Respiratory illness insights from Flutracking participatory survey data
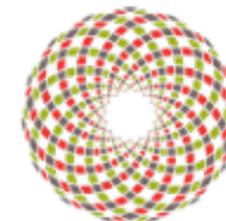
VHIN webinar — 12th June 2024

Emily Harvey
- with Frank Mackenzie, Joel Trent, Steven Turnbull, Dion O'Neale and others

m.e market economics
research & consulting

UNIVERSITY OF AUCKLAND
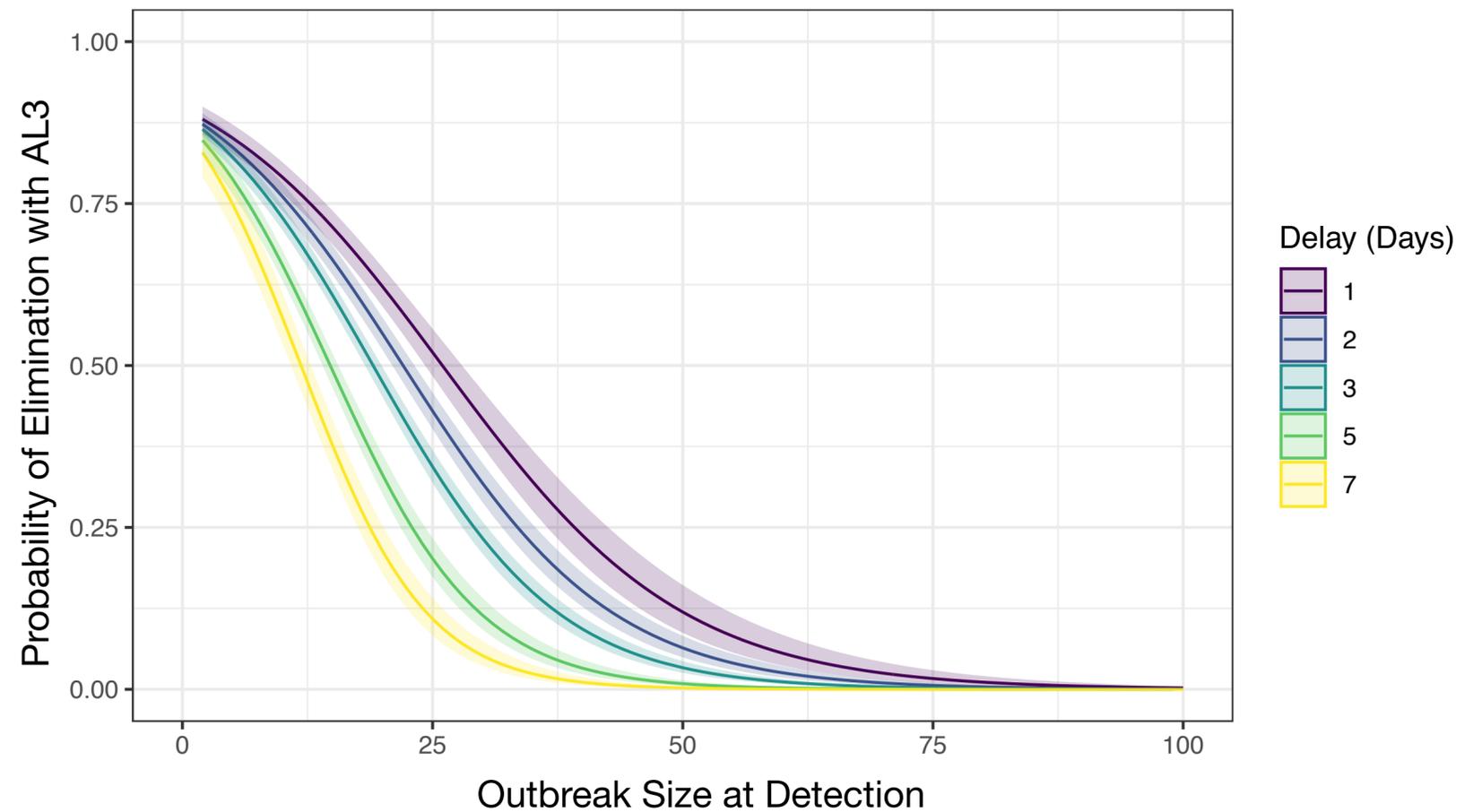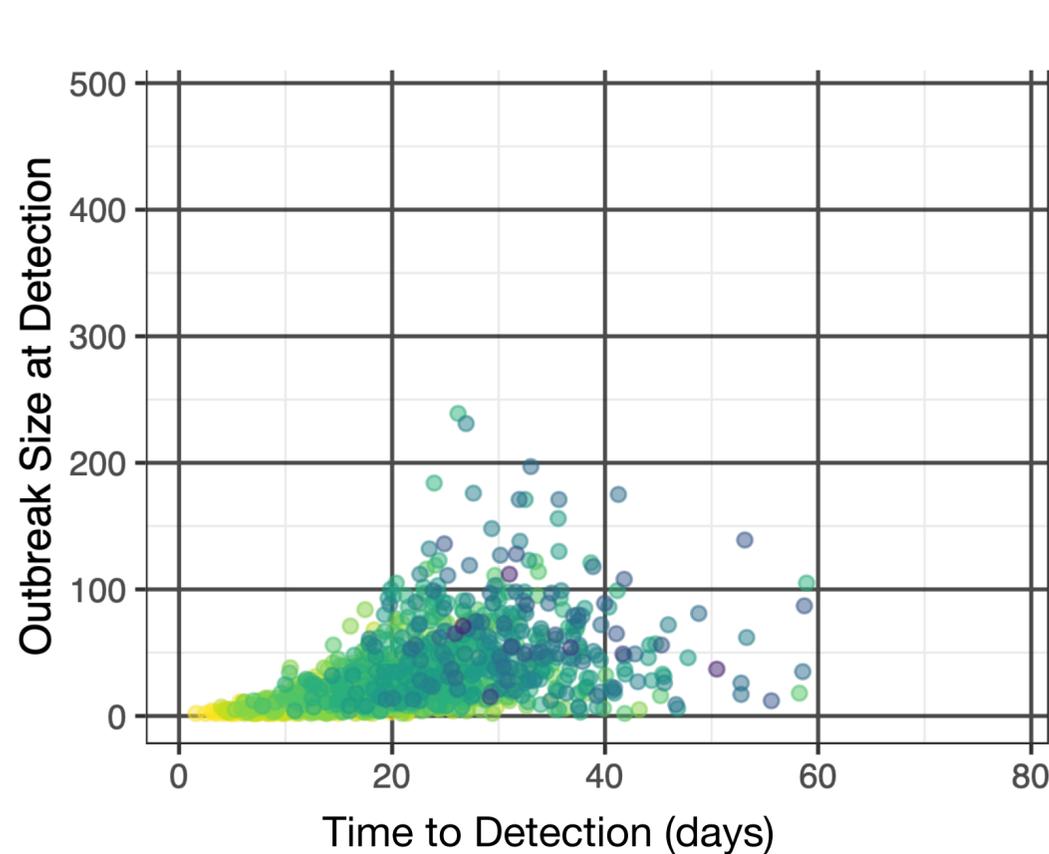Waipapa Taumata Rau
NEW ZEALAND
Covid-19 Modelling Aotearoa
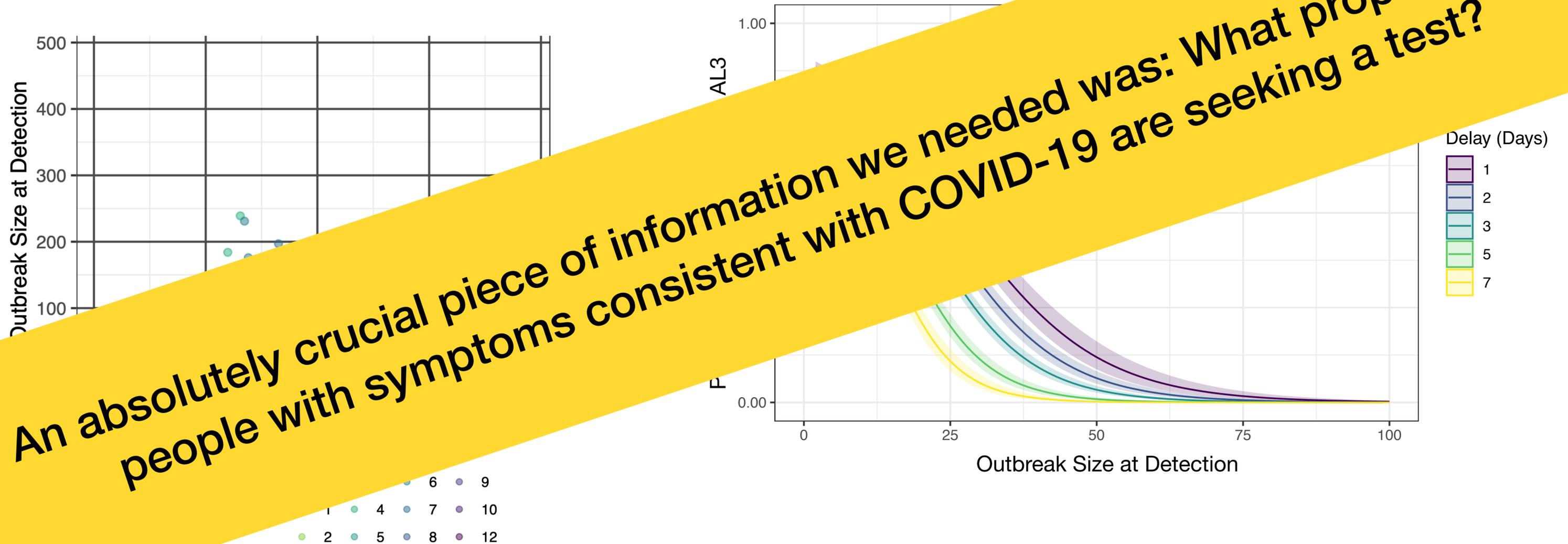
Te Pūnaha Matatini
Data • Knowledge • Insight

Questions in 2020 and 2021 in Aotearoa NZ

- How soon would we detect a new outbreak of COVID-19?

- Could we eliminate it once we had?

Questions in 2020 and 2021 in Aotearoa NZ

- How soon would we detect a new outbreak of COVID-19?
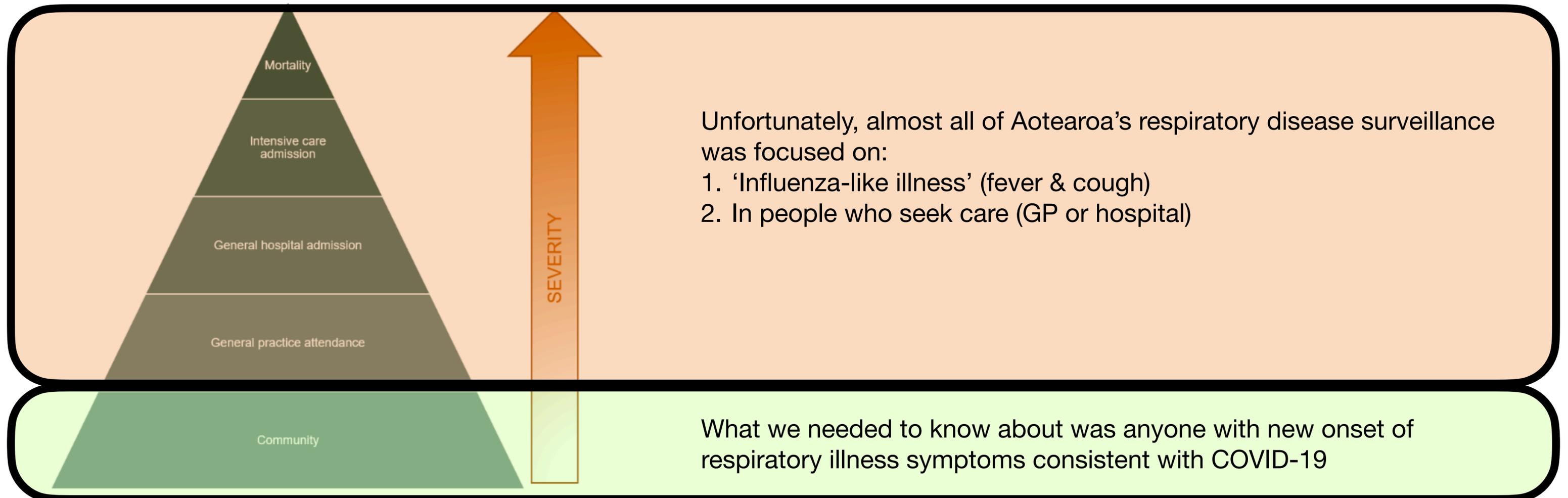
- Could we eliminate it once we had?

