

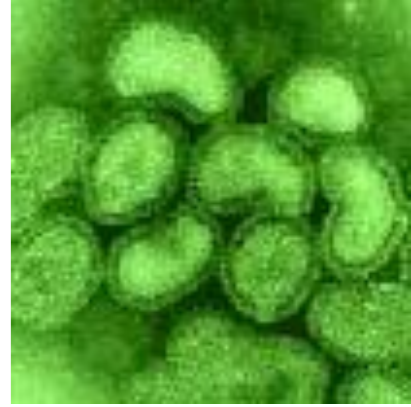
# What's happening in NZ with influenza

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**Principal Investigator, SHIVERS**  
**Director, WHO National Influenza Centre**  
**Institute of Environmental Science and Research**  
**Wellington, New Zealand**

**New Zealand influenza Symposium, 11 November 2015, Wellington**

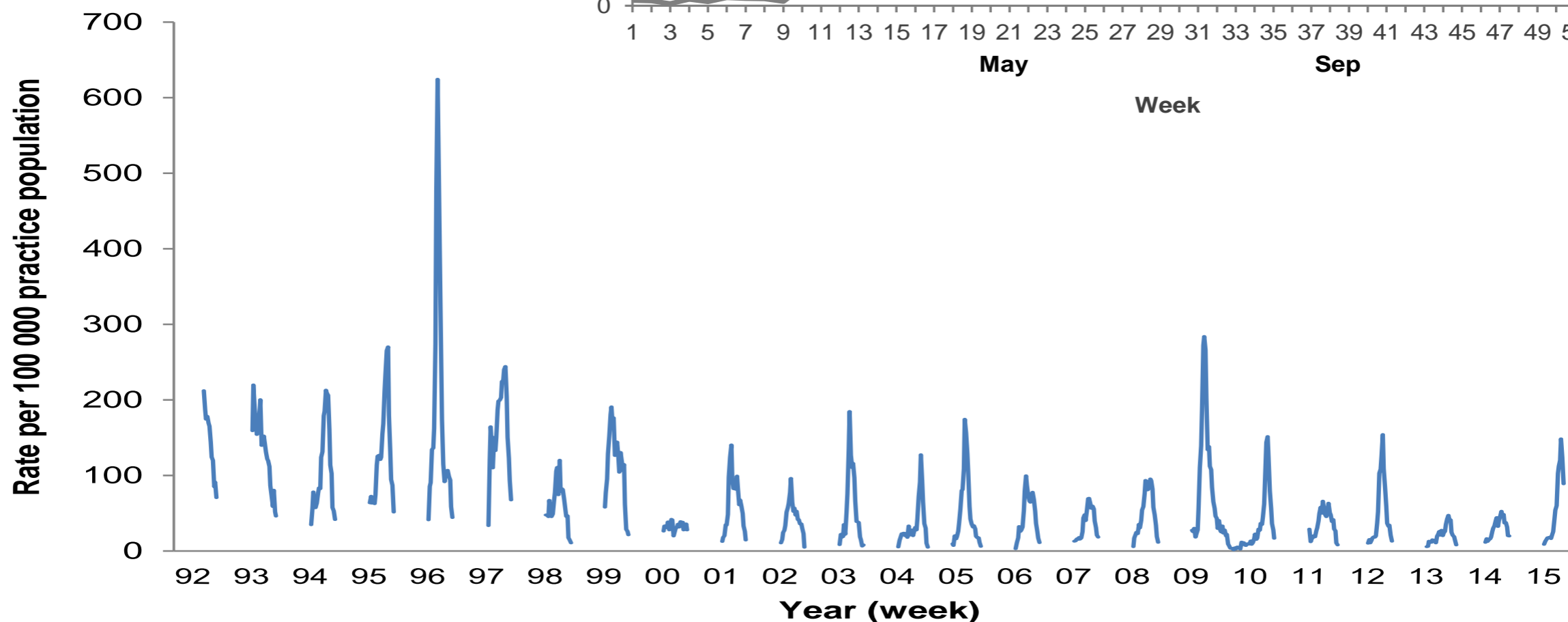
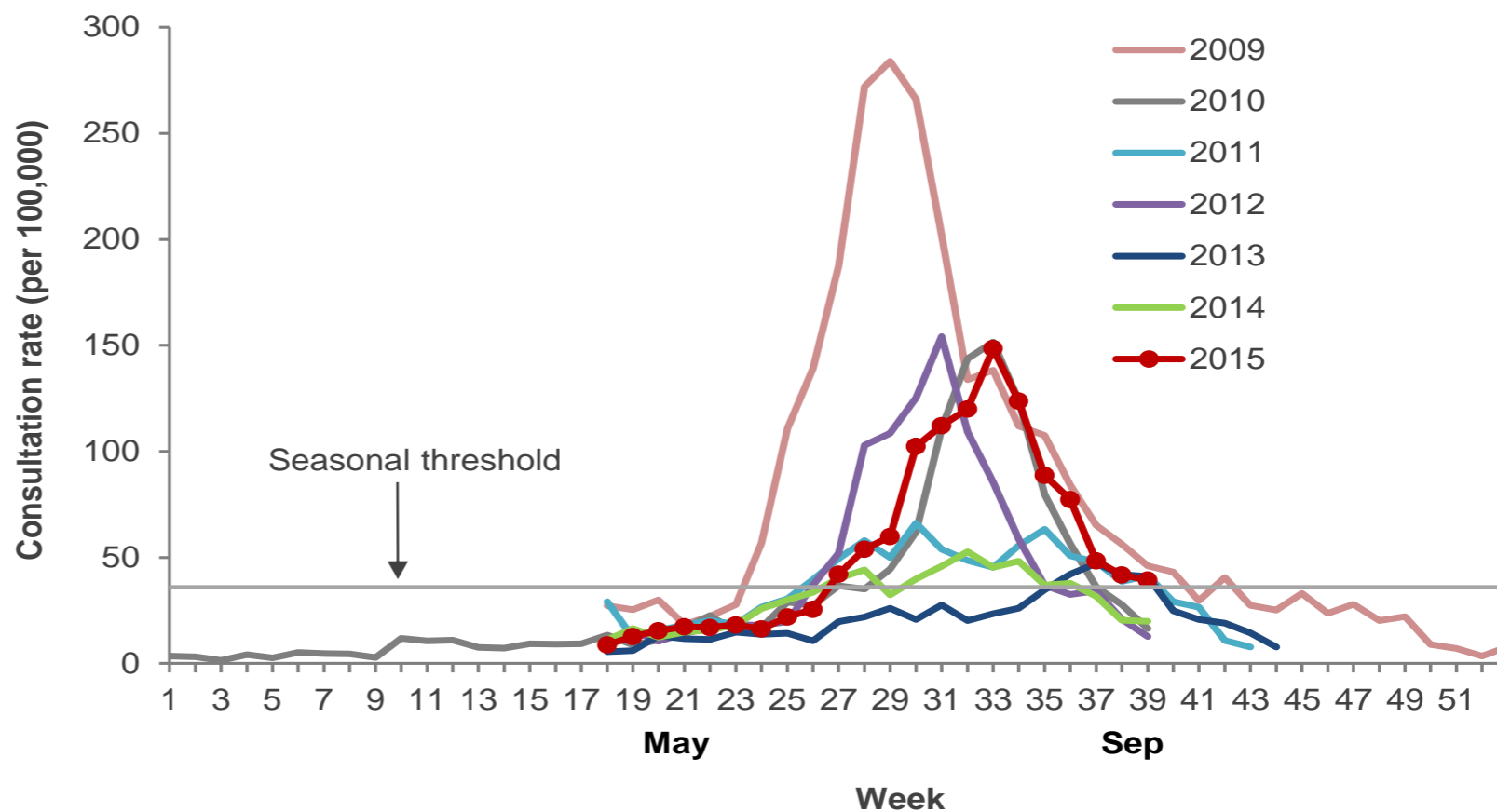
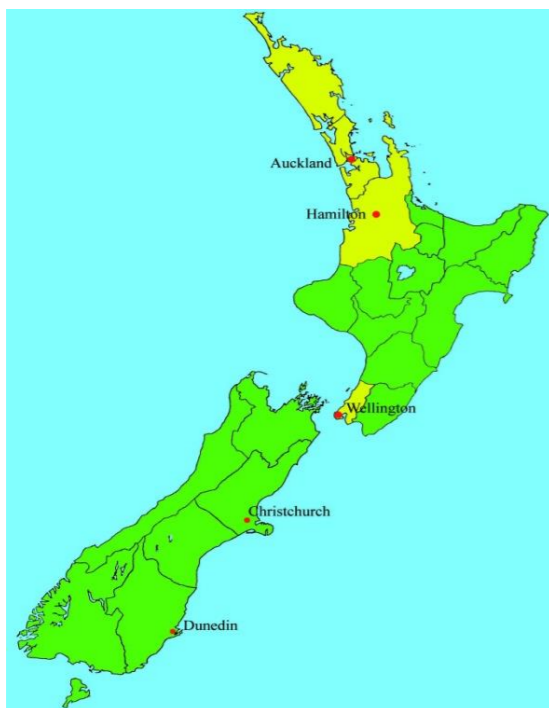


