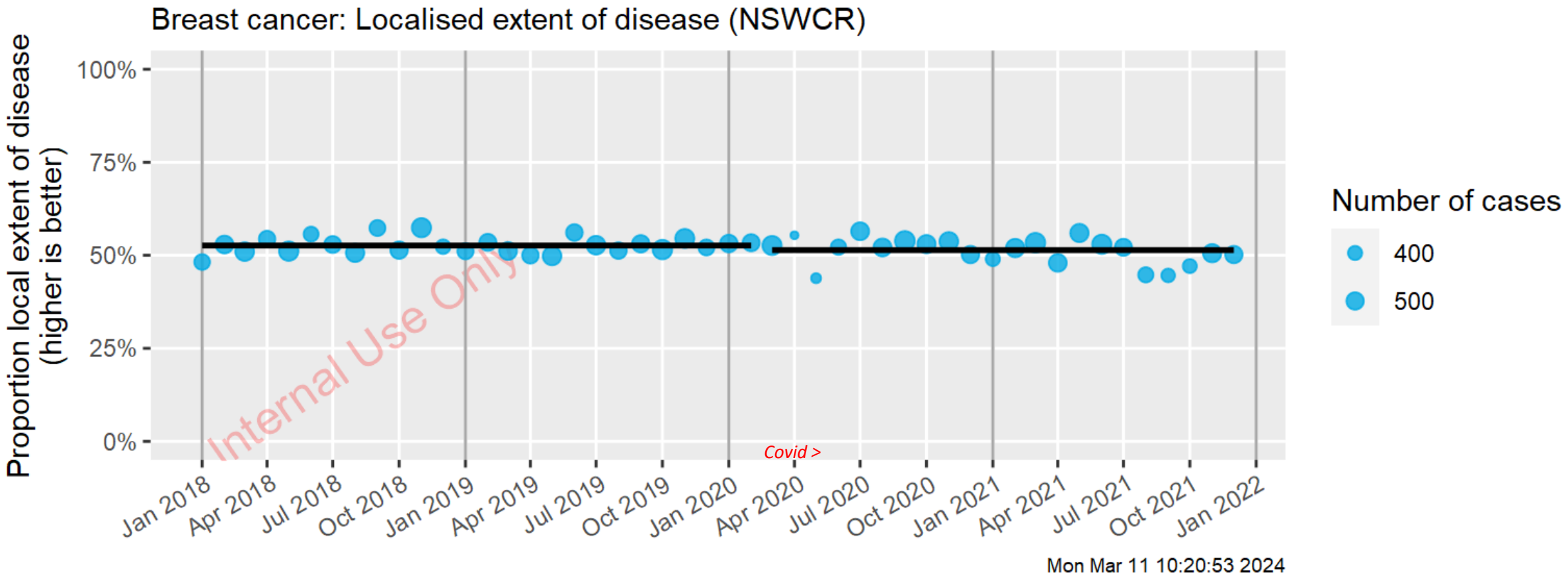