An absolutely crucial piece of information we needed was: What proportion of people with symptoms consistent with COVID-19 are seeking a test?

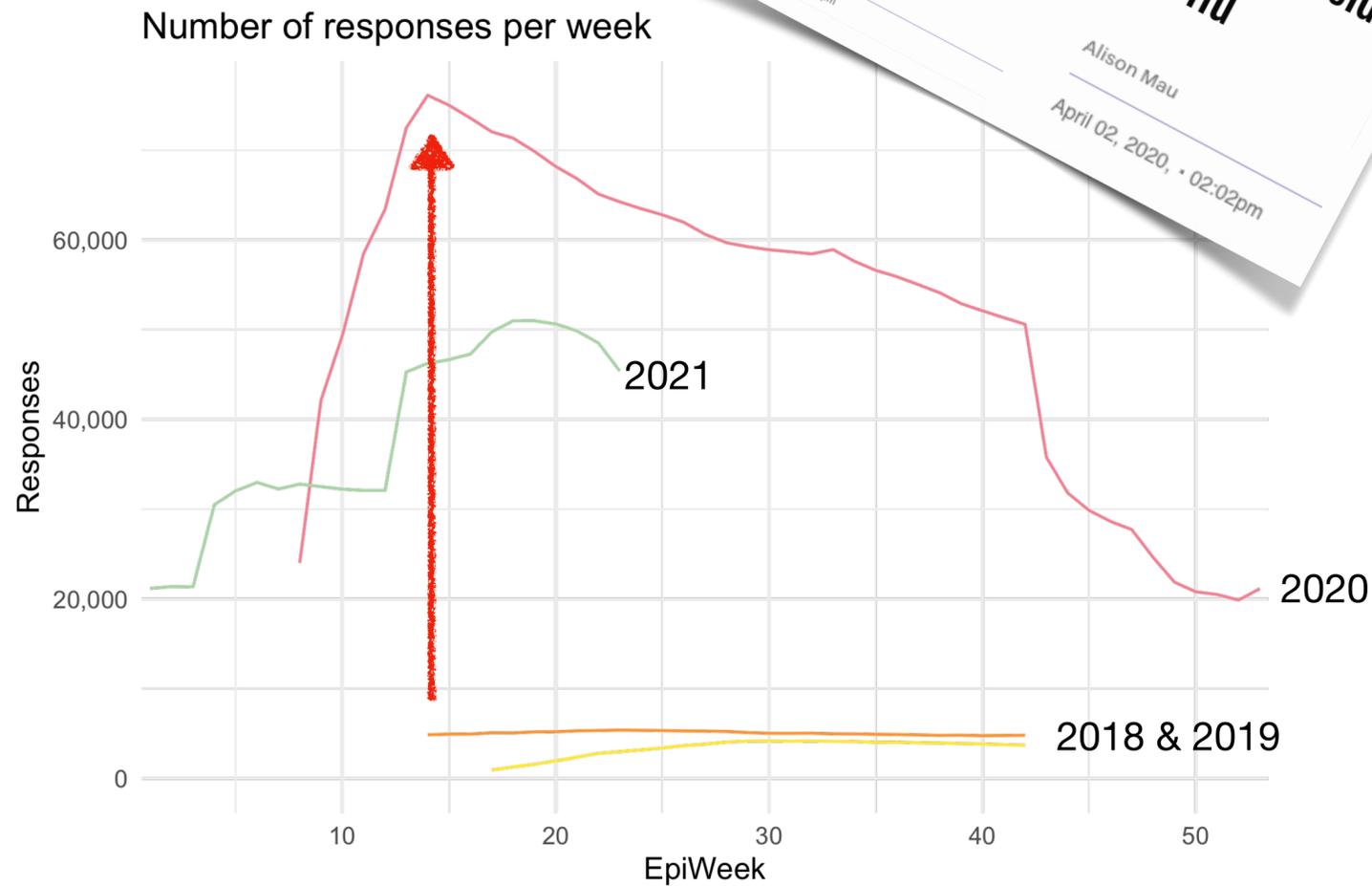# What proportion of people with symptoms are seeking a test?

Luckily we knew how many COVID tests were being done each week.

So all we needed to know was how many people had new onset of respiratory illness symptoms each week. Easy, right?

Unfortunately, almost all of Aotearoa's respiratory disease surveillance was focused on:
1. 'Influenza-like illness' (fever & cough)
2. In people who seek care (GP or hospital)

What we needed to know about was anyone with new onset of respiratory illness symptoms consistent with COVID-19

Image credit: Technical Supplement - Australian Respiratory Surveillance Report

Solution
Using Flutracking survey data

Number of responses per week

Coronavirus: Dr Ashley Bloomfield loves it, but what is the flu tracker?

Alison Mau

April 02, 2020, · 02:02pm

Alison Mau

April 02, 2020, · 02:02pm

Responses

60,000

40,000

20,000

0

2021

2020

2018 & 2019

10   20   30   40   50

EpiWeek

Demo

For the week of: **Monday, 20 May 2024**
to
Sunday, 26 May 2024

Symptoms

Did **you** have:

Fever?	○ Yes	● No	○ Don't Know
Cough?	○ Yes	● No	○ Don't Know
Sore throat?	● Yes	○ No	○ Don't Know
Runny nose?	○ Yes	● No	○ Don't Know
Shortness of breath?	○ Yes	● No	○ Don't Know
Any change in sense of taste or smell?	○ Yes	● No	○ Don't Know
Headache?	○ Yes	● No	○ Don't Know

○ None of the above

Absence From Duties

Were you absent from work or normal duties **due to these symptoms**?   ○ Yes | ○ No | ○ Don't Know

Medical Attention

Did you contact a health professional because of this illness?   ○ Yes | ○ No

COVID-19/Influenza Test

Did you have a COVID Rapid Antigen Test (RAT) or PCR test, or an influenza PCR test during the week ending Sunday 26 May?   ● Yes | ○ No | ○ Don't Know

Have you received a result yet?   ● Yes | ○ No | ○ Don't Know

COVID-19 Rapid Antigen Test? ⓘ
○ Positive
○ Negative
○ Don't Know/Invalid Result
○ Not Tested/Not Sure if Tested

COVID-19 PCR Test? ⓘ
○ Positive
○ Negative
○ Don't Know/Invalid Result
○ Not Tested/Not Sure if Tested

Influenza PCR Test?   ○ Positive

Open source R code and MethodsX publication

Using Flutracking data to estimate rates of new onset of symptoms consistent with COVID-19:

Since the official advice at the time was to seek a test if you had any one or more COVID-like symptoms, we also defined new case definitions of: `CLI1+`, '*any one or more COVID-like symptoms*' and `CLI2+`, '*any two or more COVID-like symptoms*'.

This was also important because the Alert Level 4 in early 2020 had eliminated influenza, RSV, and a number of other nasties, so '*influenza-like illness*' (`ILI`) symptoms were incredibly low.

First use cases in August 2020

Proportion of incidents that got tested

Before August Outbreak

N_Incidents	Count_tested	Prop_tested	
72206	6719	0.0930532	

After August Outbreak

N_Incidents	Count_tested	Prop_tested
15586	3015	0.1934428

Delay before seeking test

Before August Outbreak

tested_same_week_prop	tested_1_week_after_prop	tested_2_weeks_after_prop
0.639726	0.2593607	0.0692542

After August Outbreak

tested_same_week_prop	tested_1_week_after_prop
0.8606965	0.1393035

Refining a bit by December 2020

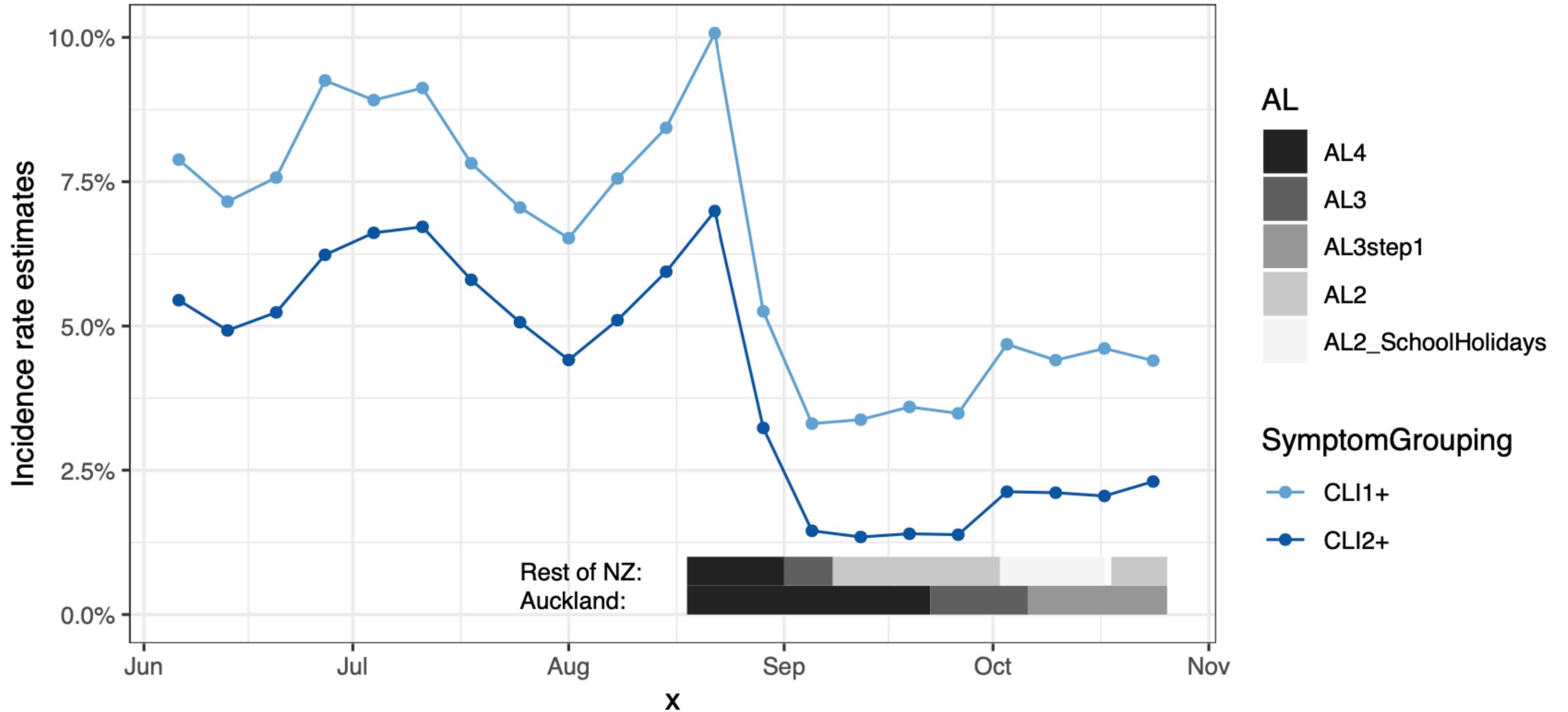**Proportion of incidents that got tested**
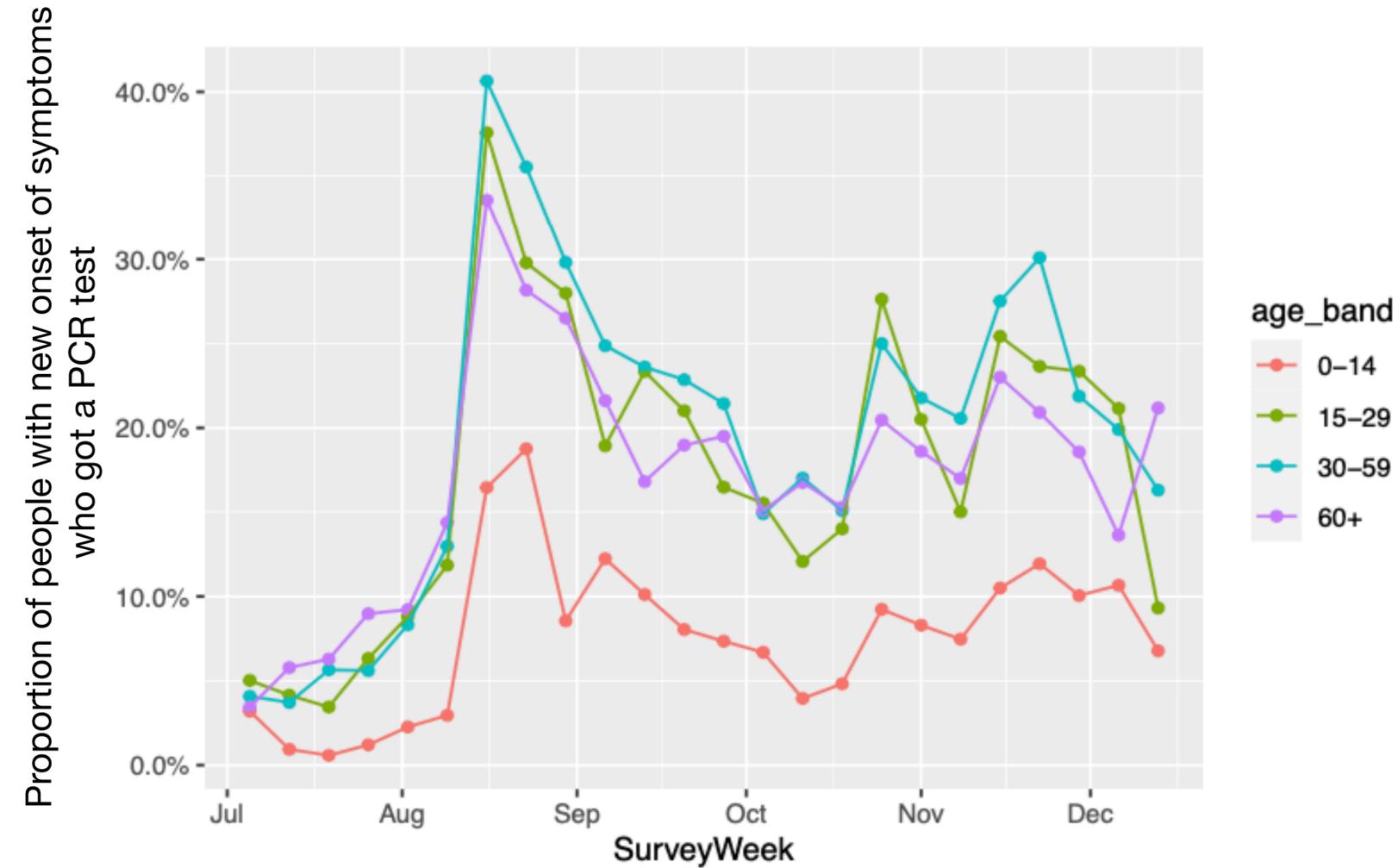
Estimated bias in testing rate in Flutracking respondents vs whole population

