

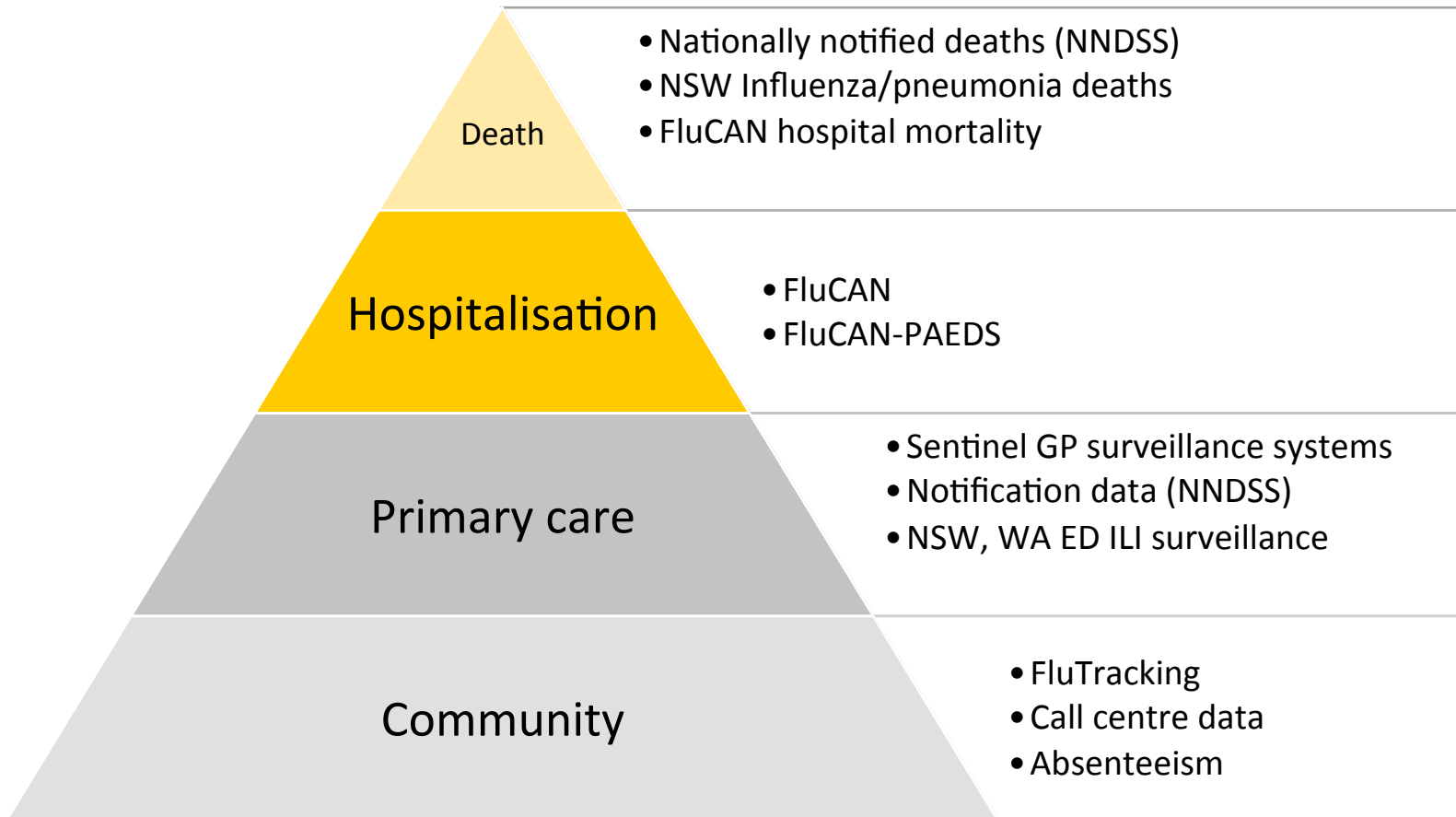
Influenza vaccine effectiveness in 2016

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Influenza Surveillance



FluCAN 2012-16



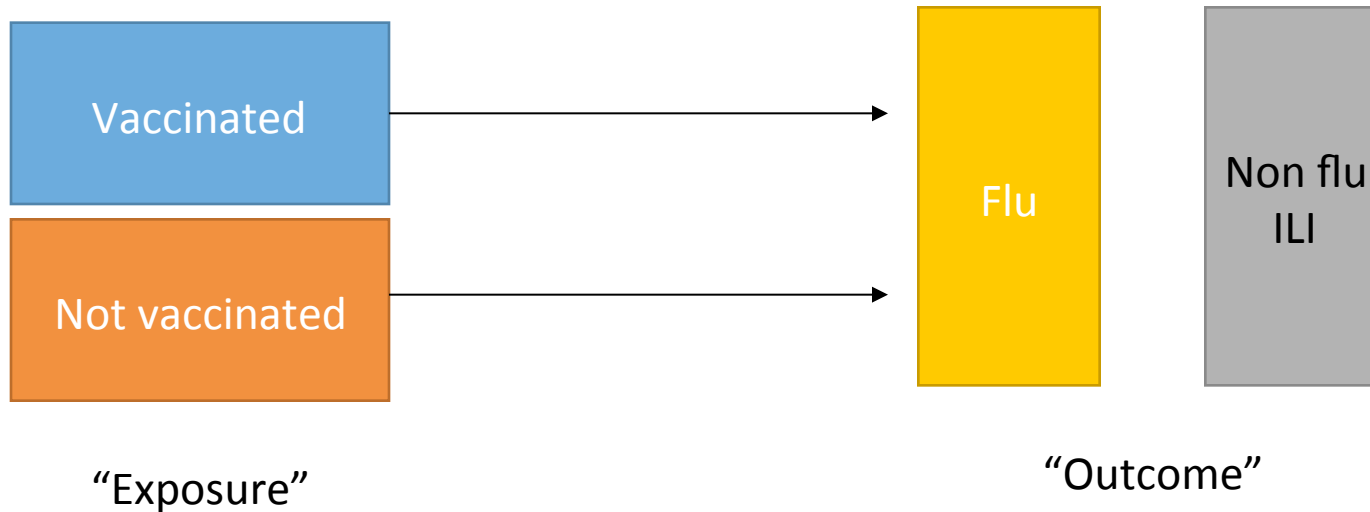
17 hospitals (incl 2 paediatric hospitals)