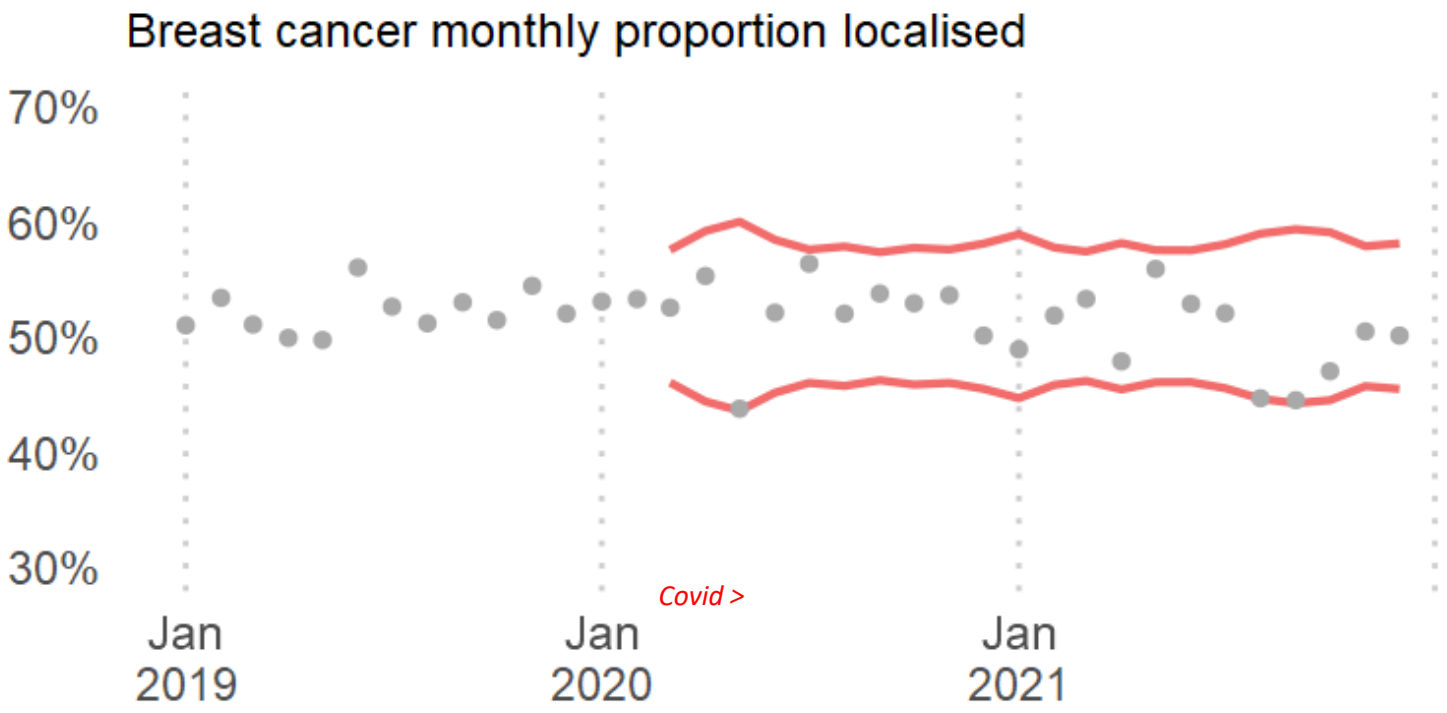
Proportion localised disease