Using in August 2021

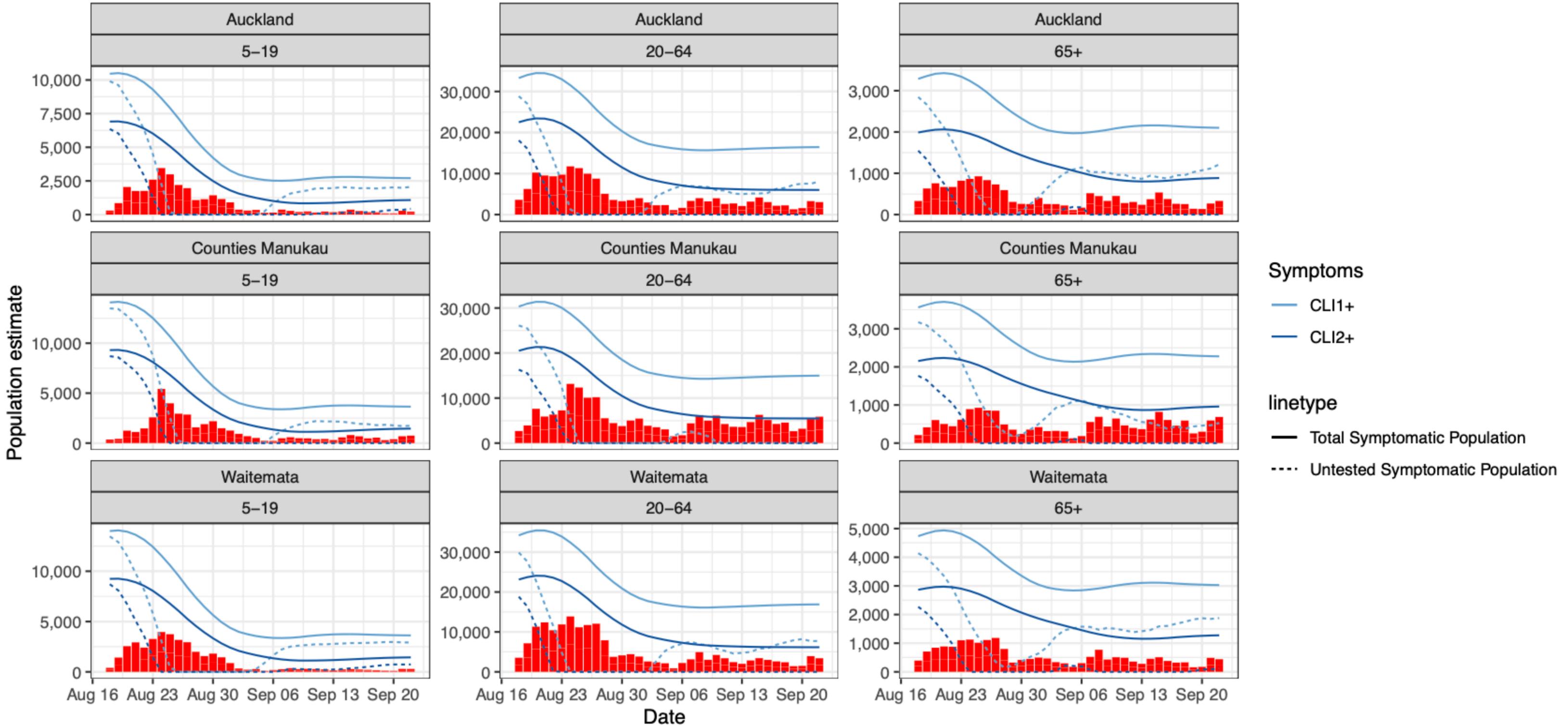Figure 1: National level incidence estimates

Red bars show daily test numbers.
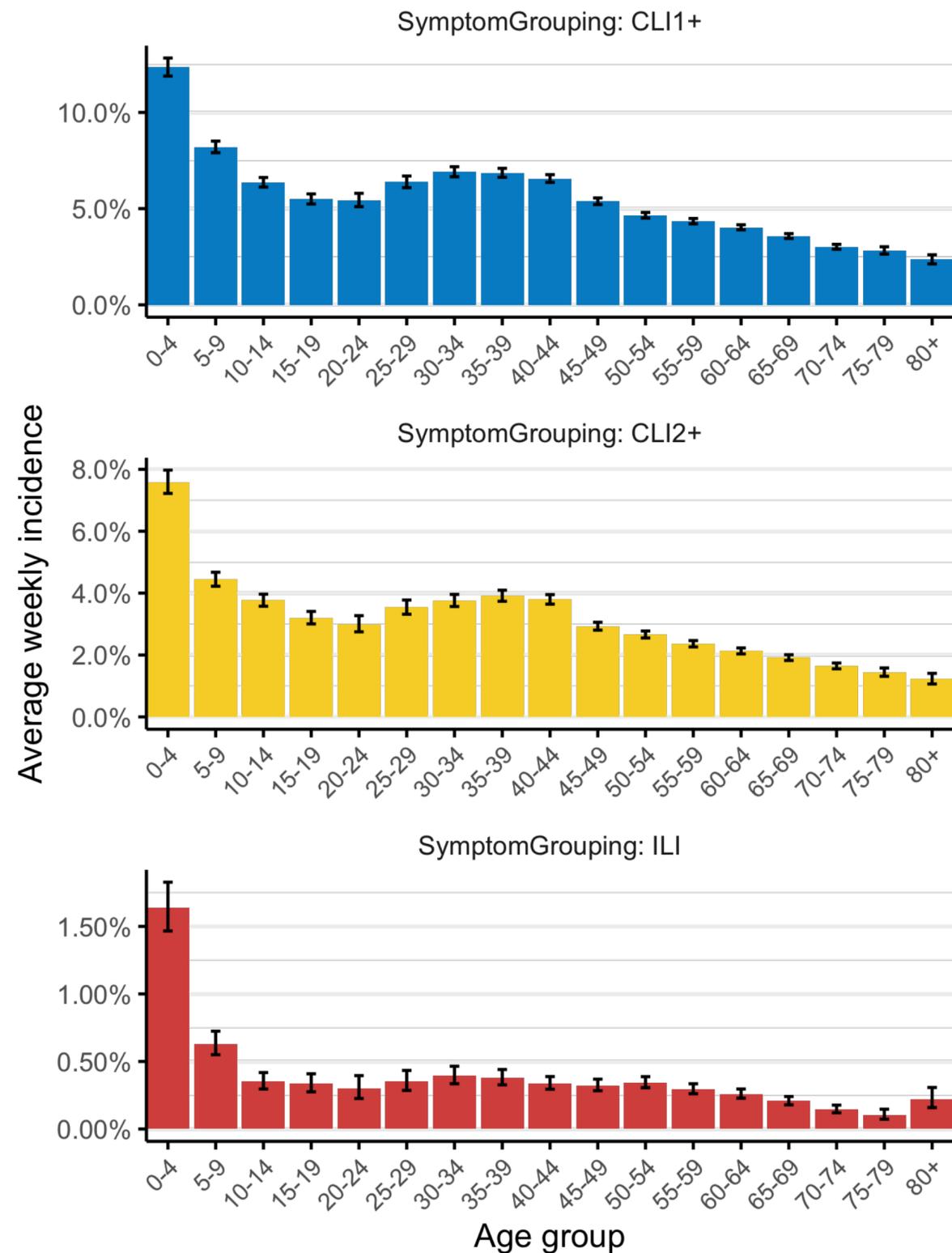We assume people 'recover' and/or wouldn't seek testing after approx 7 days.
CLI1+ considers incidence for any one or more COVID-like symptoms,
CLI2+ considers incidence for any one or more COVID-like symptoms.

Friends we made (biases we found) along the way
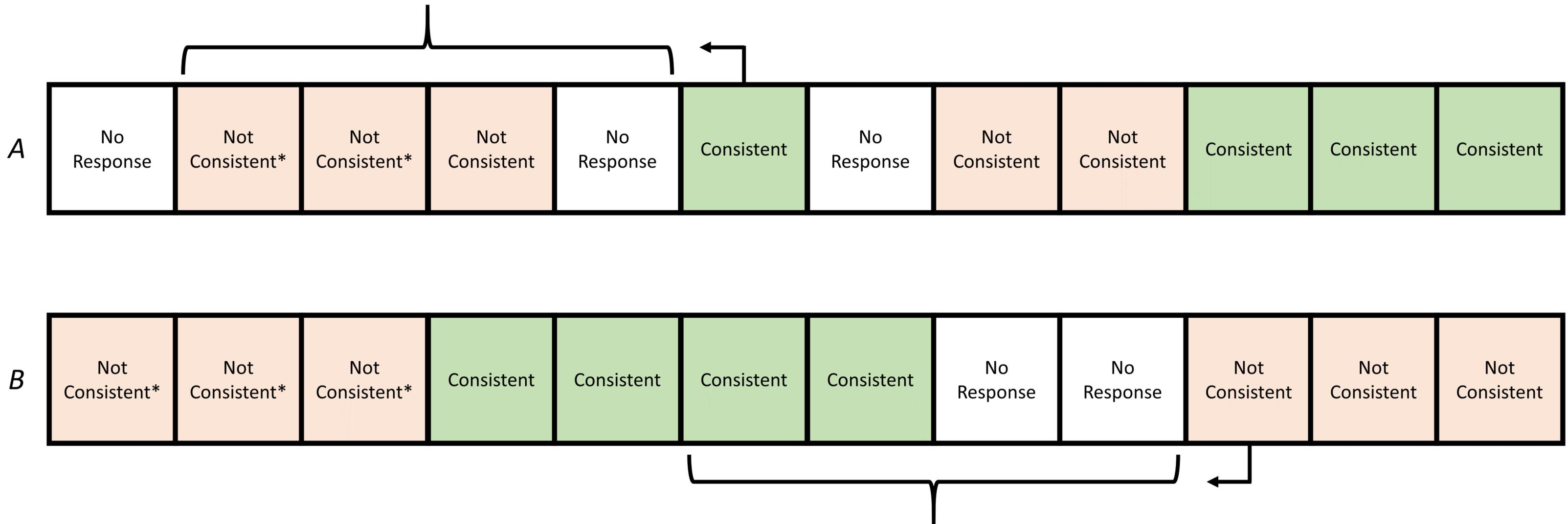
Age of respondents

Different age groups have very different incidence rates. AND Flutracking survey responses are biased towards higher age groups.