# Outline



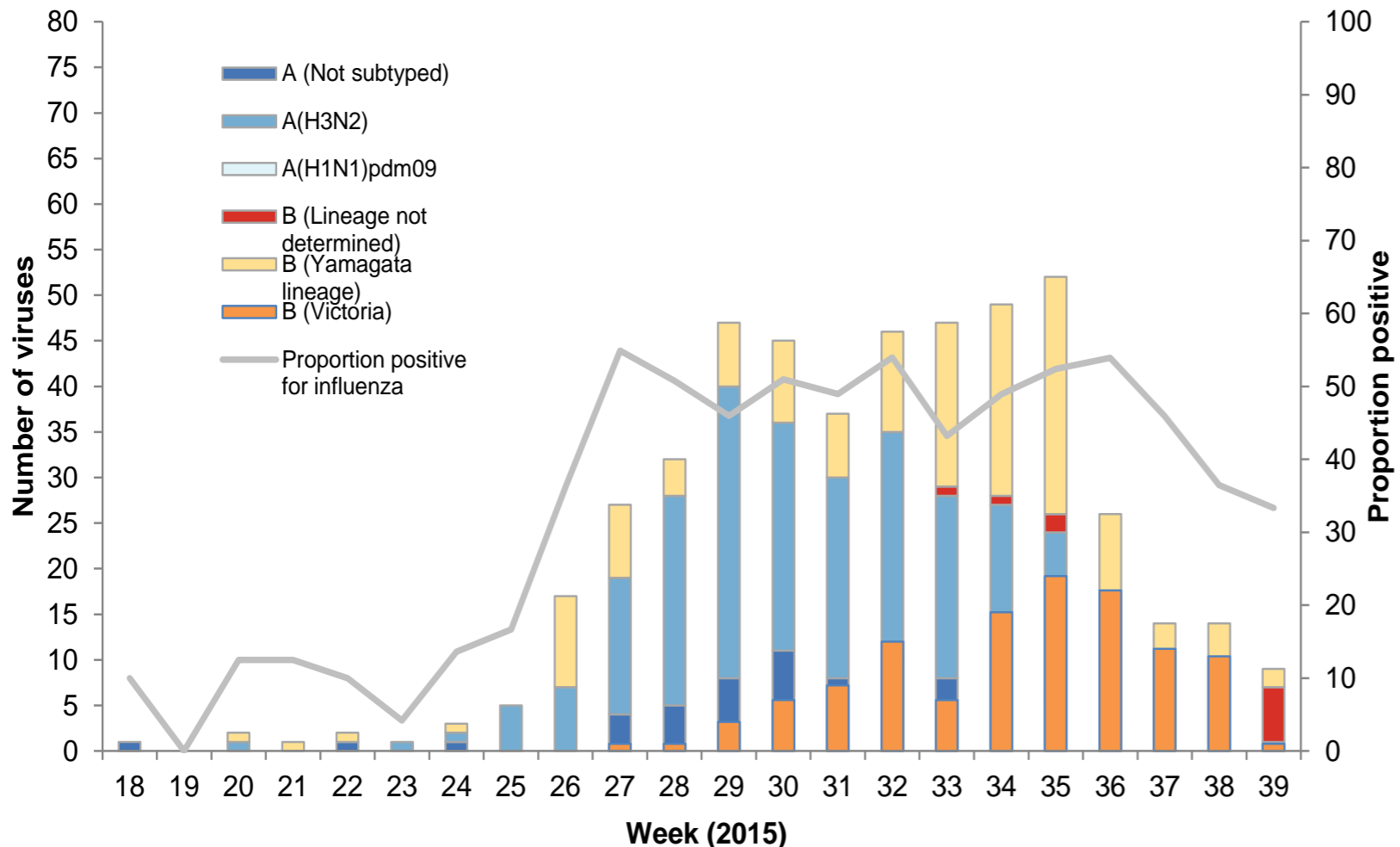
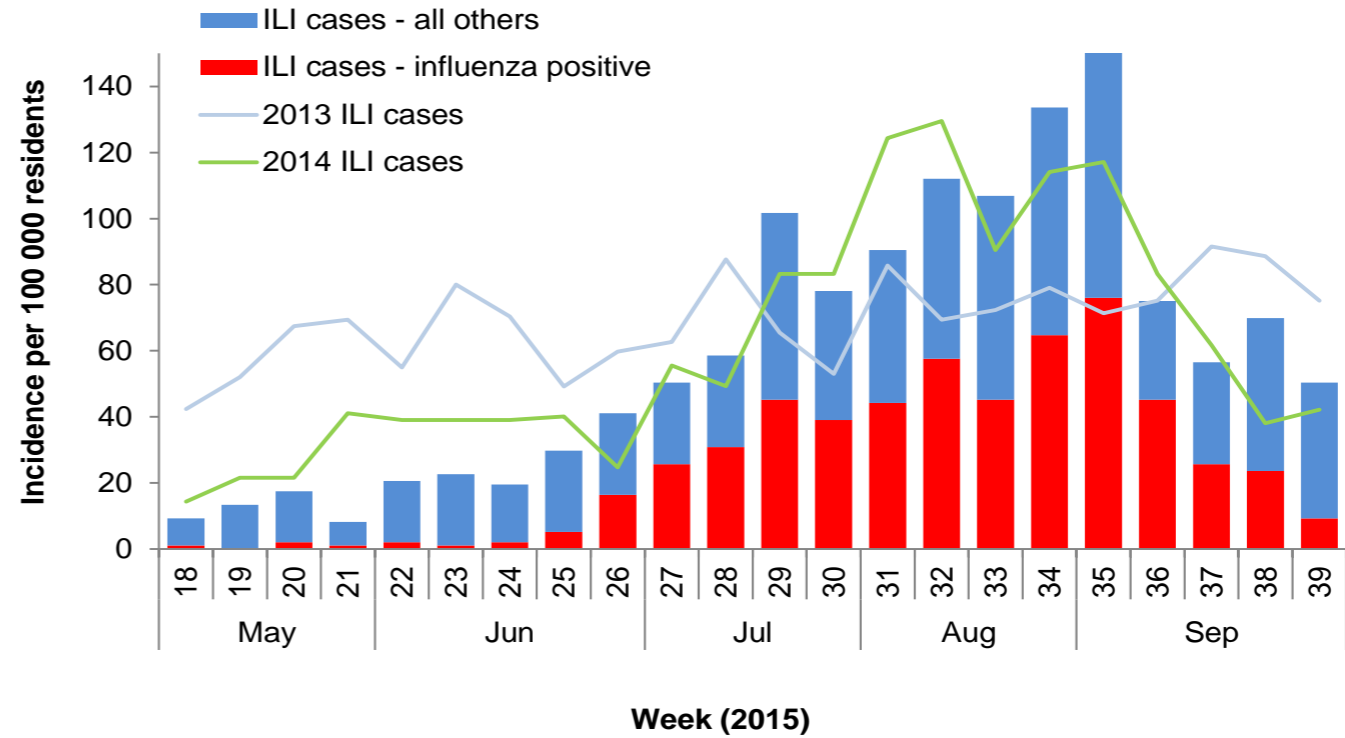
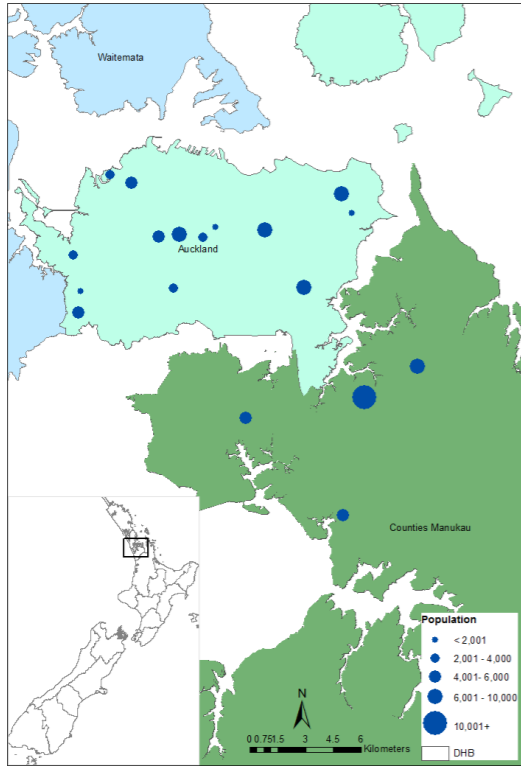
- What happened in 2015 winter season
- Disease burden & epidemiology
- Vaccine effectiveness
- Risk factors
- Aetiology