All states/territories

Metropolitan/regional
Temperate/tropical

~12% of national bed capacity

Incidence density test-negative



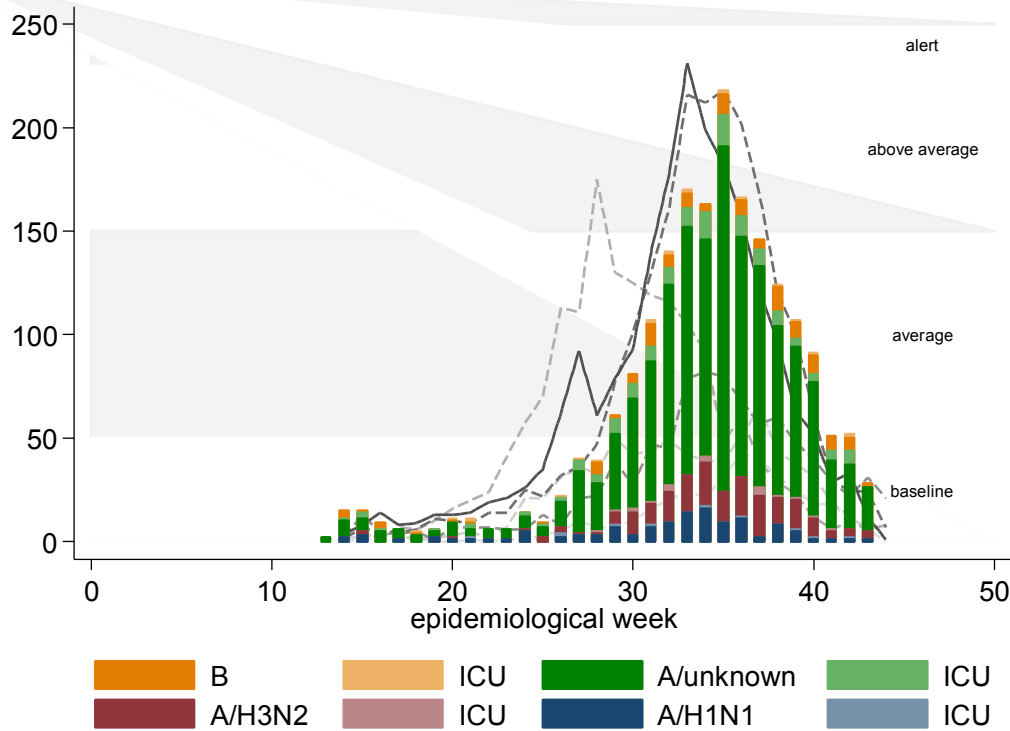
Case = influenza

Control = non influenza ILI matched for date of presentation

Case/control status assigned when test result known

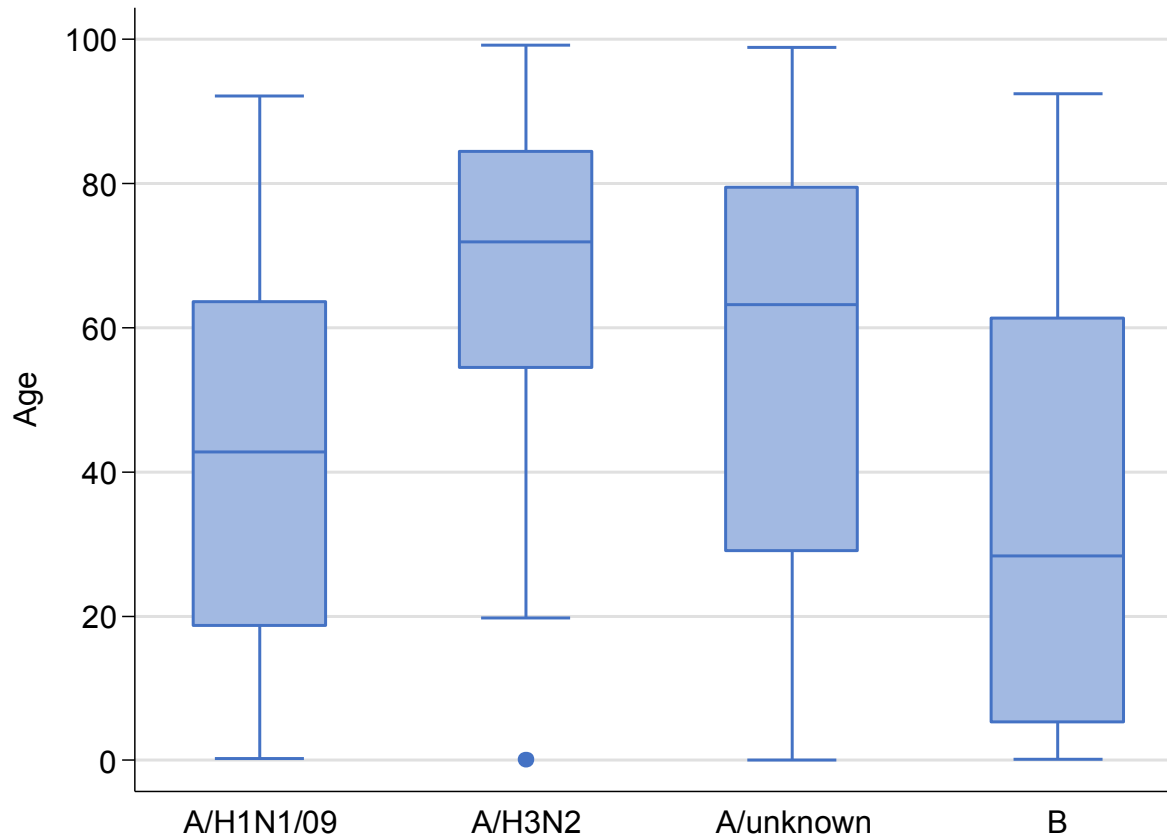
Adjust for confounders

2016 season

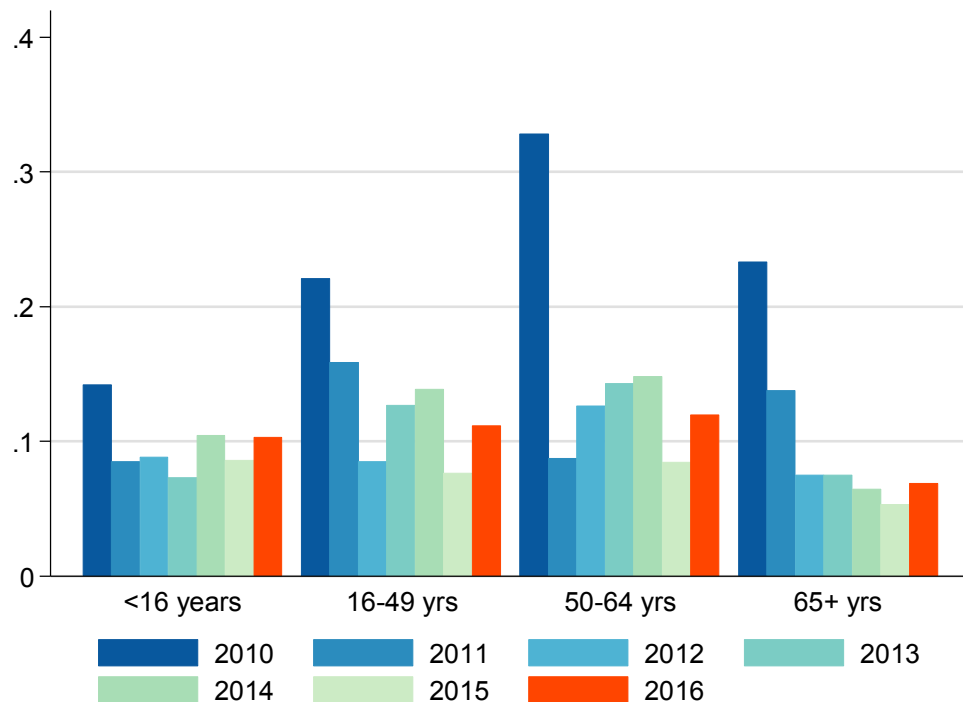


- 1952 cases;
- 75% chronic comorbidities
- 7% influenza B
- (~17 000 admissions nationally)
- Mortality 65/1899 (3.4%)