This makes it crucial that any overall estimates are re-weighted by age (age standardisation).

We also produce two estimates: one which excludes under5s, and one which doesn't - this is important especially for ILI

https://doi.org/10.1016/j.mex.2022.101820

Responding when sick bias

Defining 'consistent responses' with a moving window

A

| No Response | Not Consistent* | Not Consistent* | Not Consistent | No Response | Consistent | No Response | Not Consistent | Not Consistent | Consistent | Consistent | Consistent |

B

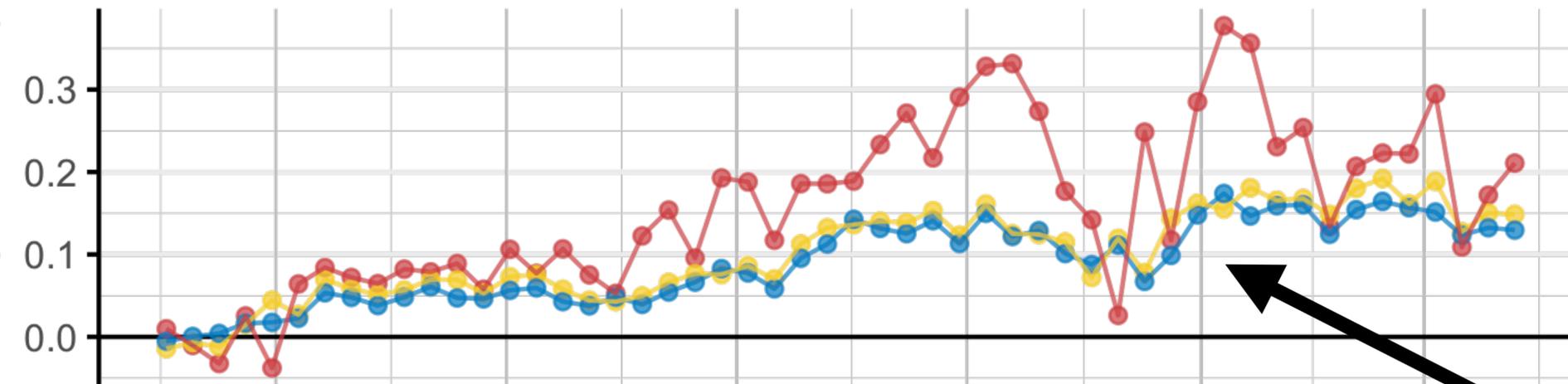| Not Consistent* | Not Consistent* | Not Consistent* | Consistent | Consistent | Consistent | Consistent | No Response | No Response | Not Consistent | Not Consistent | Not Consistent |

Settled on a 4 week window, and allowing 1 missing week
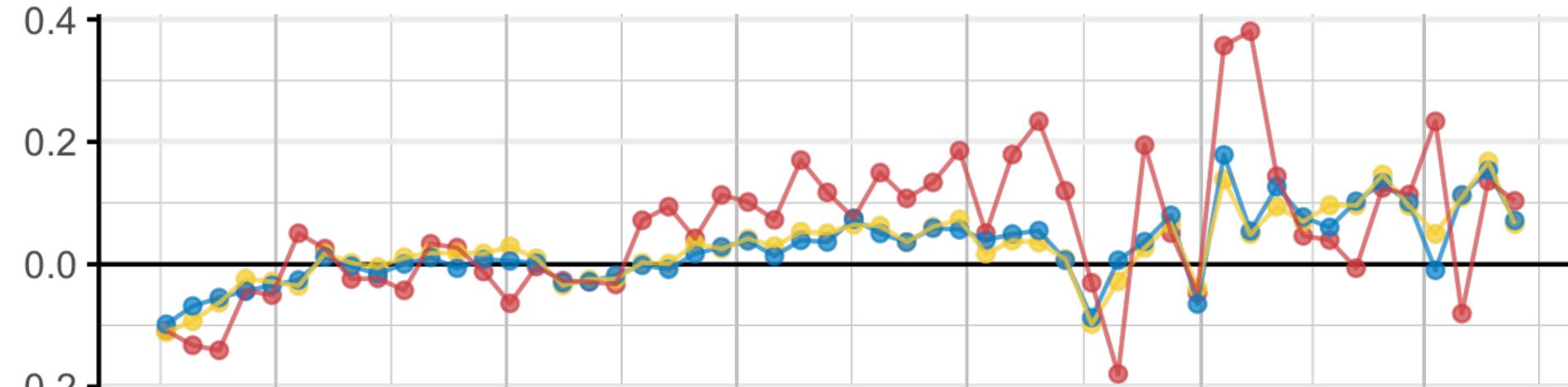## "responded in 3 of the last 4 weeks"
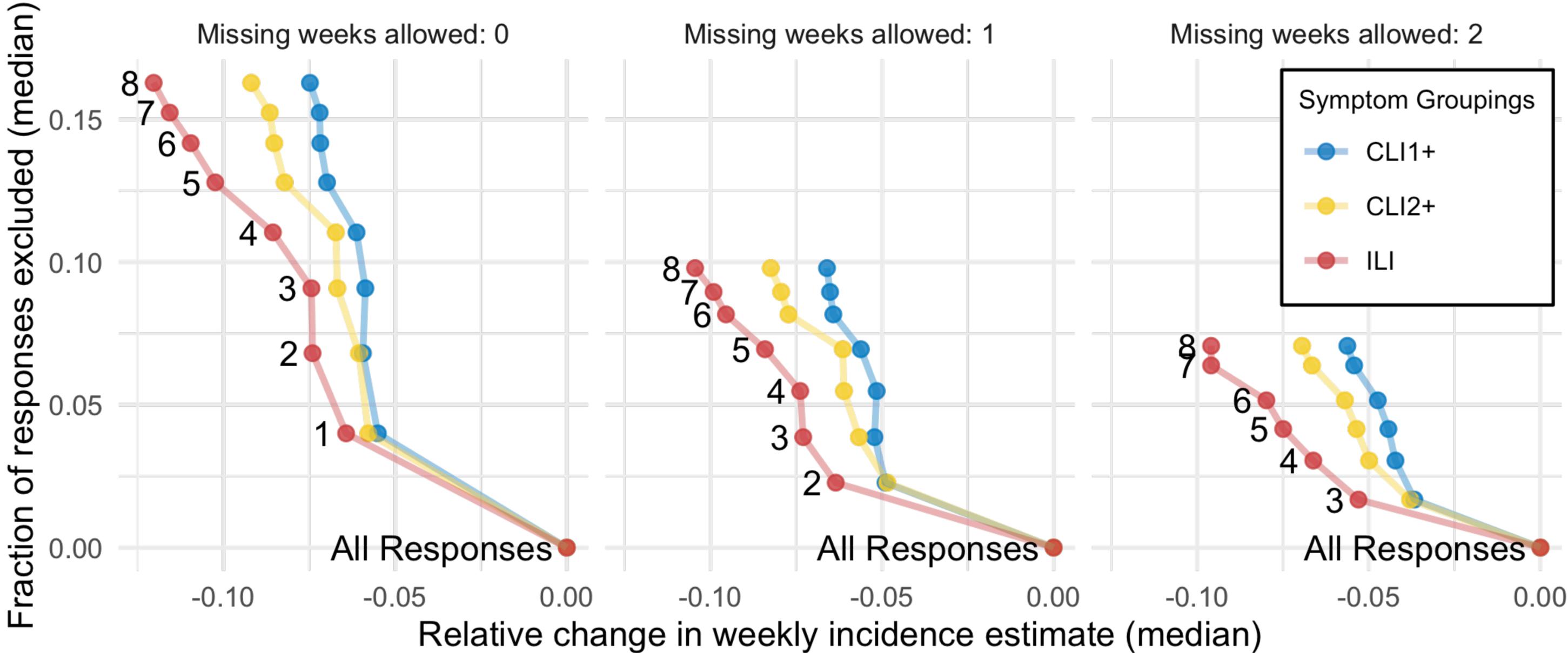
Effect of considering only consistent responses
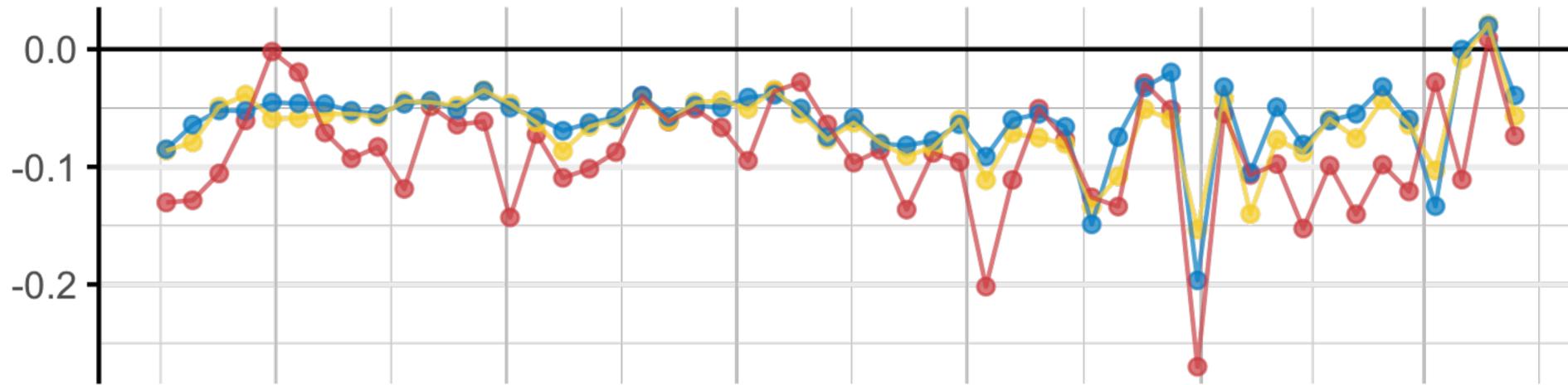
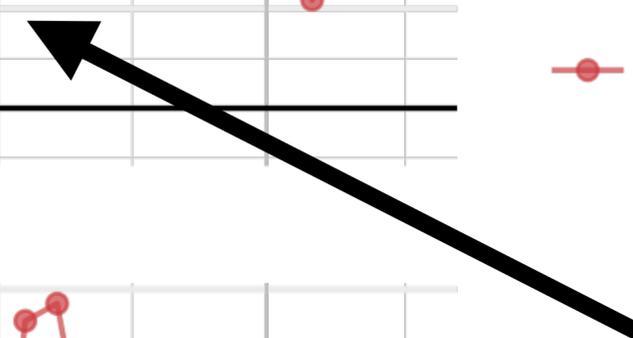Effect of age-weighting responses

Combined effect

The impact of these adjustments varies throughout the year depending on how the responding cohort changes and how symptom rates change