# National sentinel ILI - consultation rates, 1992-2015



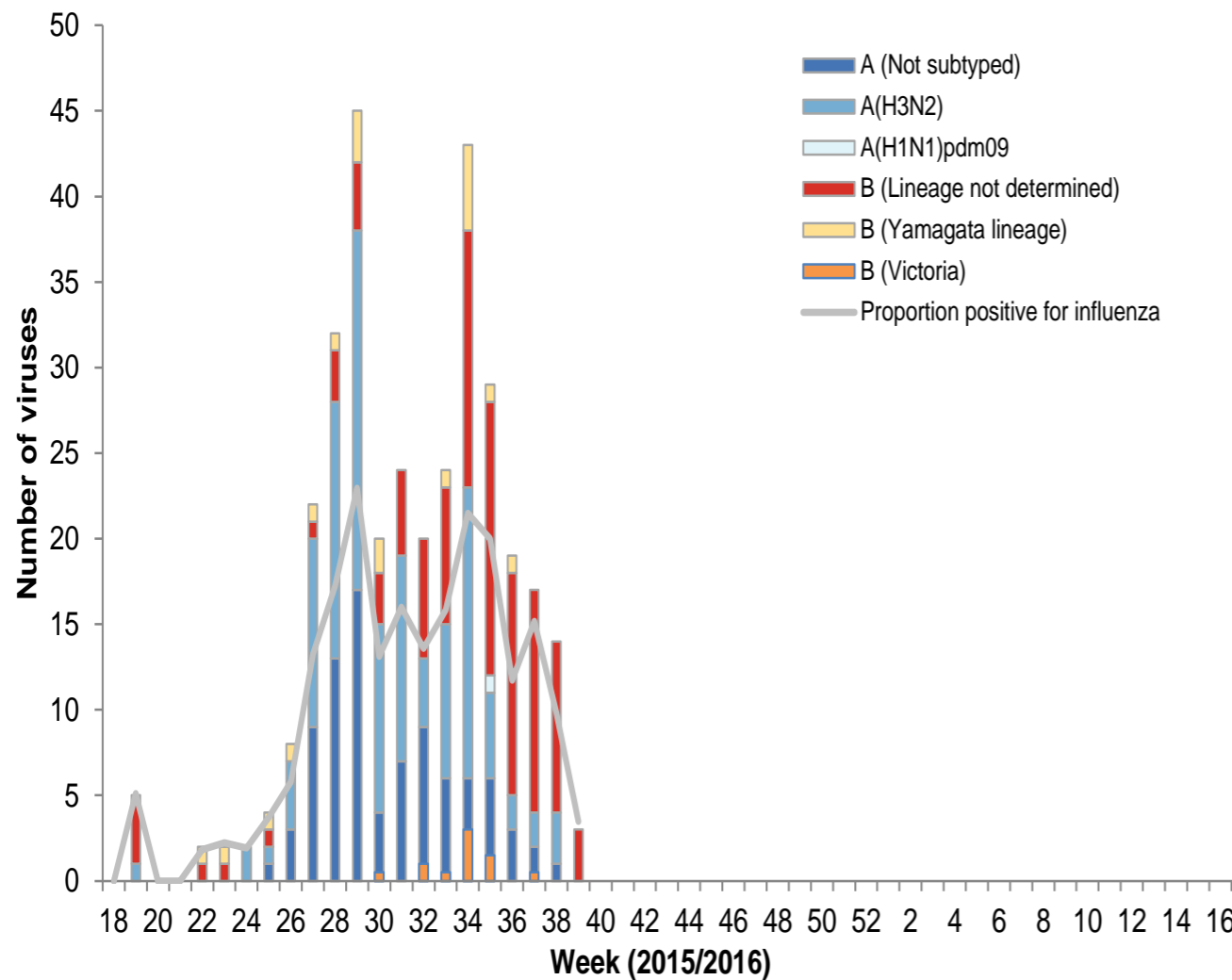
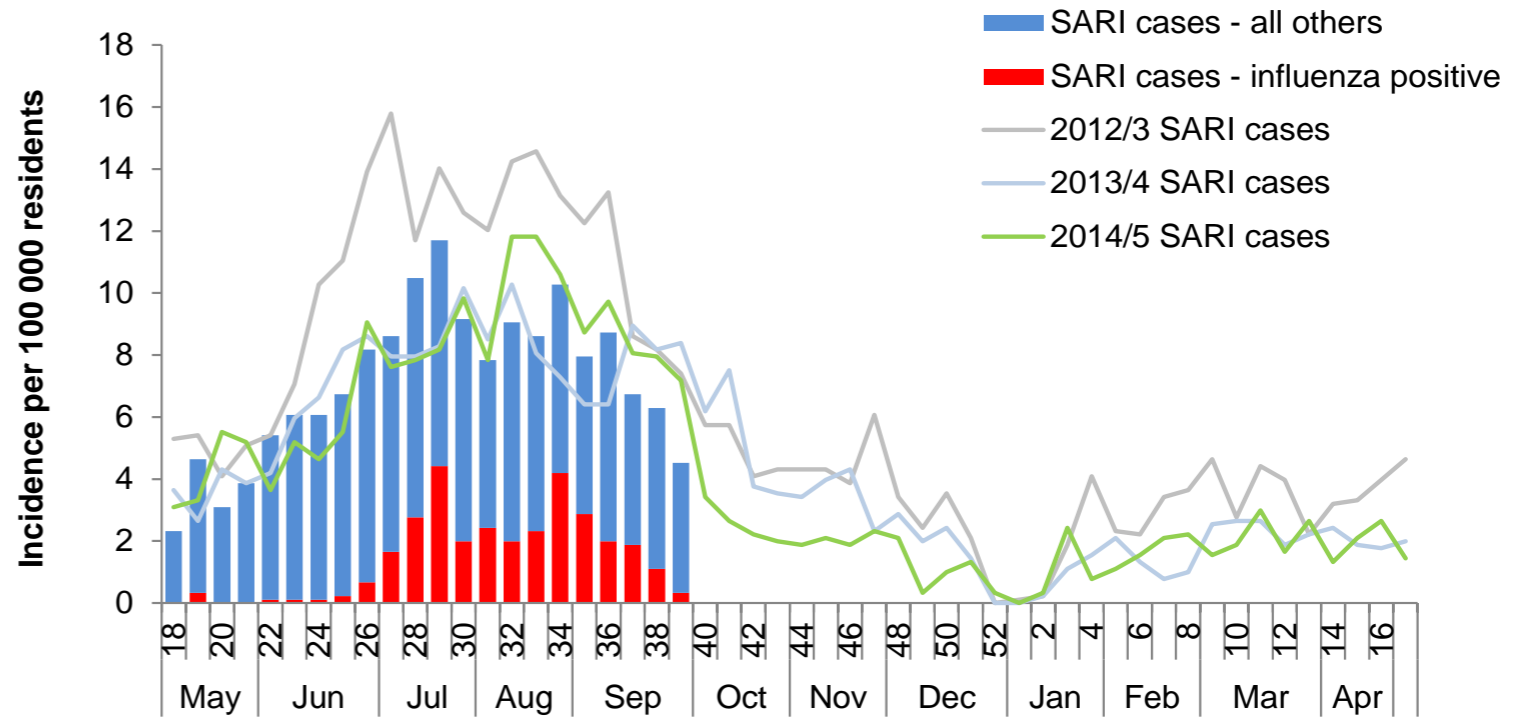