Age distribution

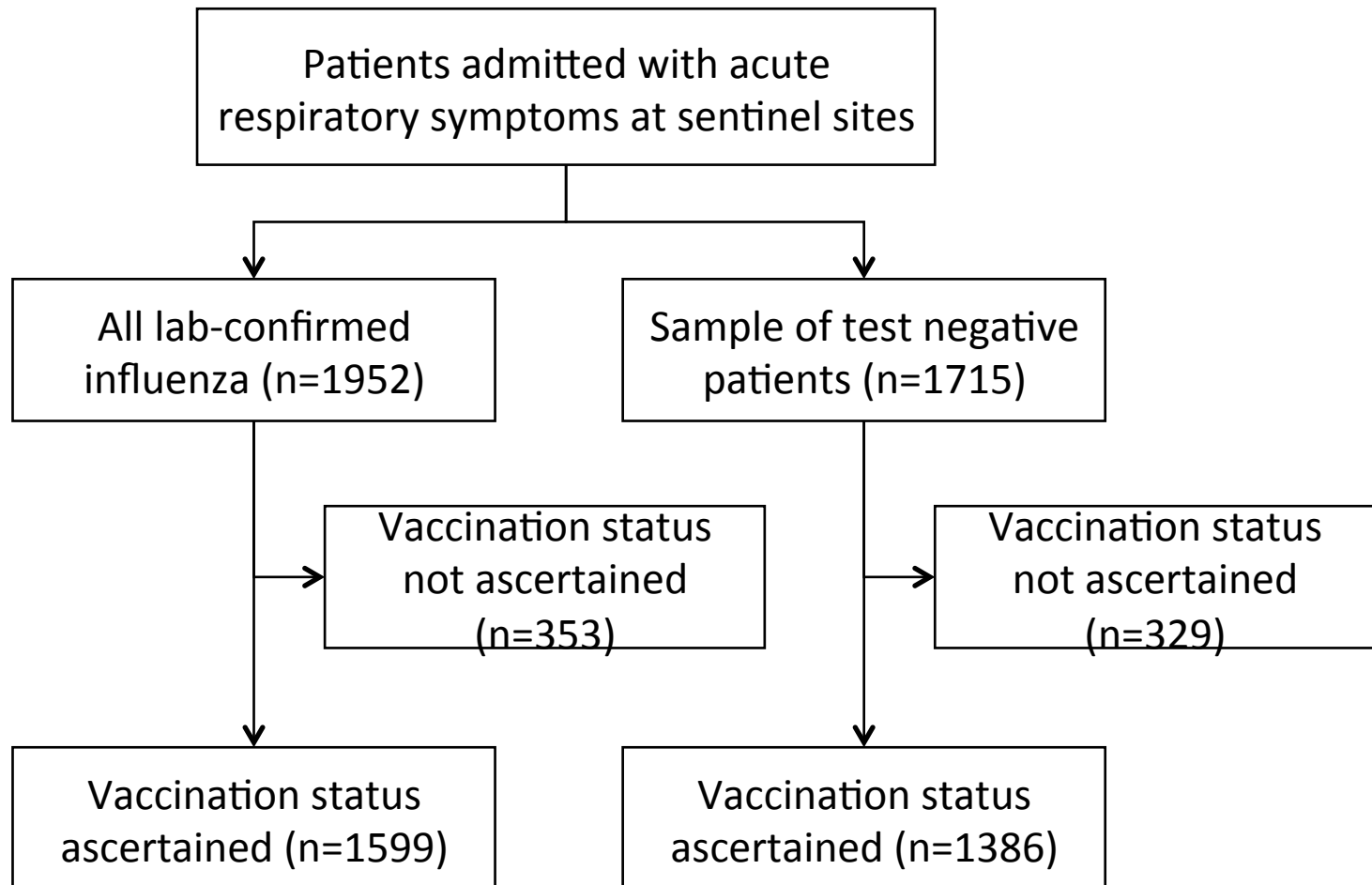


Severity – proportion admitted to ICU

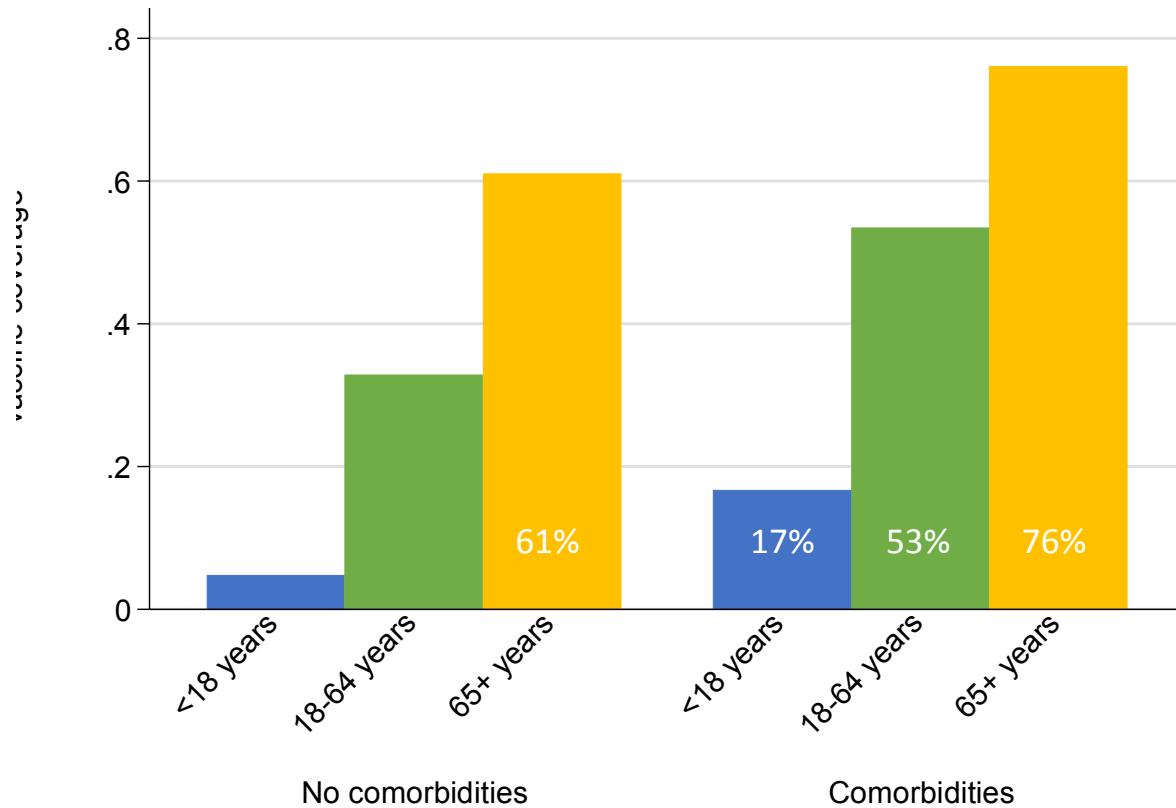


- Overall 9.1%
- Paediatric 10.3%;
- Non-elderly adults 11.5%;
- Elderly 6.9%
- Indigenous Australians (14.9%)
- Pregnant women (14.6%).

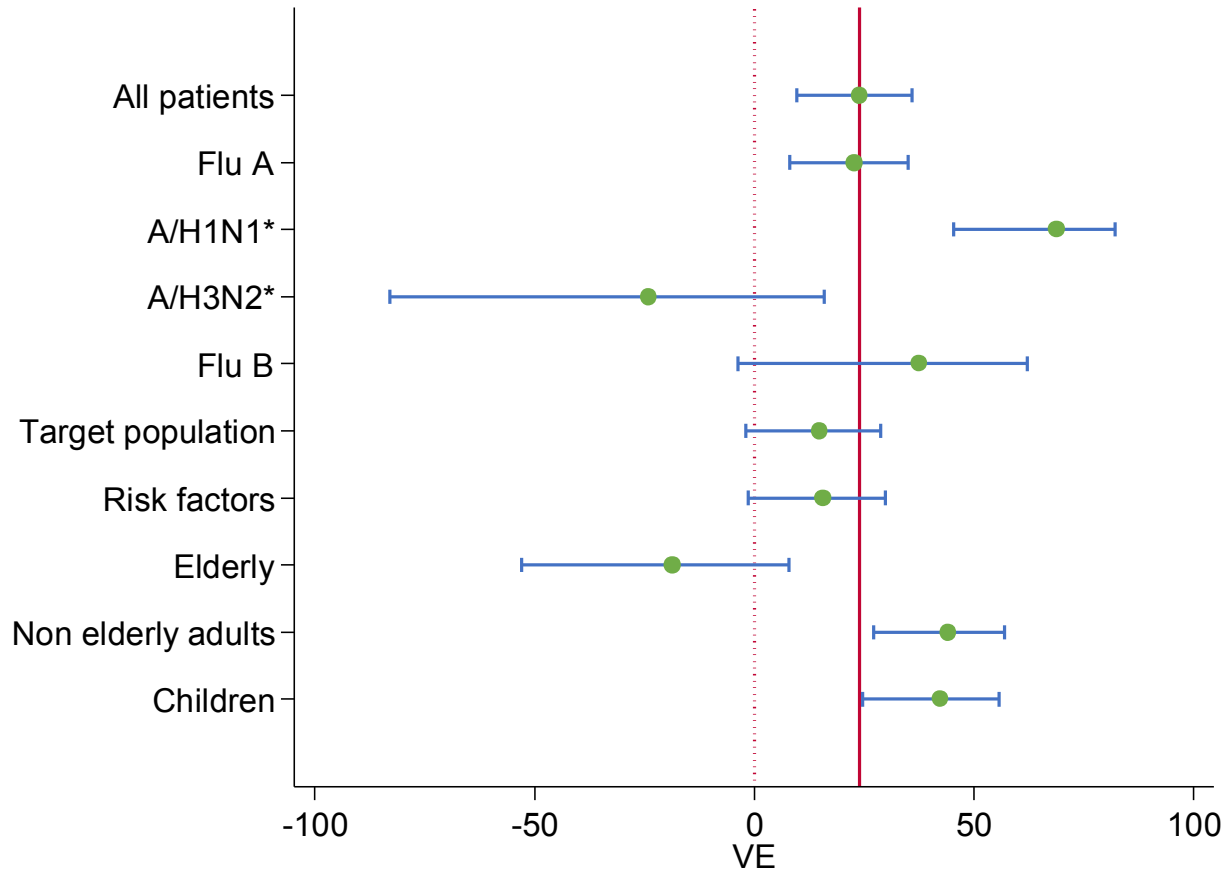
VE analysis



Vaccine coverage



Vaccine effectiveness



Summary

- Vaccination in 2016 was associated with a small reduction in the risk of hospitalisation with influenza.
 - Estimated vaccine effectiveness: 24.0% (95% CI: 9.7%, 35.9%).
- Based on point estimates, VE appeared to be
 - Higher in non-elderly adults (44.1%) than the elderly (-18.6)
 - Higher in A/H1 (68.9%) and influenza B (37.5%) than A/H3 (-24.0%).