Symptom Grouping
- CLI1+
- CLI2+
- ILI

Age representation getting worse through time

		Average weekly responses %[a] (n[b])	Average weekly consistent responses %[a] (n[b])	All participants % (n)	Consistent participants % (n)	Aotearoa New Zealand Census 2018 %
Age (years)	0-9	8.8% (3924)	8.6% (3510)	10.8% (9291)	10.5% (8203)	13.1%
	10-19	10.6% (4736)	10.5% (4271)	11.6% (9993)	11.6% (9036)	12.9%
	20-29	6.3% (2801)	6.1% (2507)	8.0% (6887)	7.6% (5933)	14.1%
	30-39	11.9% (5294)	11.7% (4776)	13.7% (11799)	13.3% (10390)	13.0%
	40-49	16.9% (7540)	16.8% (6866)	17.2% (14815)	17.5% (13611)	13.0%
	50-59	18.1% (8080)	18.3% (7467)	16.2% (13908)	16.6% (12946)	13.0%
	60-69	16.8% (7472)	17.1% (6967)	13.9% (11907)	14.2% (11051)	10.4%
	70-79	9.0% (4026)	9.2% (3765)	7.3% (6268)	7.3% (5718)	6.7%
	80+	1.5% (674)	1.5% (628)	1.3% (1099)	1.3% (992)	3.6%
	Total	(44547)	(40756)	(85967)	(77880)	
Ethnicity	Māori	6.6% (2931)	6.5% (2633)	7.8% (6720)	7.6% (5933)	14.7%
	Pacific	1.5% (658)	1.5% (591)	1.8% (1567)	1.8% (1393)	7.2%
	Asian	3.6% (1603)	3.5% (1434)	4.3% (3670)	4.0% (3093)	13.4%
	Other	4.9% (2176)	4.9% (1980)	5.2% (4441)	5.1% (3949)	2.4%
	Pākeha/NZ European	83.5% (37178)	83.7% (34119)	80.9% (69569)	81.6% (63512)	62.3%
Gender	Female	55.7% (24805)	55.7% (22698)	55.5% (47687)	55.4% (43153)	50.6%
	Male	44.1% (19665)	44.1% (17989)	44.3% (38124)	44.4% (34585)	49.4%
	Other	0.2% (77)	0.2% (70)	0.2% (156)	0.2% (142)	No data
Region	Northland	2.8% (1268)	2.9% (1165)	2.9% (2466)	2.9% (2222)	3.8%
	Auckland	28.7% (12762)	28.5% (11630)	29.2% (25168)	29.0% (22612)	33.4%
	Waikato	7.4% (3312)	7.4% (3022)	7.6% (6500)	7.6% (5941)	9.8%
	Bay of Plenty	4.3% (1921)	4.3% (1747)	4.5% (3892)	4.4% (3452)	6.6%
	Taranaki	2.1% (930)	2.1% (843)	2.1% (1804)	2.10% (1615)	2.5%
	Gisborne	0.4% (176)	0.4% (160)	0.4% (380)	0.4% (338)	1.0%
	Hawke's Bay	3.2% (1433)	3.2% (1322)	3.2% (2740)	3.20% (2518)	3.5%
	Manawatū-Whanganui	3.8% (1692)	3.8% (1549)	3.8% (3283)	3.9% (3006)	5.1%
	Wellington	21.9% (9737)	22% (8950)	20.9% (17988)	21.0% (16382)	10.8%
	Marlborough	0.7% (321)	0.7% (293)	0.7% (602)	0.7% (547)	1.0%
	Nelson	1.4% (614)	1.4% (559)	1.4% (1172)	1.4% (1067)	1.1%
	Tasman	1.2% (529)	1.2% (485)	1.2% (1047)	1.2% (950)	1.1%
	West Coast	0.5% (234)	0.5% (215)	0.6% (472)	0.5% (414)	0.7%
	Canterbury	14.2% (6324)	14.3% (5809)	14.1% (12098)	14.2% (11066)	12.8%
	Otago	5.9% (2626)	5.9% (2401)	5.8% (4995)	5.8% (4524)	4.8%
	Southland	1.5% (660)	1.5% (600)	1.6% (1347)	1.6% (1213)	2.1%

Note: all is not always as it appears

Diversion: Impact of gender on incidence rates
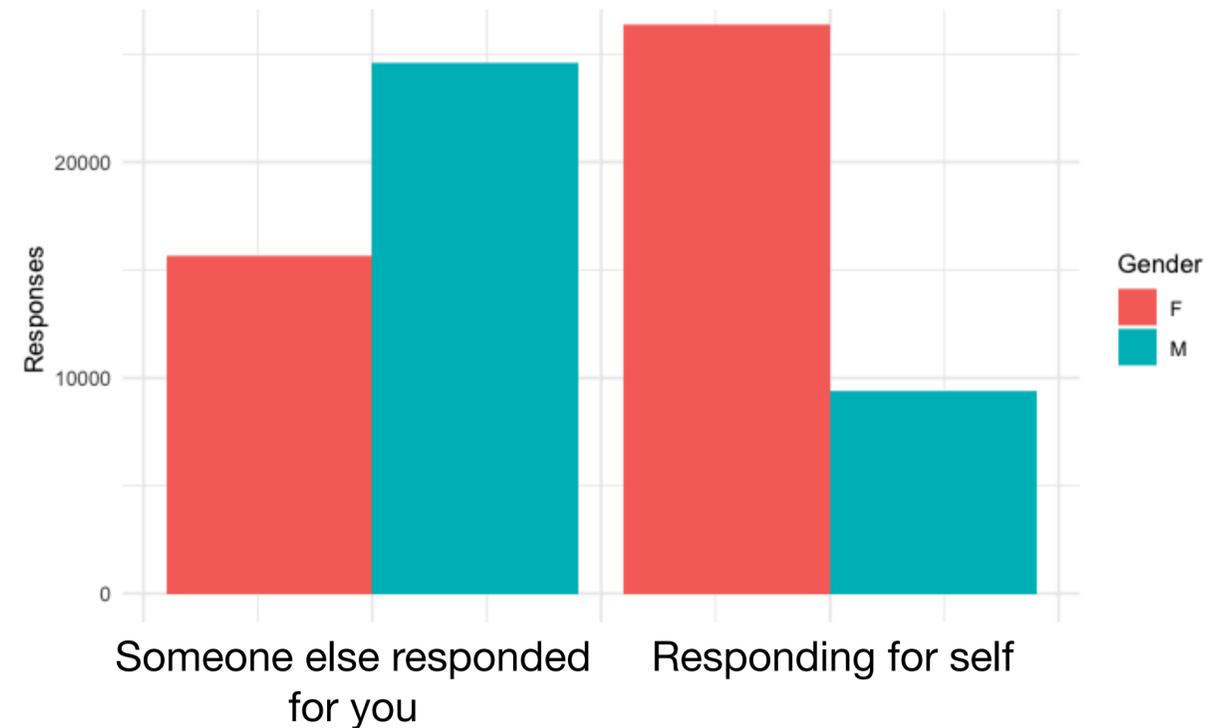

It looks like incidence is higher in women

Is this just that women are younger? ✖

Is this just that women in households with kids? ✖

THE SPINOFF

NEWS   READ ▼   WATCH   LISTEN   MORE ▼

SCIENCE October 28, 2021

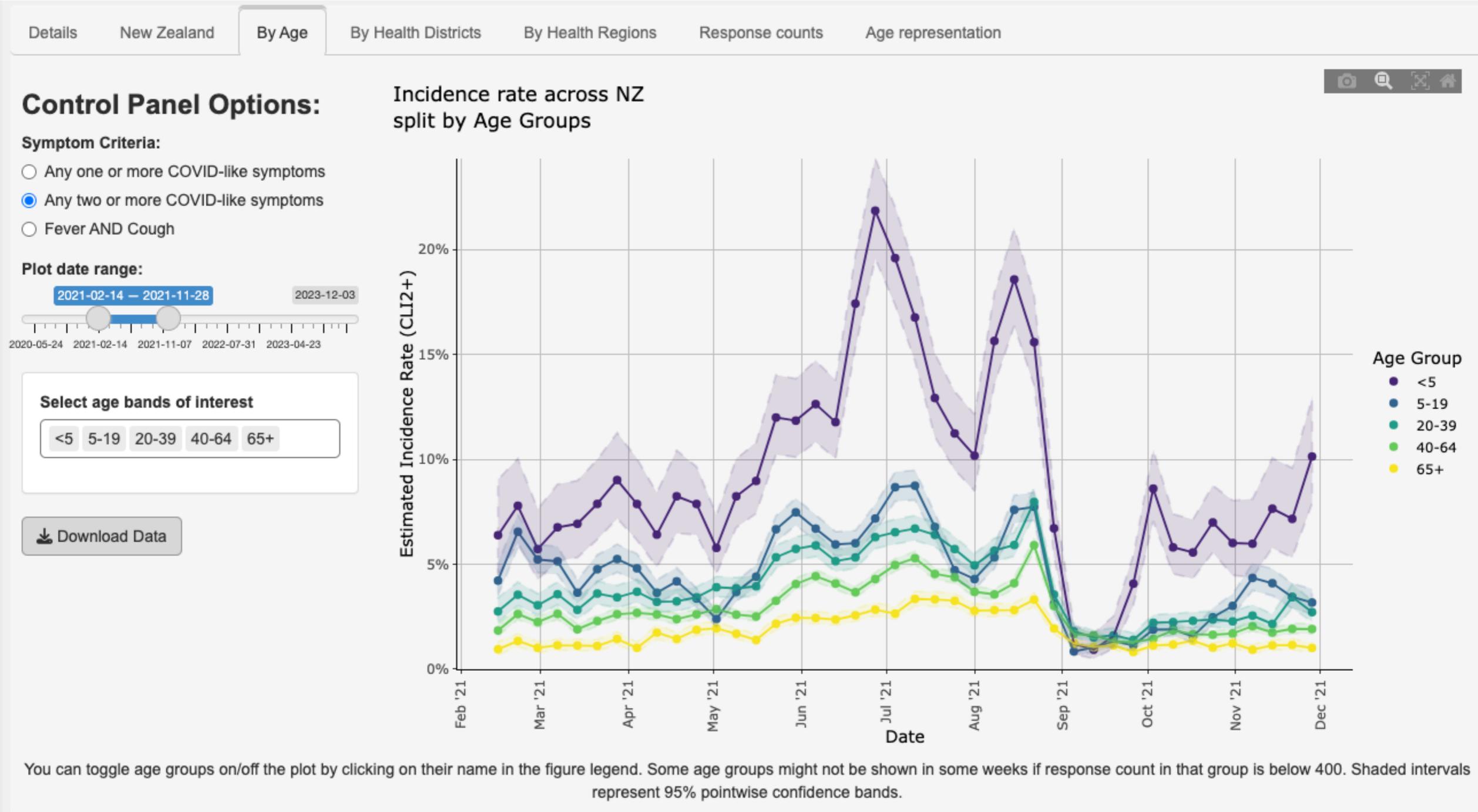# Siouxsie Wiles: FluTracking data fortifies our Covid defences. Here's how you can help

Siouxsie Wiles
Contributing writer

Share Story

https://thespinoff.co.nz/science/28-10-2021/siouxsie-wiles-flutracking-data-is-a-huge-help-in-tracking-covid-heres-how-you-can-help

Public dashboard

https://emilynz.shinyapps.io/fluTracking-shiny-app/

Where could **Flutracking fit in pandemic preparedness and respiratory disease surveillance now?**

Aotearoa NZ has some world-leading work going on related to respiratory illness surveillance, especially when it comes to genomic analysis, and severe acute respiratory illness in hospitals, but it has some gaps
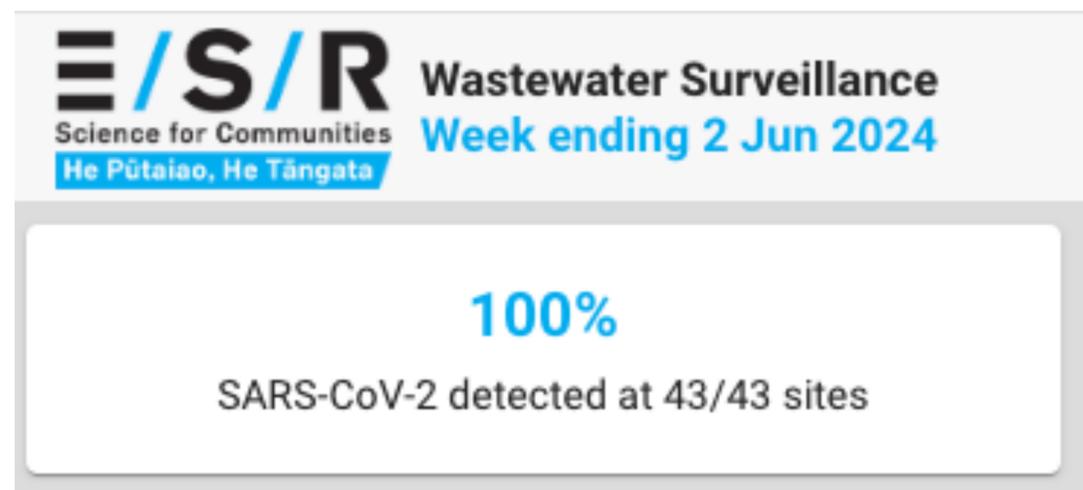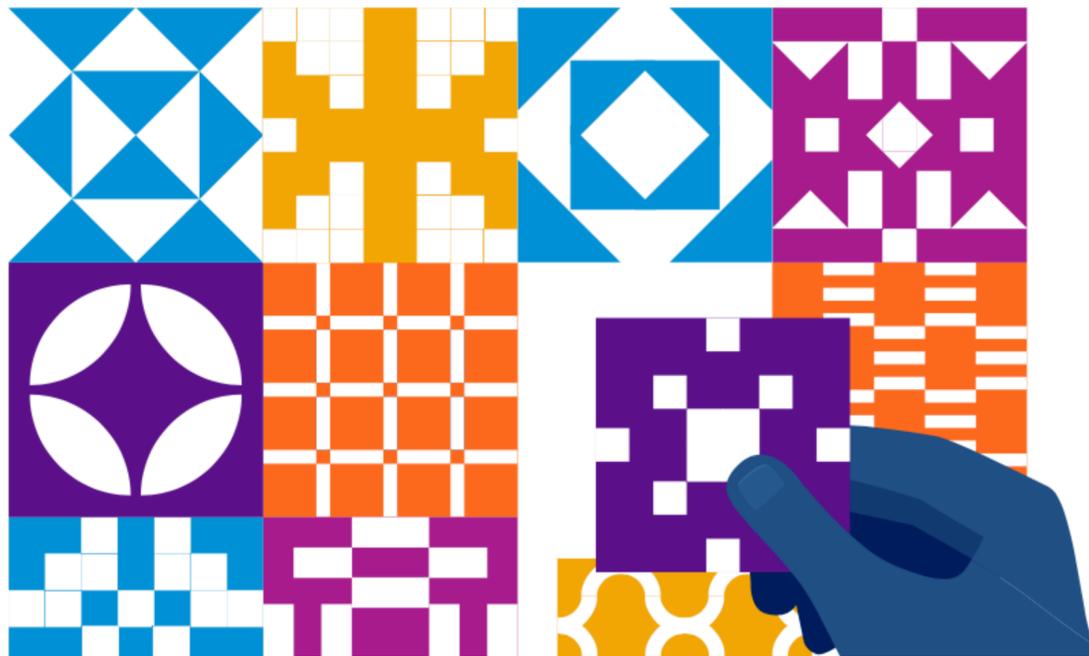
Where could **Flutracking fit in pandemic preparedness and respiratory disease surveillance now?**