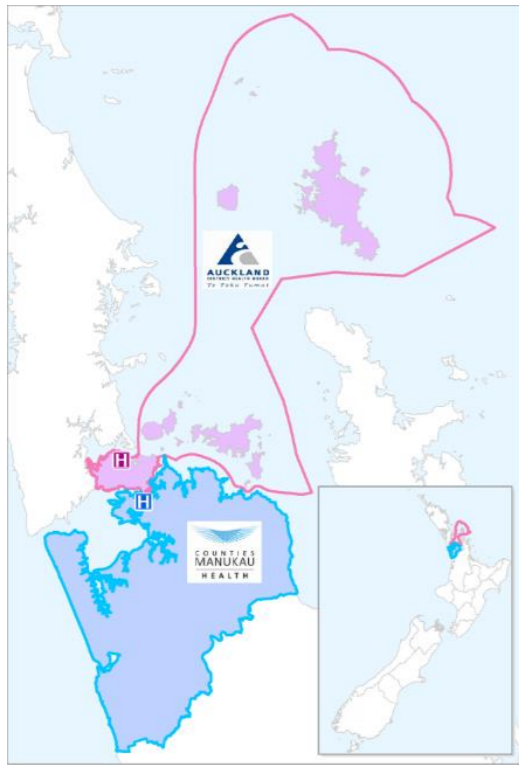
- Overall ILI activity in 2015: Moderate to high
- Peaked in week 33 (10-16 August)