Year	A/H1	A/H3	B (Victoria)	B (Yamagata)
2011	A/California/7/2009 (H1N1)*	A/Perth/16/2009 (H3N2)	B/Brisbane/60/2008	
2012	A/California/7/2009 (H1N1)	A/Perth/16/2009 (H3N2)*	B/Brisbane/60/2008*	
2013	A/California/7/2009 (H1N1)	A/Victoria/361/2011 (H3N2)*	<i>B/Brisbane/60/2008</i>	B/Wisconsin/1/2010*
2014	A/California/7/2009 (H1N1)*	A/Texas/50/2012 (H3N2)	<i>B/Brisbane/60/2008</i>	B/Massachusetts/ 2/2012 (clade 2)*
2015	A/California/7/2009 (H1N1)	A/Switzerland/ 9715293/2013*	<i>B/Brisbane/60/2008*</i>	B/Phuket/3073/2013 (clade 3)*
2016	A/California/7/2009 (H1N1)*	A/Hong Kong/ 4801/2014	B/Brisbane/60/2008	<i>B/Phuket/3073/2013*</i>
2017	A/Michigan/45/2015 (H1N1)	A/Hong Kong/ 4801/2014	B/Brisbane/60/2008	<i>B/Phuket/3073/2013</i>

Bold: strain change; **shaded*:** dominant A/B strain; *italic:* omitted in TIV

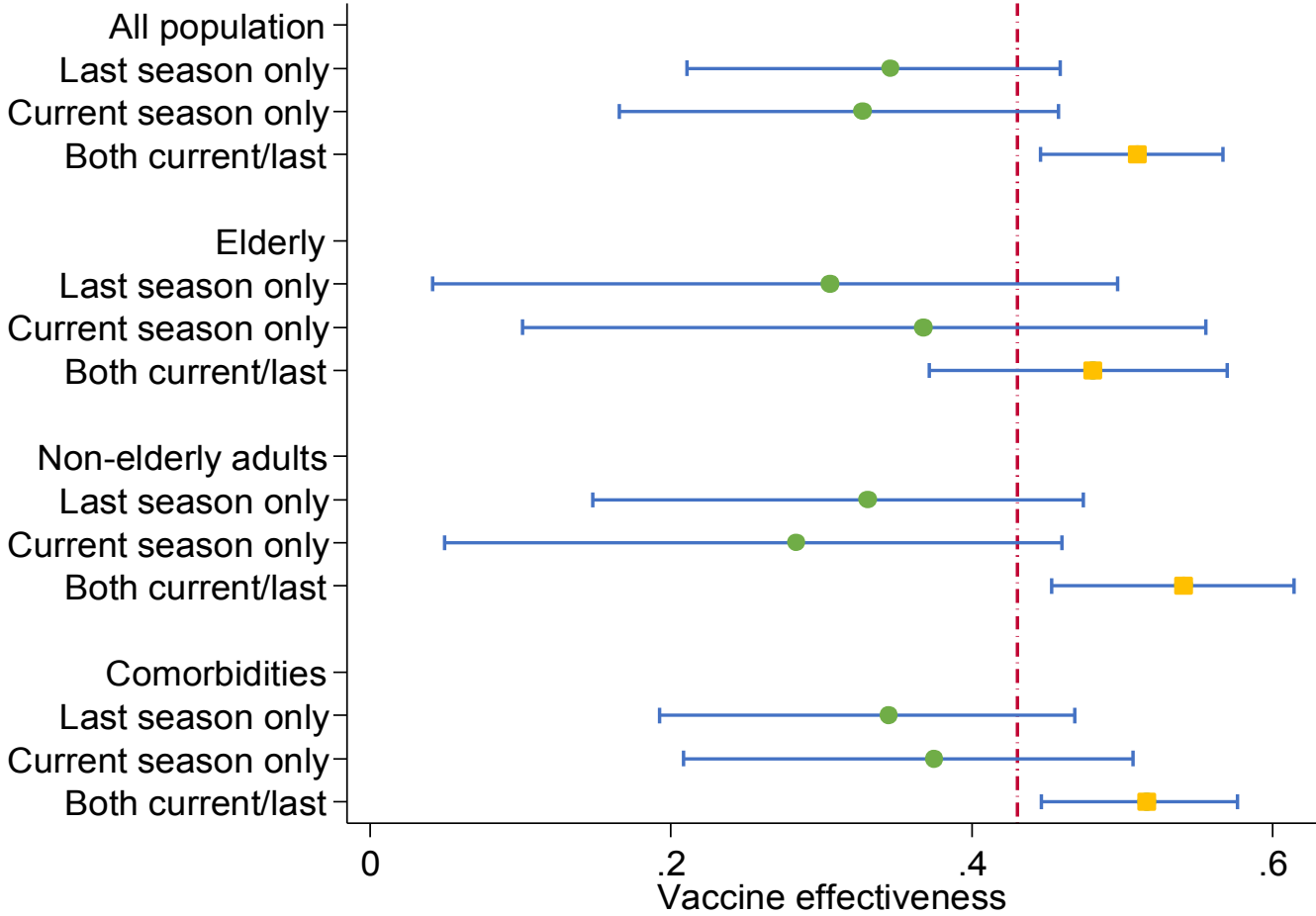
Why – vaccine?

- Vaccine mismatch?
 - Lower VE against A/H3 for several years
 - A/H3 strains are dominating, particularly in elderly
 - A/H1 VE also lower?
- Some problem with the vaccine?
 - antigenic change due to egg adaptation previously described

Why - immunology?