Proportion localised disease

- Some more formal analysis



Proportion localised disease

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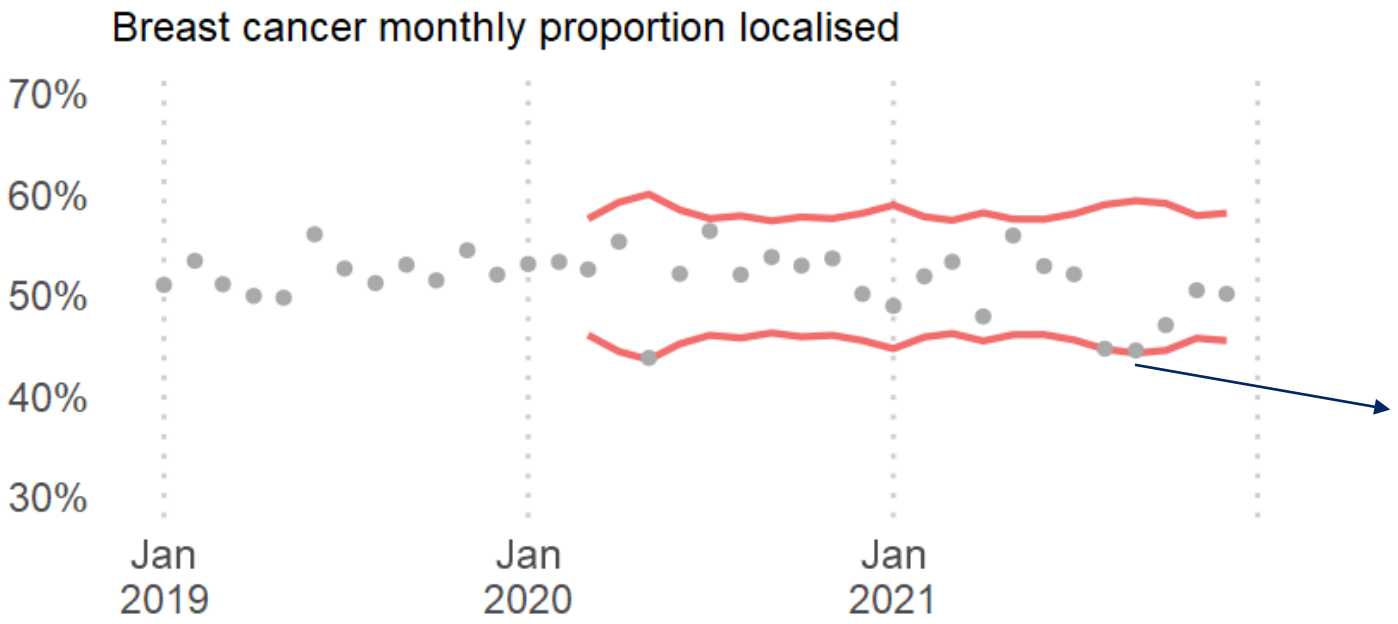
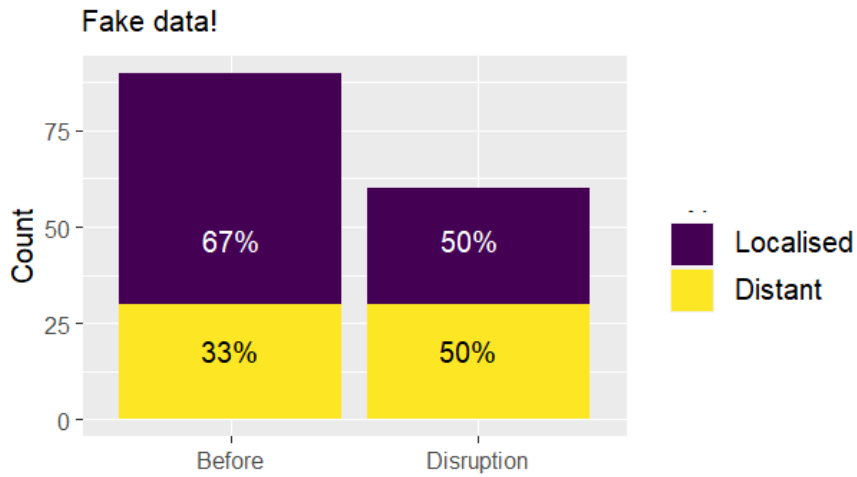