# SHIVERS GP – ILI and influenza cases, 2015



- 2015: highest peak, in wk 35 (24-30 Aug)
- Most of season, A(H3N2) predominant (till wk 33)
- More B in late season. B/Victoria > B/Yamagata since wk 36

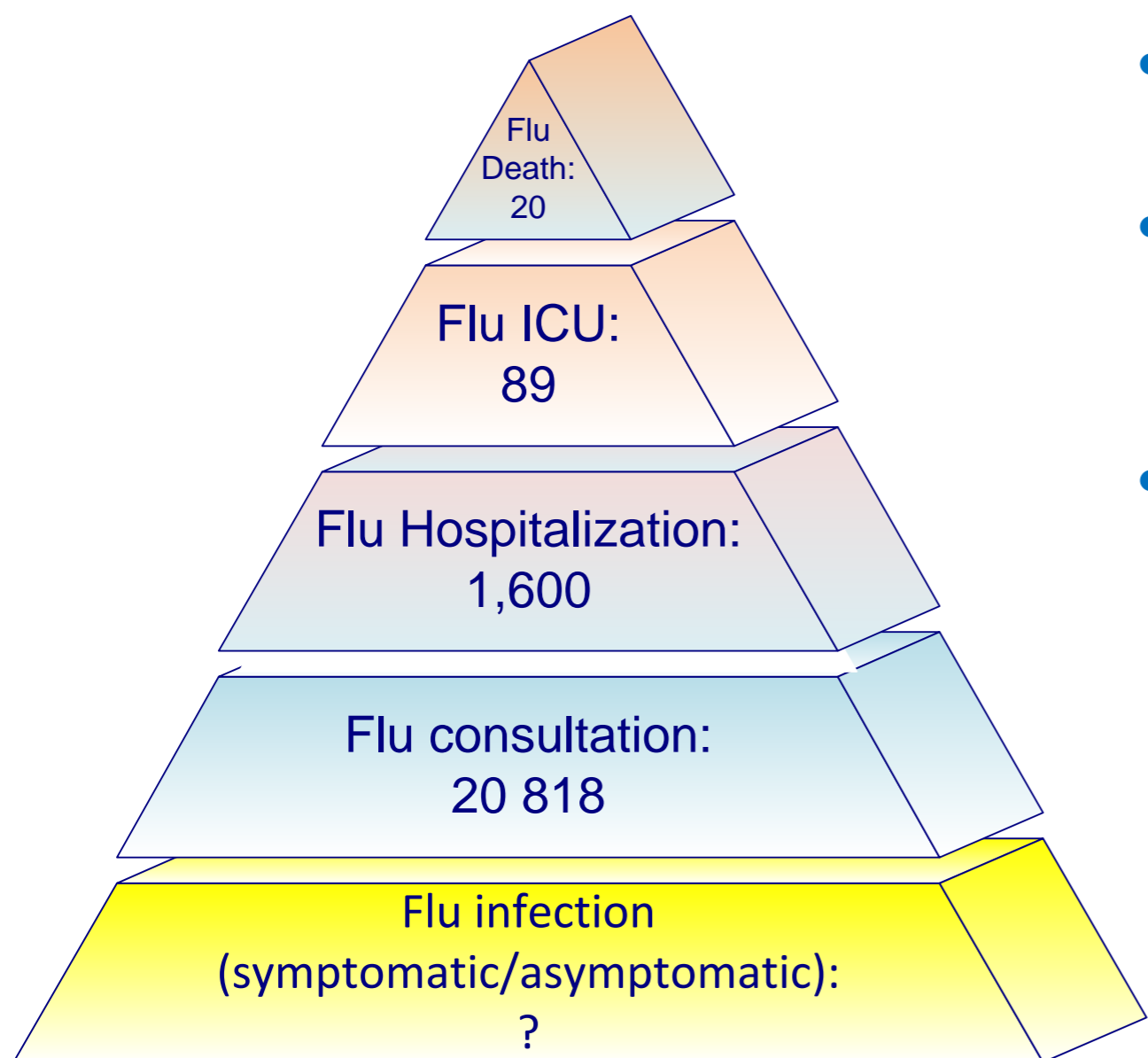
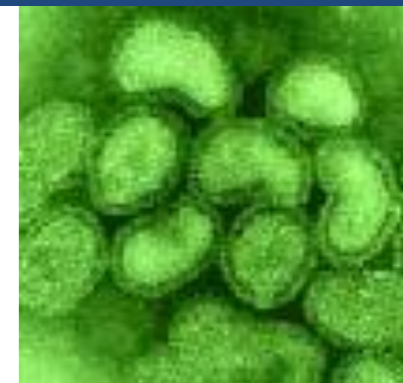
# SHIVERS Hospital - SARI & influenza cases, 2015