- Immunological interference by having 4 instead of 3 strains?
 - Immunogenicity based on HI is good for QIV vs TIV
- Repeated vaccinations?
 - Individuals tend to get serially vaccinated
 - Wouldn't explain this year's problem
 - A/H1 vaccine component hasn't changed since 2009

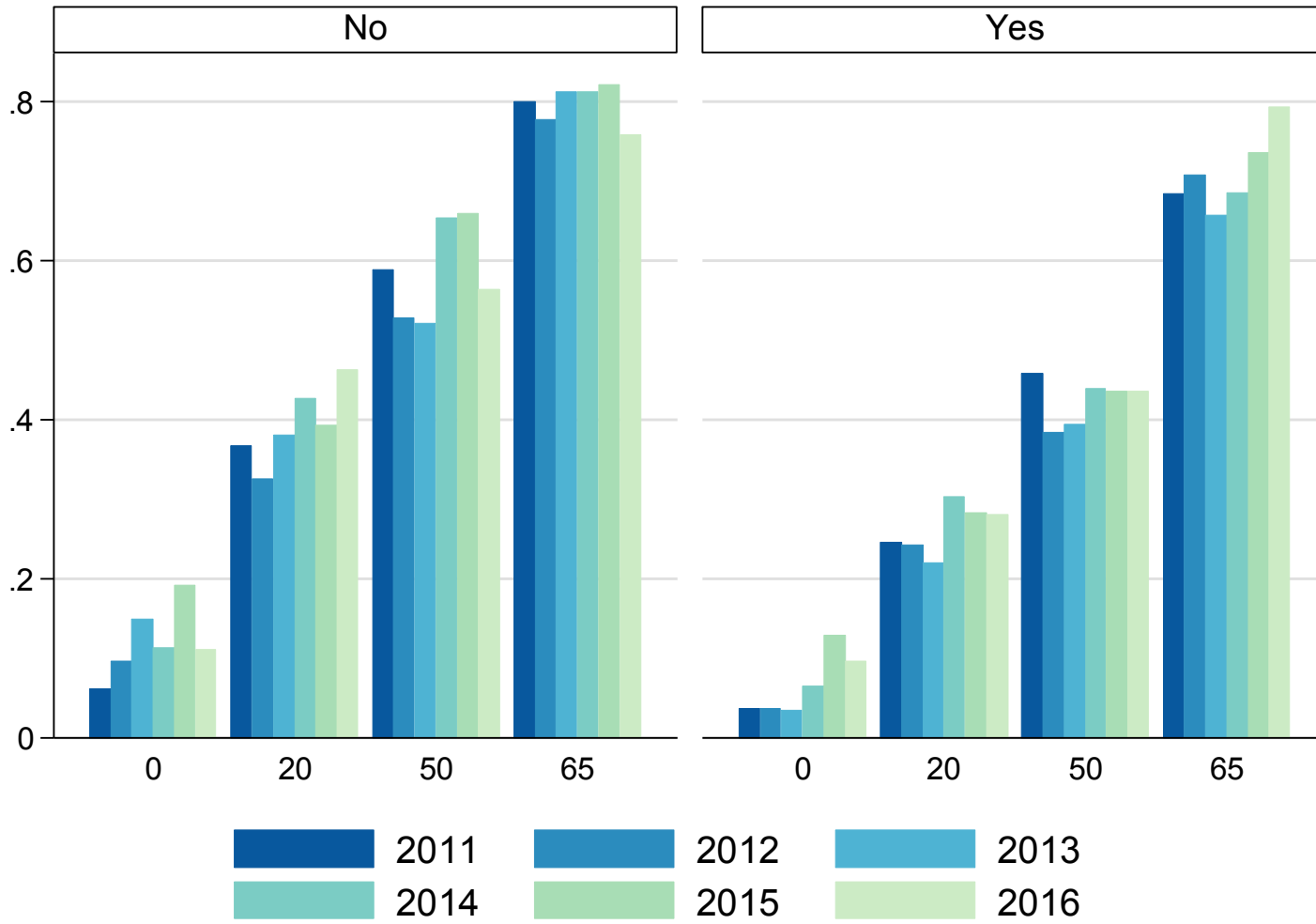
Serial vaccination 2010-2015



Why – bias or confounding?

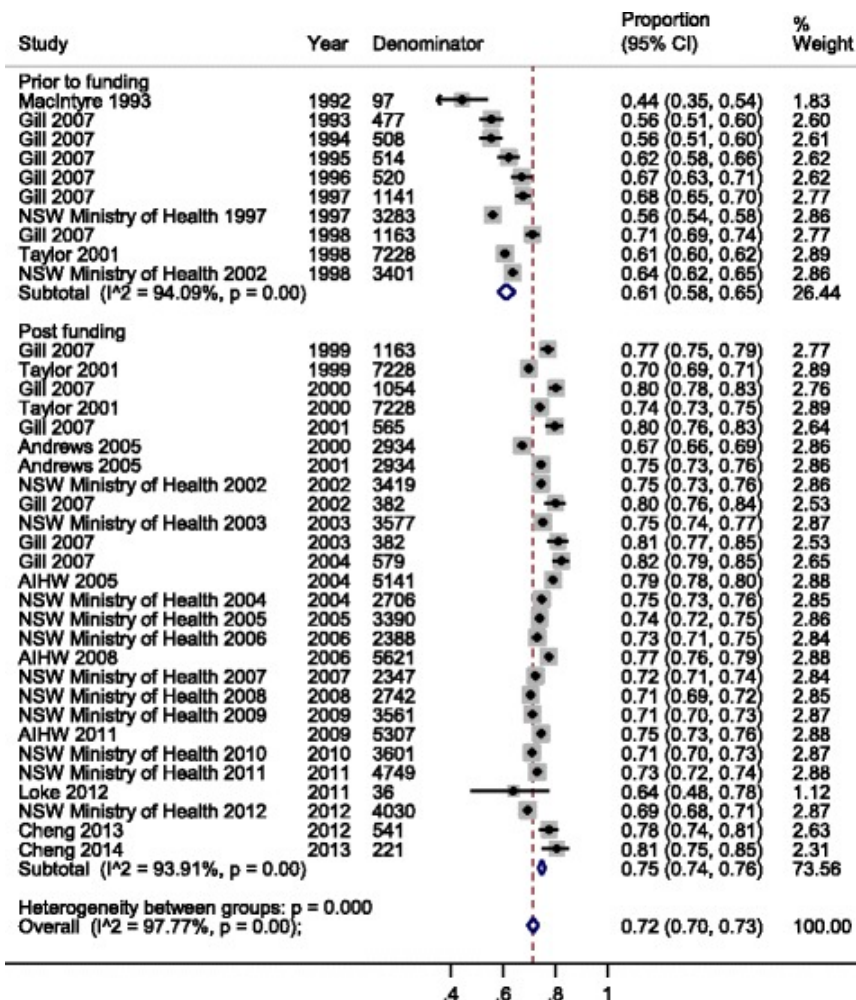
- Epidemiological bias in FluCAN?
 - haven't changed methods this year; reasonable numbers.
 - More vaccine failure rather than lower coverage
- VE of ~50% would mean that either there are
 - more controls vaccinated than the data suggest (coverage >80%) or
 - vaccine failure is less common (<55%).