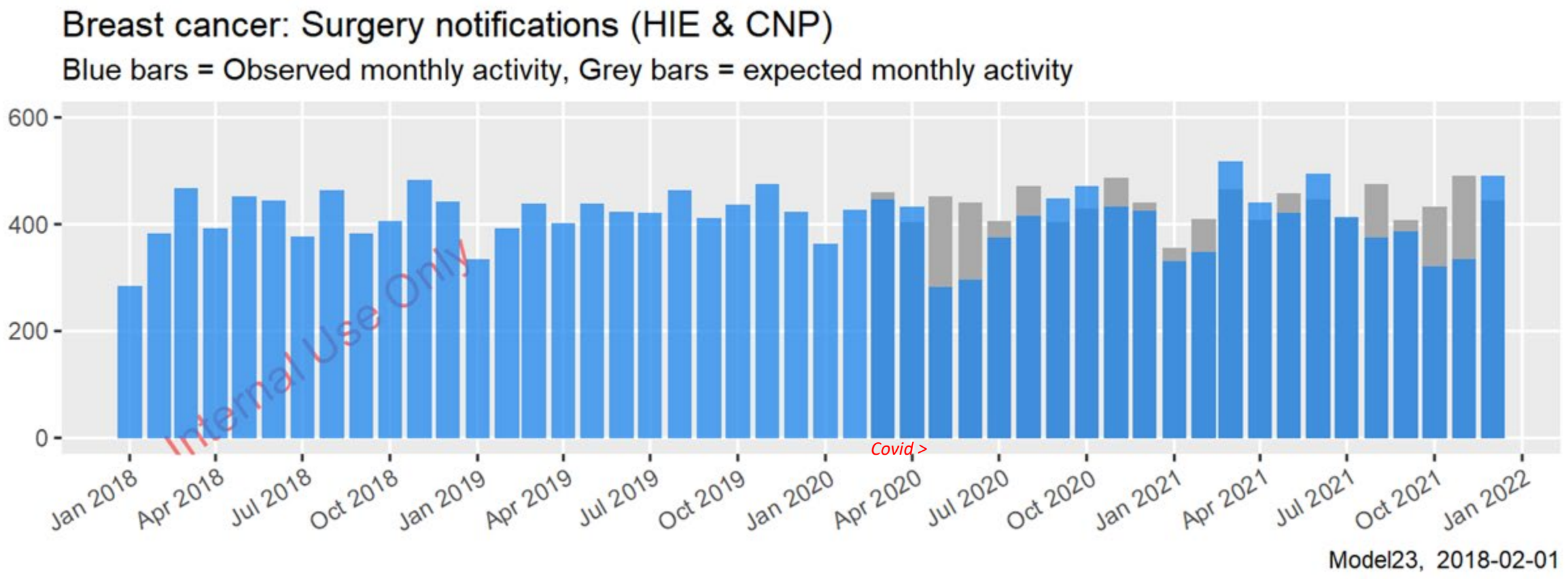
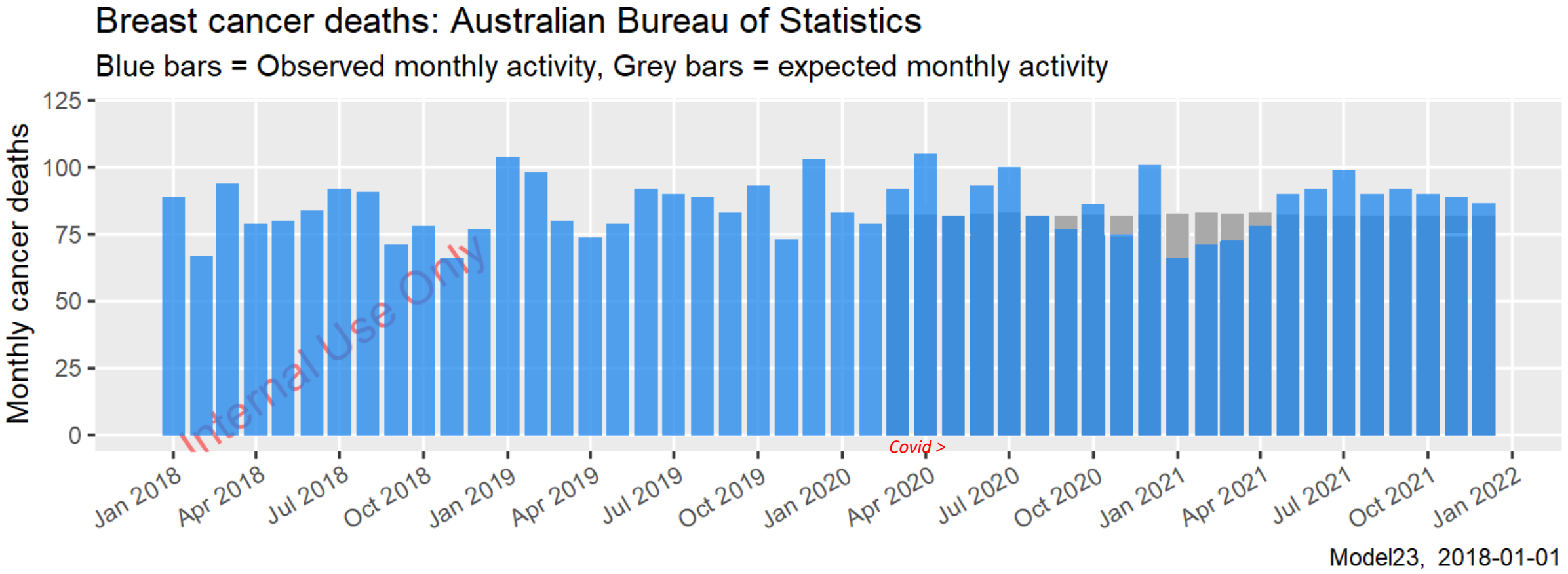