- Week (2015/2016)**
- 2015: in the middle seasonal range with two peaks: wk29 (13-19 July) & wk34(17-23 Aug)
  - Most of season, A(H3N2) predominant (till wk 34)
  - B predominant since wk 35 (24-30 Aug)



# 1. Disease burden & epidemiology



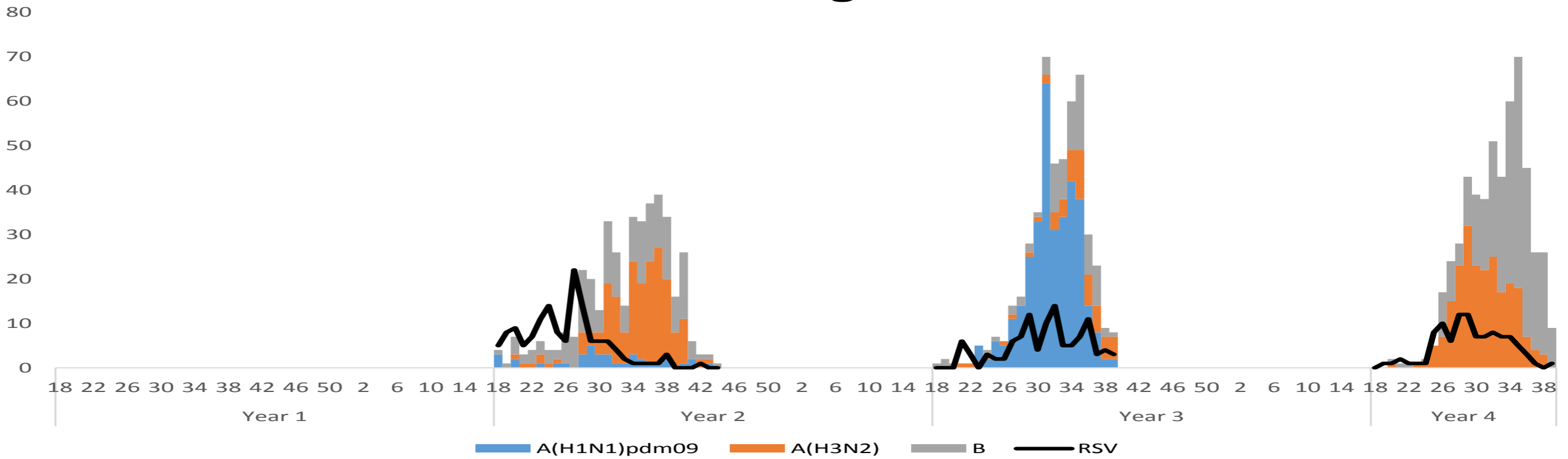
New Zealand Population: 4,470,800

- 2012: SARI-Severe influenza
- 2013: ILI-Moderate influenza requiring GP consultation
- 2015: Serosurvey
  - Mild influenza not requiring GP consultation
  - Symptomatic/asymptomatic infection