Flu vaccination in cases/controls by year



Graphs by flupos

Validity of hospital controls



- FluCAN estimates of coverage stable
- Similar vaccine coverage to meta-analysis of Australian studies in elderly

Comparison with other systems

	Hospital based		Primary care based	
	FluCAN	SHIVERS (NZ)	VicSPIN	SHIVERS (NZ)
Overall	24 (10, 36)	12 (-122, 65)	37 (-14, 66)	2 (-63, 41)
A/H1	69 (46, 82)	23 (-597, 91)		69 (-11, 92)
A/H3	-24 (-83, 16)	N/A	39 (-24, 70)	-57 (-201, 18)
Elderly	-19 (-53, 8)	-43 (-1384, 86)	8 (-909, 92)	13 (-494, 87)

No similar signal in 2015/16 northern hemisphere season (Sept 2016)

- Problems with LAIV noted
- Estimated IIV VE >40 in 3 networks.

VicSPIN – James Fielding
SHIVERS – Nevil Pierse, Sue Huang

Implications for policy/practice

- First year that VE against hospitalisation shown to be low in Australia
 - Particular problem with A/H3 in elderly
- No proposed change in A/H3 vaccine strain in 2017
- Future strategies?
 - Adjuvanted or high dose vaccines in elderly?
 - Q/LAIV? (only approved for <18 year olds)

Implications for research

- Highlights need for
 - better marker of protection
 - ongoing monitoring of VE
 - Better vaccine!
- Further confirmation required
 - Global Influenza Vaccine Effectiveness Network (GIVE)
- Why has vaccine failed in the elderly?

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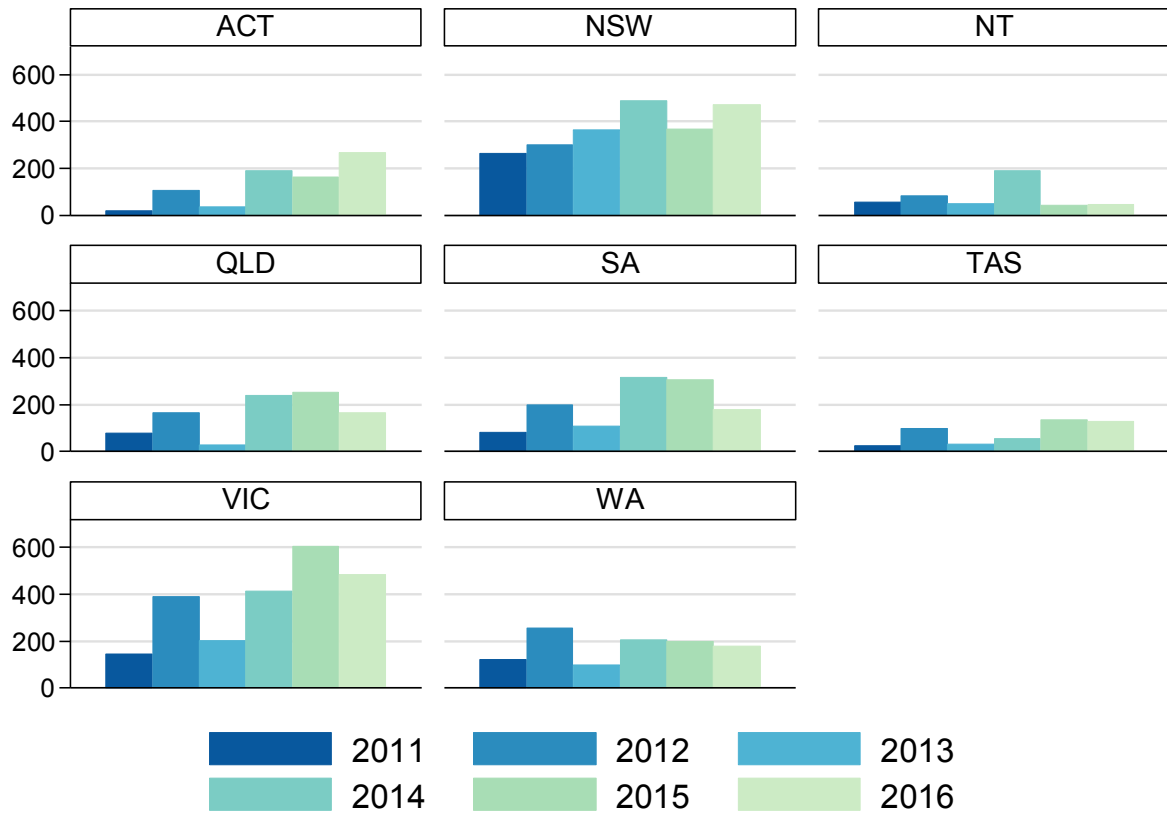
Tom Kotsimbos