Surgery

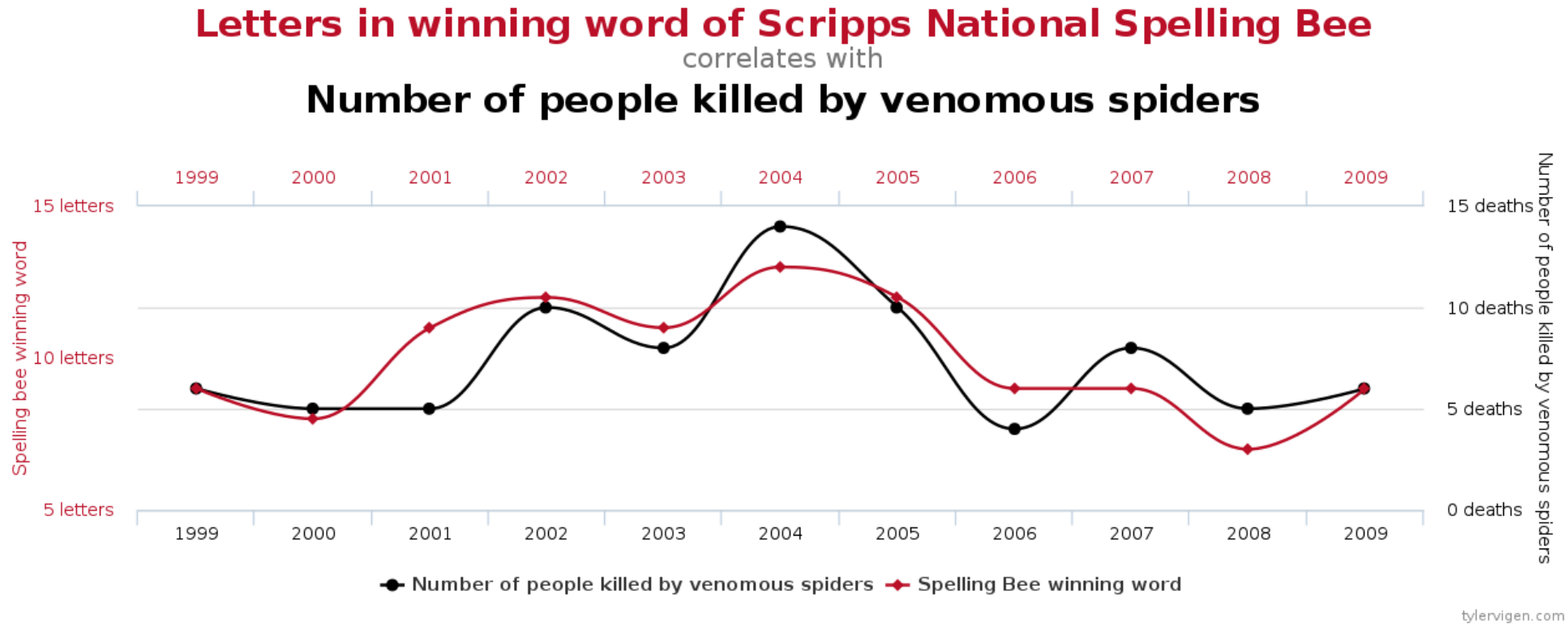

Breast cancer: Surgery notifications (HIE & CNP)
Blue bars = Observed monthly activity, Grey bars = expected monthly activity
600
400
200
0
Internal Use Only
Covid >
Jan 2018
Apr 2018
Jul 2018
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019
Jan 2020
Apr 2020
Jul 2020
Oct 2020
Jan 2021
Apr 2021
Jul 2021
Oct 2021
Jan 2022
Model23, 2018-02-01

Breast cancer specific mortality



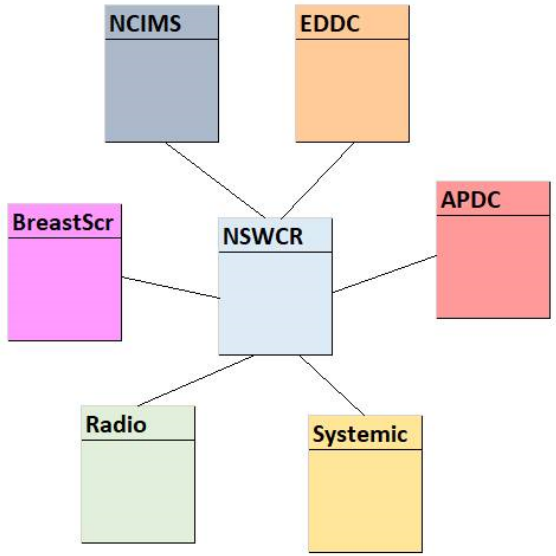
Putting it all together

- Association & Causation



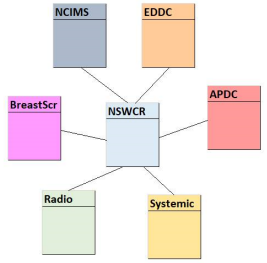
Wrangling Linked Data

- Cancer cases form the cohort.
- Link to emergency, hospital admission, chemo, radio, screening, infectious diseases, and more…