"Crafting the mosaic"

A framework for resilient surveillance for respiratory viruses of epidemic and pandemic potential

I

Domain I:
detection and assessment of an emerging or re-emerging respiratory virus;

II

Domain II:
monitor epidemiological characteristics of respiratory viruses in interpandemic periods; and
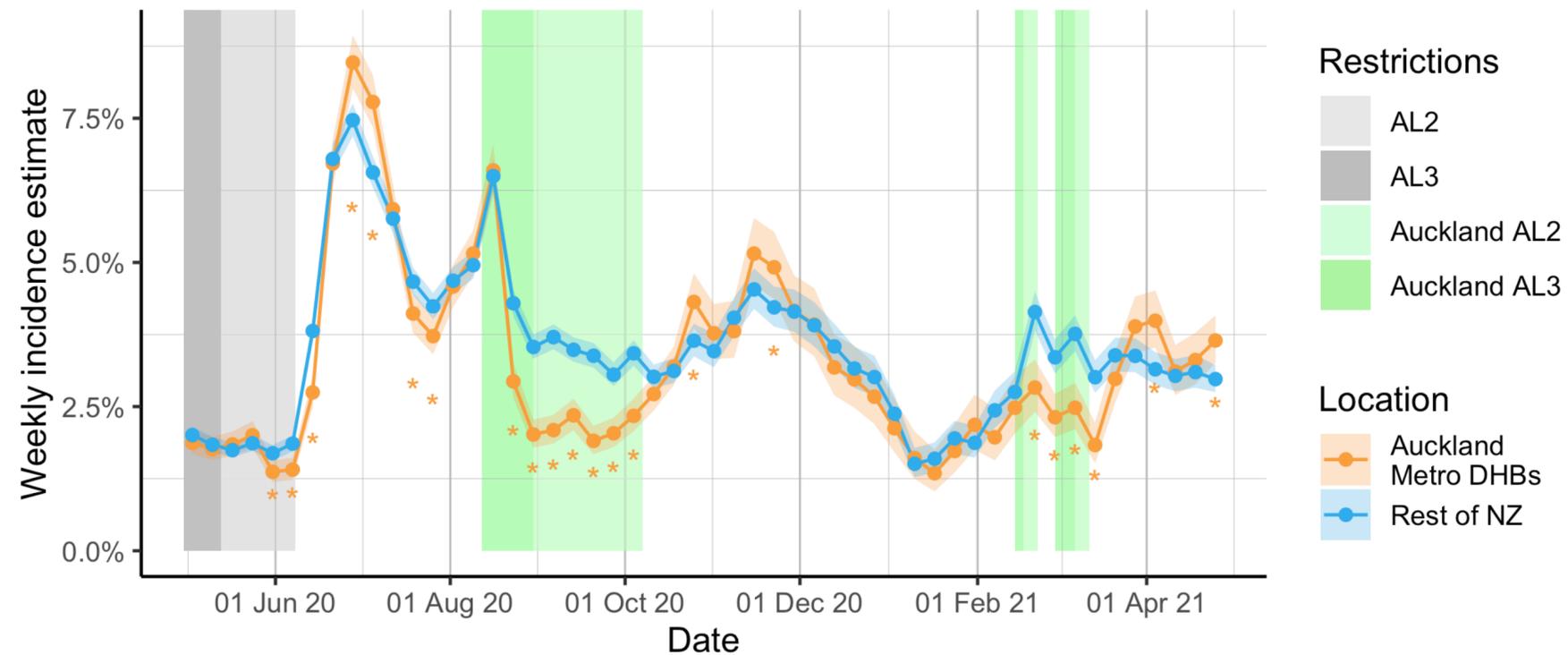
III

Domain III:
informing use of human health intervention

World Health Organization

Behavioural insights
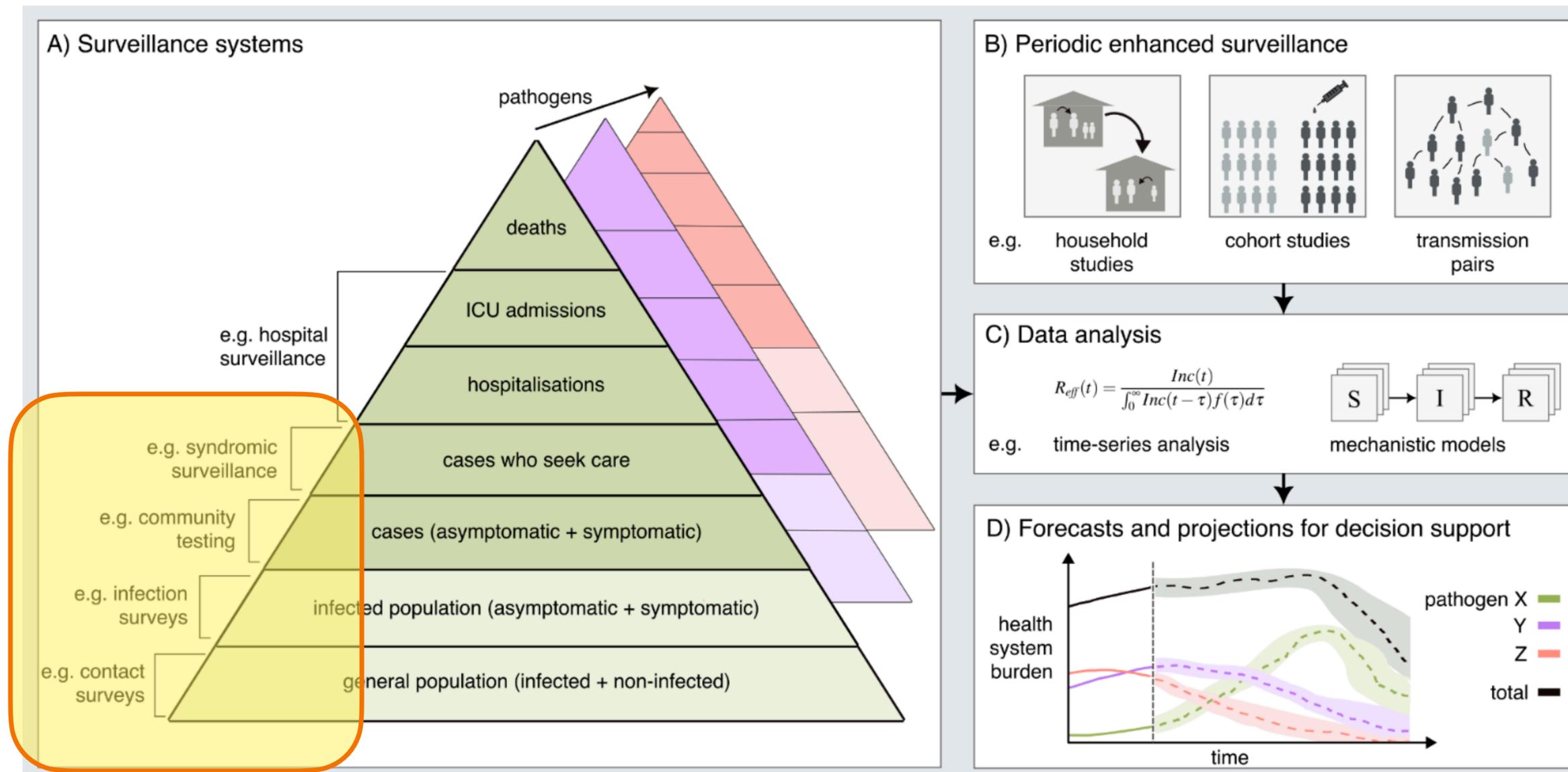
Reflect changes in contact rates or behaviour