Paul Kelly

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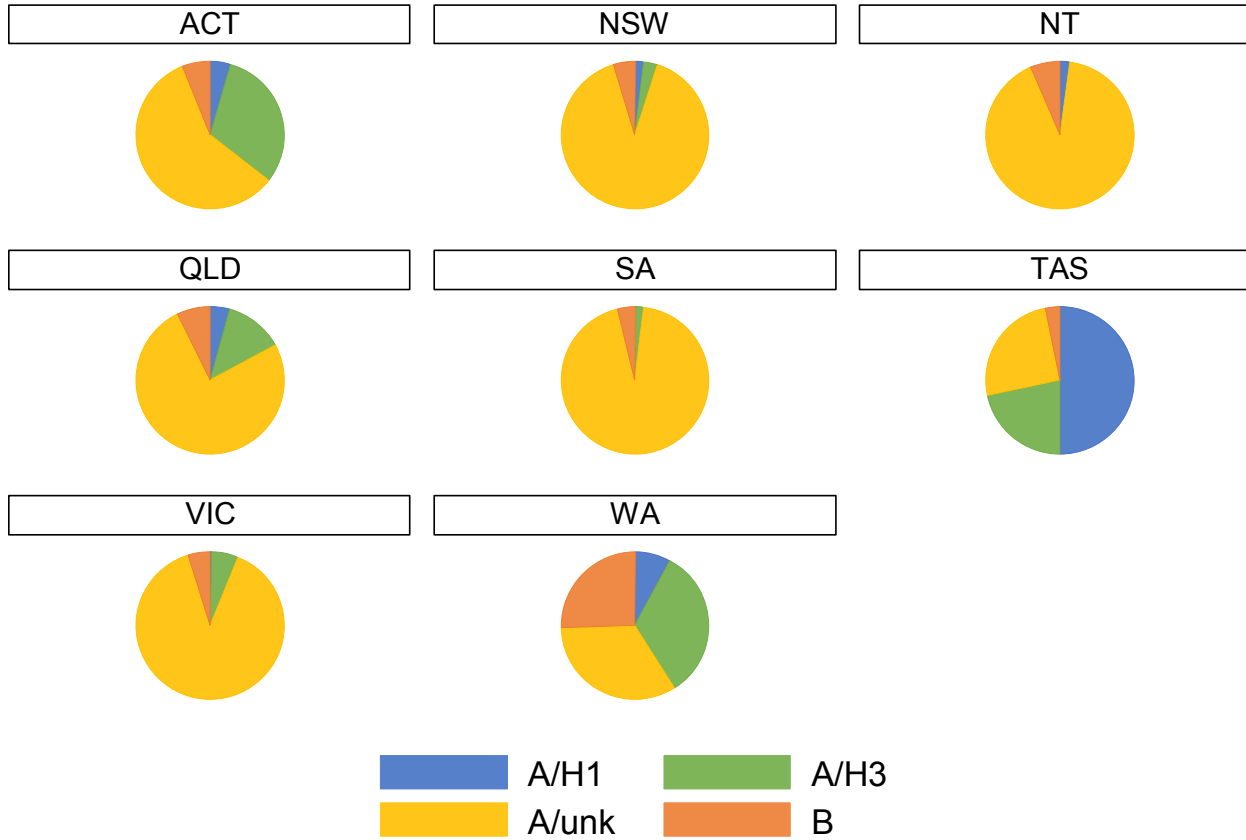
Thanks to study staff at each site

Case counts by state



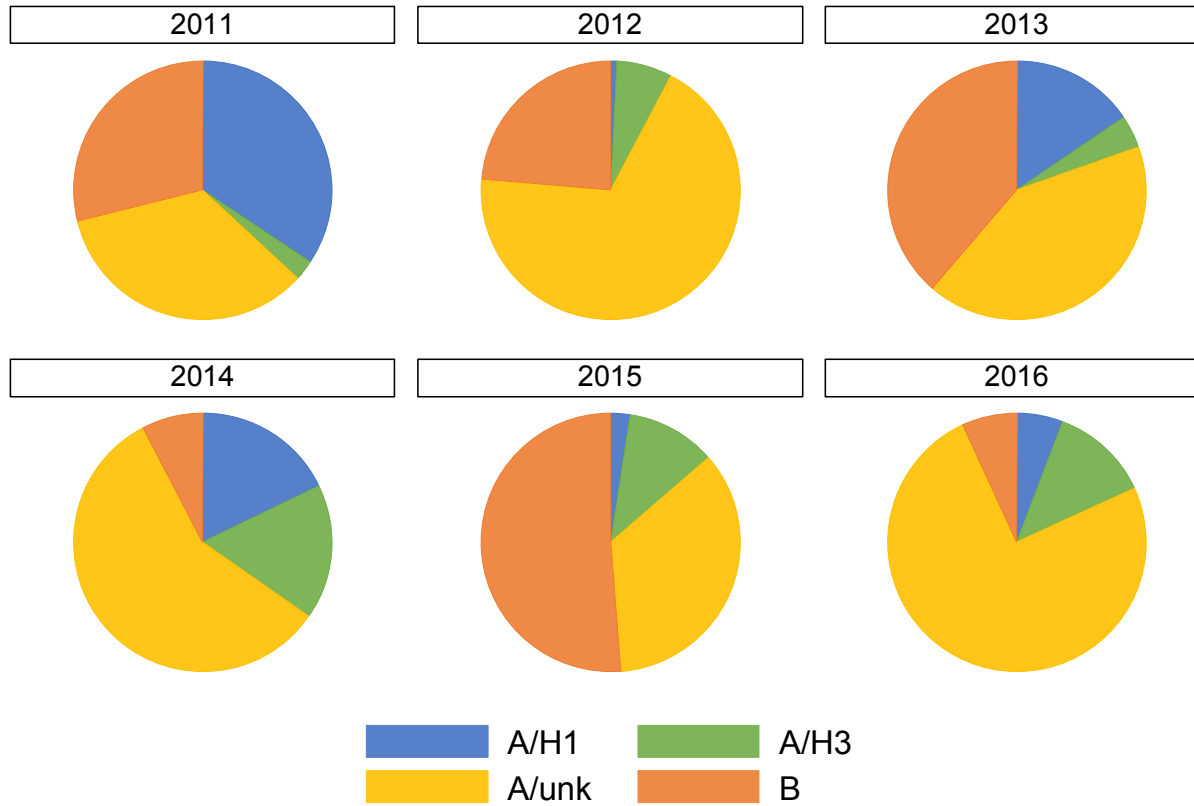
Graphs by state

Flu subtype by state



Graphs by state

Flu subtype by year



Graphs by epiyear