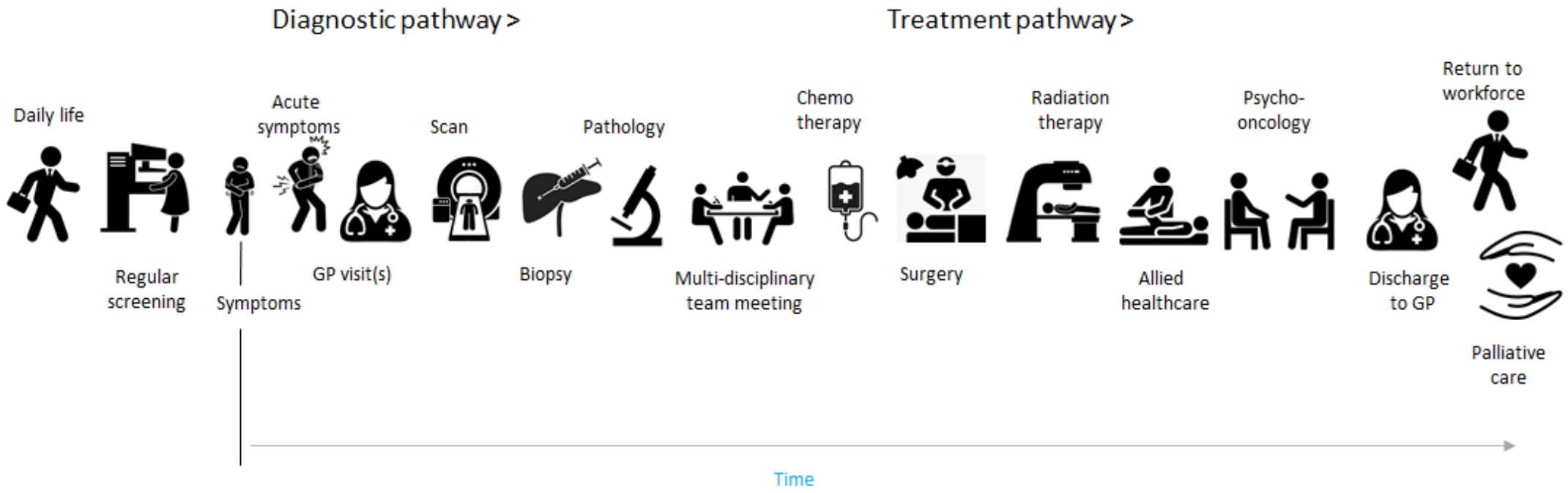


PersonID	Event	Date	Info
P1	Birth	12-Feb-65	#####
P1	ED presentation	12-Mar-20	#####
P1	Admission	20-Jun-20	#####
P1	Cancer diagnosis	12-Sep-20	#####
P1	Admission	05-Oct-20	#####
P1	Radiotherapy	12-Jan-21	#####
P1	Admission	12-Feb-21	#####

Pathway analysis

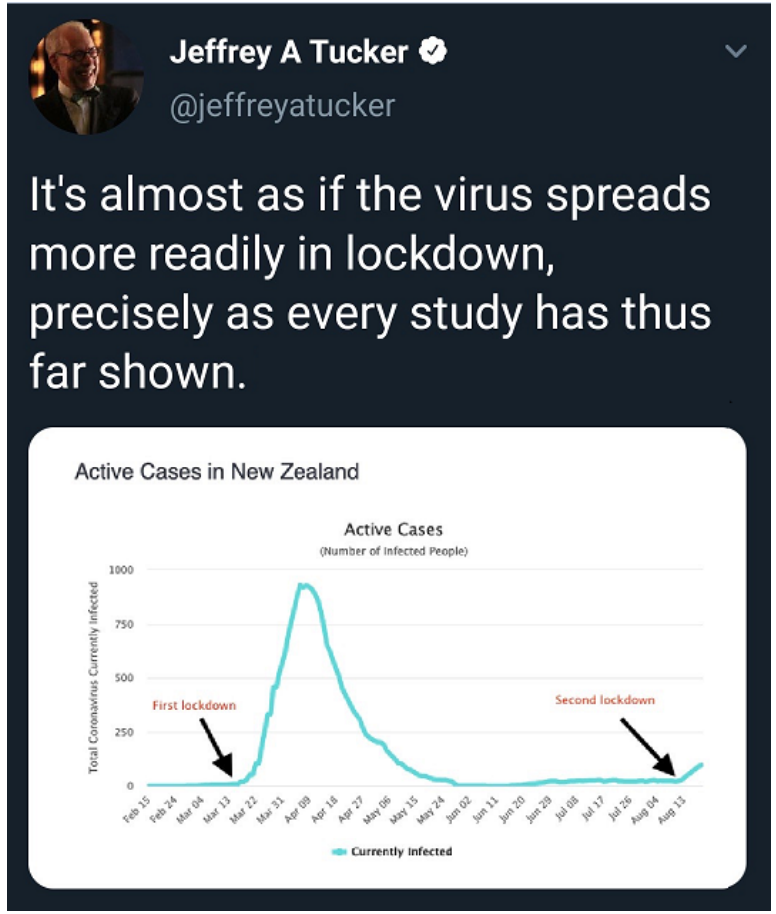


- Analyse the person level pathways.




What would we do *next time*?...

- 2020-2021 a once in a lifetime natural experiment.
- Adopt a “risk management mindset” not a “research mindset”.
- Academia…
- Media…



Thank you