2 or more COVID-like symptoms

The impact of Alert Level changes is very clear

Where could **Flutracking fit in pandemic preparedness and respiratory disease surveillance now?**
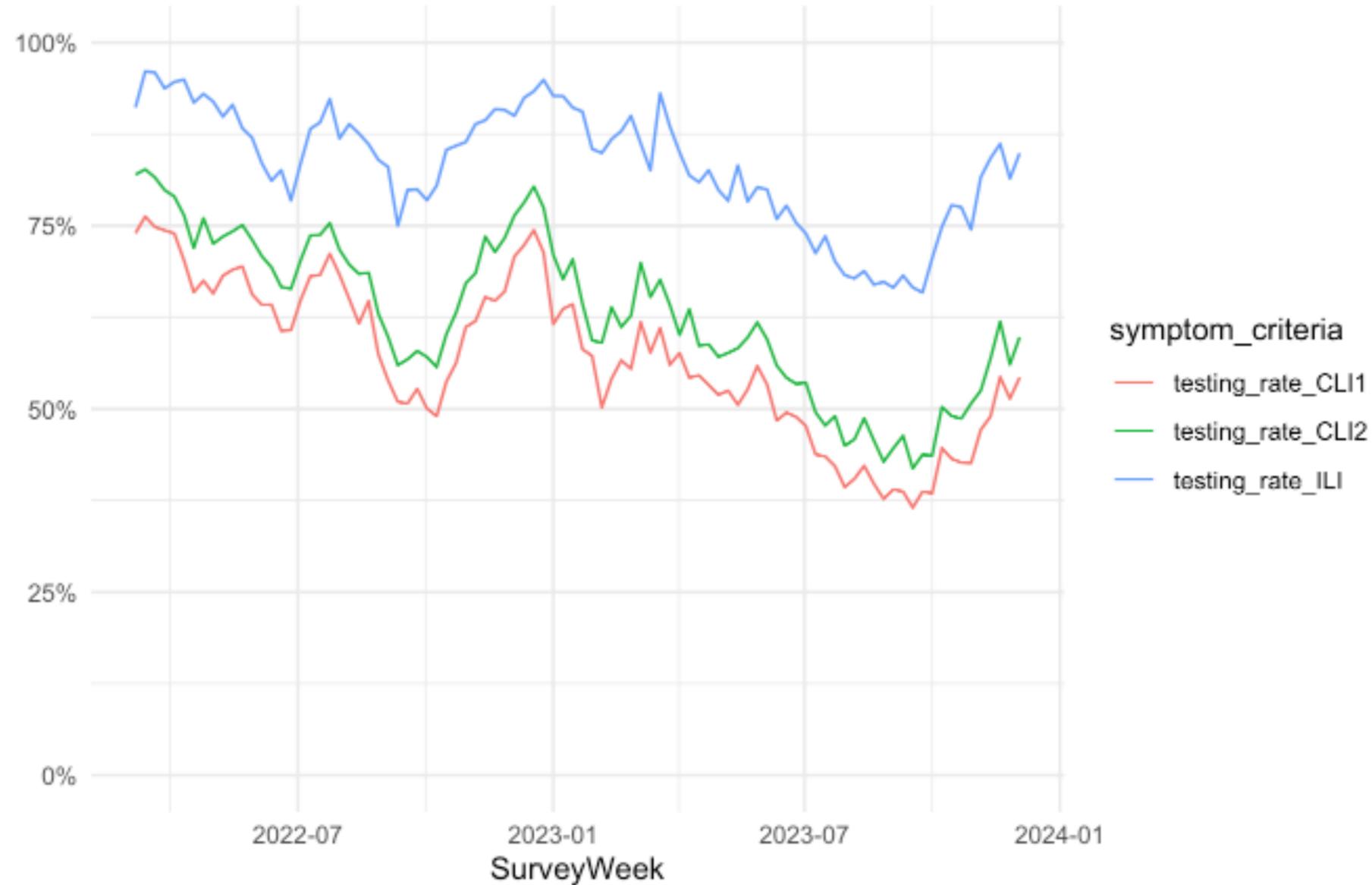
Eales et al. (2024) *Key challenges for the surveillance of respiratory viruses: transitioning out of the acute phase of the SARS-CoV-2 pandemic*
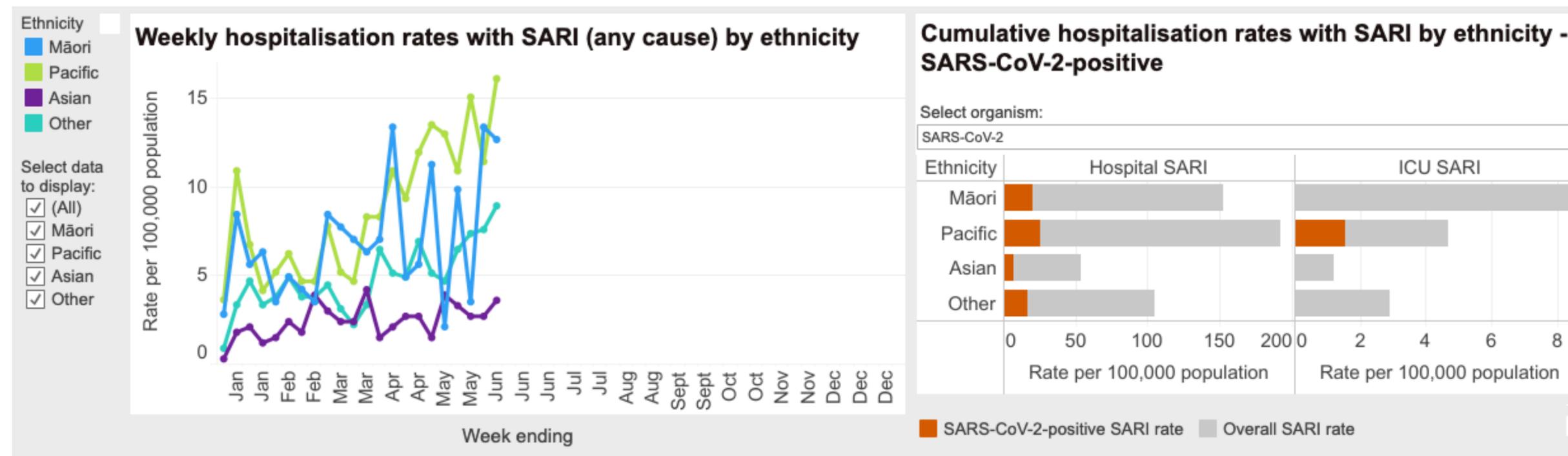
Behavioural insights

Test seeking behaviour

Can also look at healthcare seeking (and being able to access healthcare)

Burden of disease

Existing surveillance systems focus on the severe end of the pyramid.

There are major inequities at this severe end.

But what about the burden of respiratory illnesses that don't put you in hospital?

Time off work. Time off school. Impact on health and wellbeing.

How do we justify investment in reducing a burden that we haven't measured?

Potential interventions that we know could reduce the burden of acute respiratory illness:

- Improved indoor air quality (ventilation and filtration) in schools, workplaces, public spaces

- Improved housing quality

- Reducing crowding in houses

- Vaccinations (for some respiratory viruses)

- Better sick leave provisions

How do we justify investment in reducing a burden that we haven't measured?
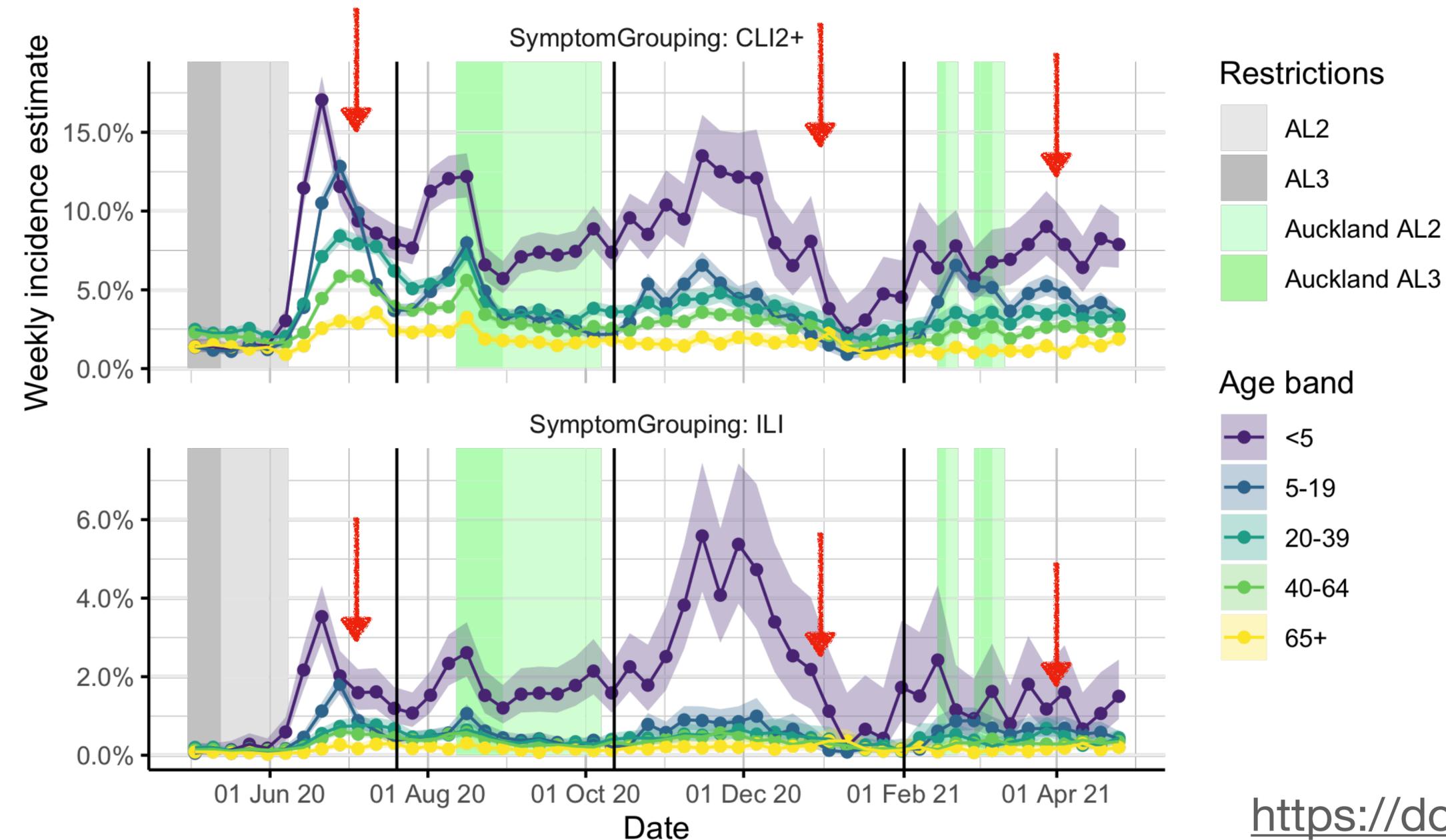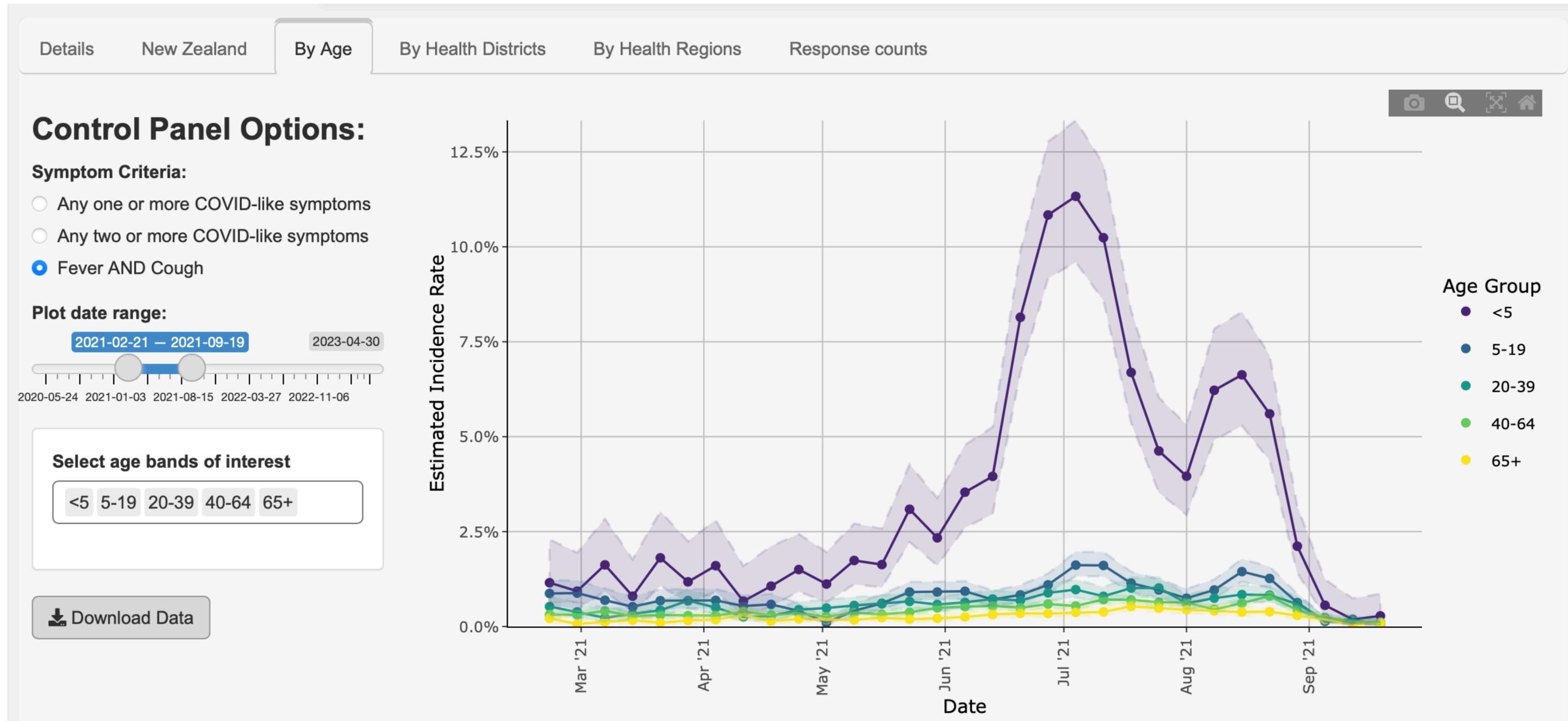

School Holidays reliably reduce respiratory incidence rates in children

Improved indoor air quality.

Where are we at now?

Public dashboard

NOTE: data is only up until December 2023

https://emilynz.shinyapps.io/fluTracking-shiny-app/

How does this compare to Flutracking official reports?

- Australian Flutracking team have implemented age standardisation

- NZ Flutracking team (at ESR) have implemented consistent respondents adjustment, but not age standardisation

Week ending 3rd June 2024:

Age band	Percent of population	Percent of responses
0-4	5.78%	0.85%
5-17	16.52%	7.41%
18-64	61.17%	51.02%
65+	16.53%	40.72%

Reported ILI (fever & cough) incidence: 1.8%

ILI (fever & cough) incidence with age standardisation: 2.4%

Drop in participation AND representativeness

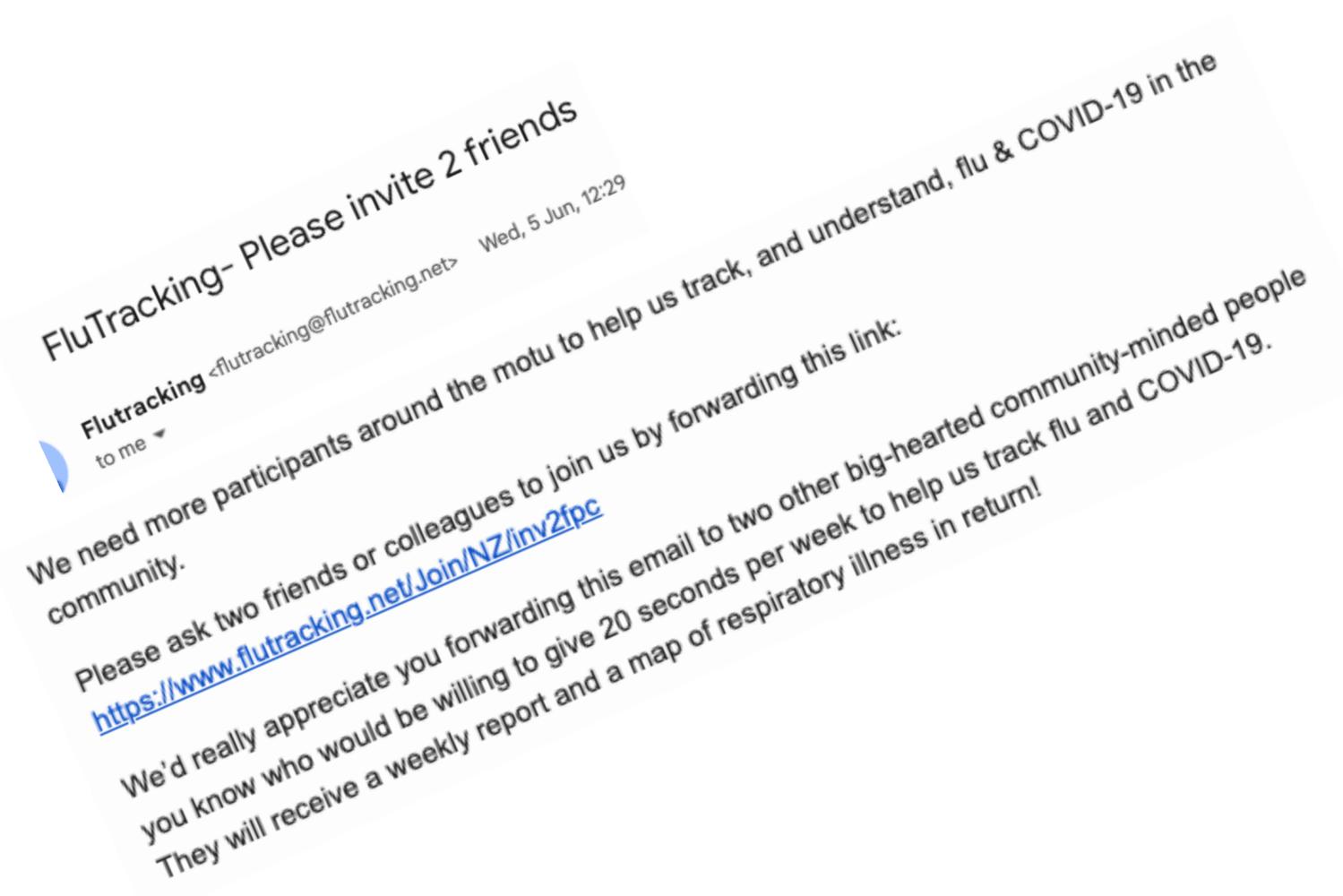https://emilynz.shinyapps.io/fluTracking-shiny-app/
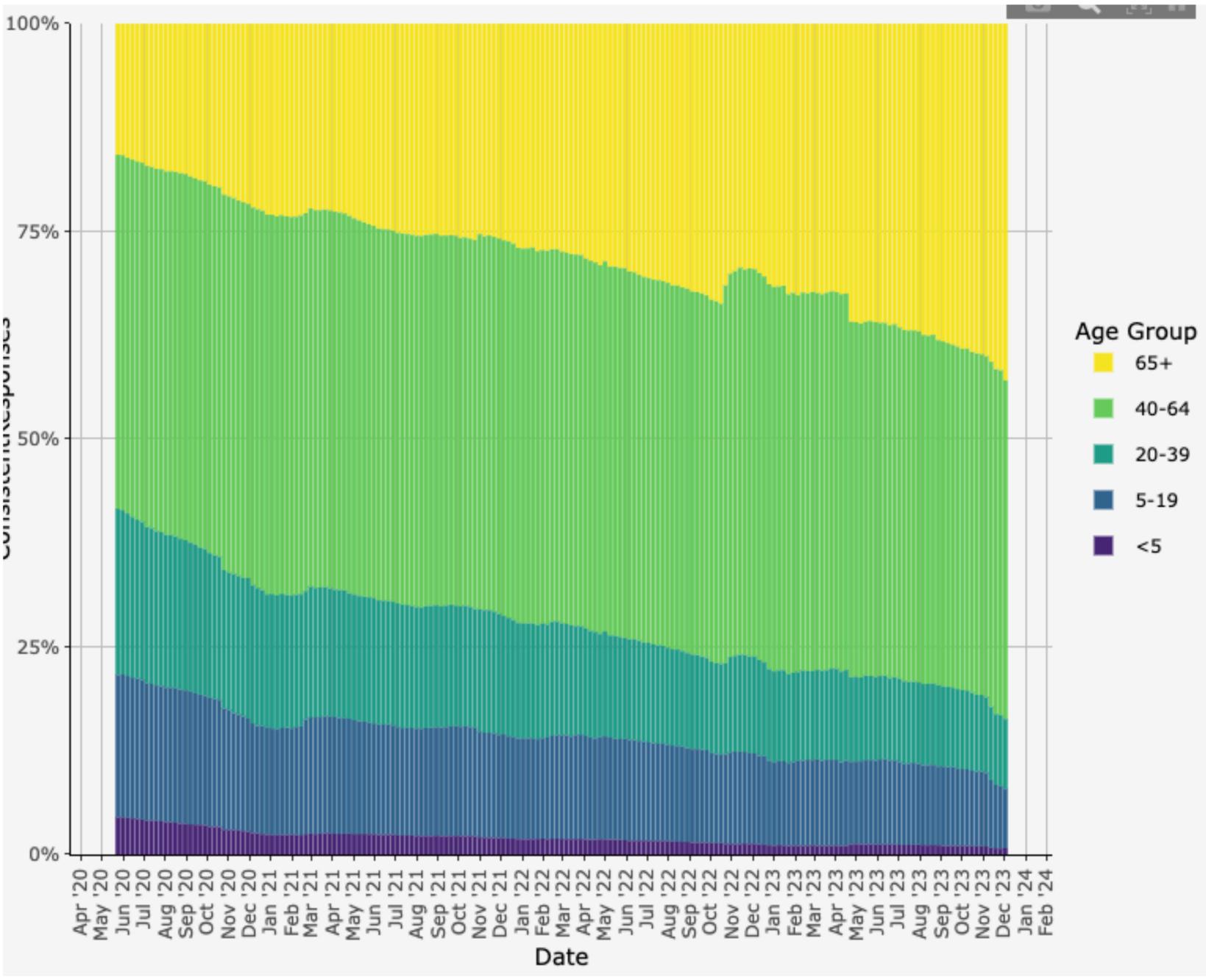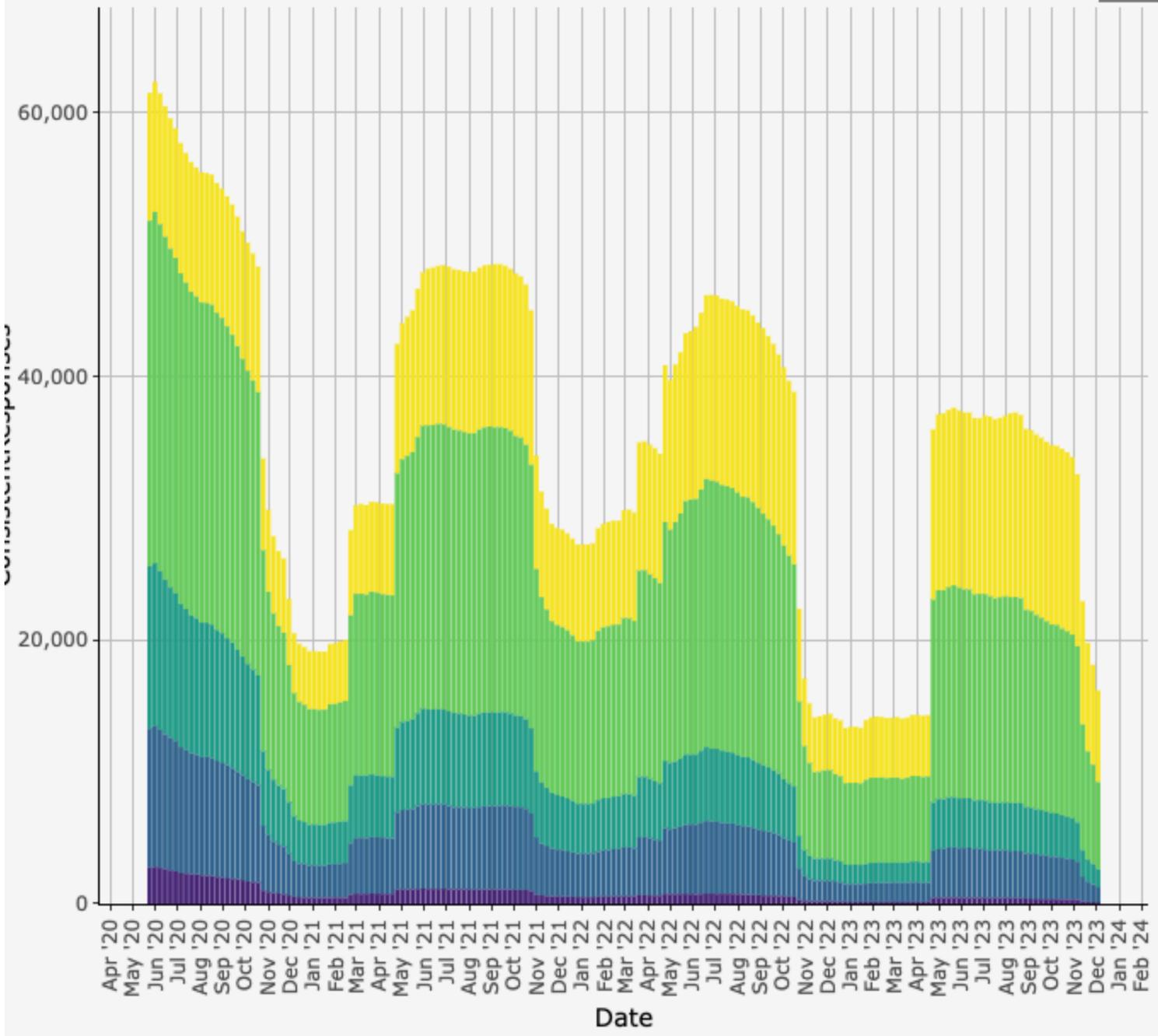
How to make it useful (and used!)
Increase participation - especially in under 65s (but also other underrepresented populations, like those not in Wellington)

Sign up and go in the draw to win

Sign up now to FluTracking and become part of a movement making a real difference. For a limited time, you'll also go in the draw to win one of five $50 Prezzy Cards. This offer expires 30 June 2024, is open to New Zealand residents only, aged 12-years or older. Terms and Conditions apply.

FluTracking- Please invite 2 friends

Flutracking <flutracking@flutracking.net>   Wed, 5 Jun, 12:29

to me

We need more participants around the motu to help us track, and understand, flu & COVID-19 in the community.

Please ask two friends or colleagues to join us by forwarding this link:

https://www.flutracking.net/Join/NZ/inv2fpc

We'd really appreciate you forwarding this email to two other big-hearted community-minded people you know who would be willing to give 20 seconds per week to help us track flu and COVID-19. They will receive a weekly report and a map of respiratory illness in return!

Sign up to be a FluTracker and go in the draw to win

SIGN UP NOW ↗

Caveats / hesitations / concerns

Although I believe participatory survey data like Flutracking could be hugely valuable for Aotearoa in all sorts of ways, I have some concerns.

- At the moment, after 1.5yrs of being in charge of the data, ESR has no data sharing process in place for researchers for Flutracking data

- The representativeness, and the number, of Flutracking respondents needs to be higher for a number of potential applications. Small numbers increase privacy/identifiability concerns and drastically reduce the reliability of the data.

- There is a social license risk associated with asking people to take the time to fill in a survey like this and then doing (almost) nothing with it

- Community based (and community lead) versions?