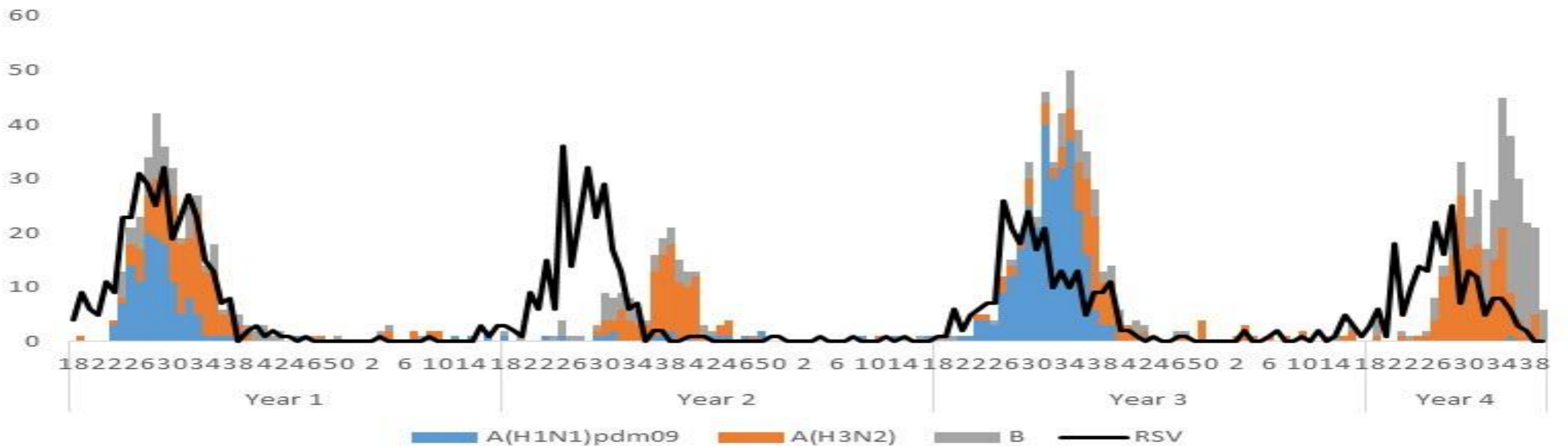


# Influenza and RSV circulation by week

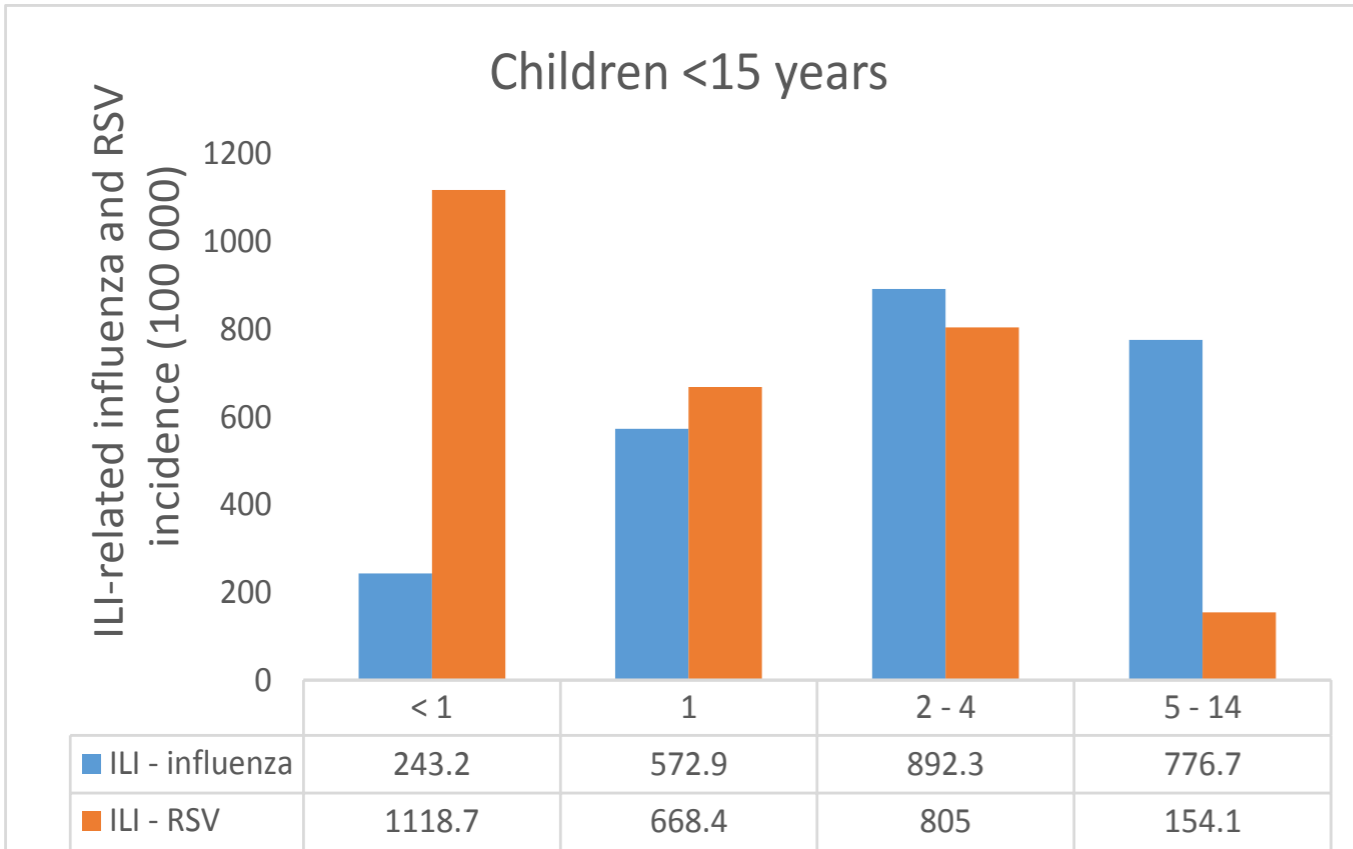
All ages



All ages

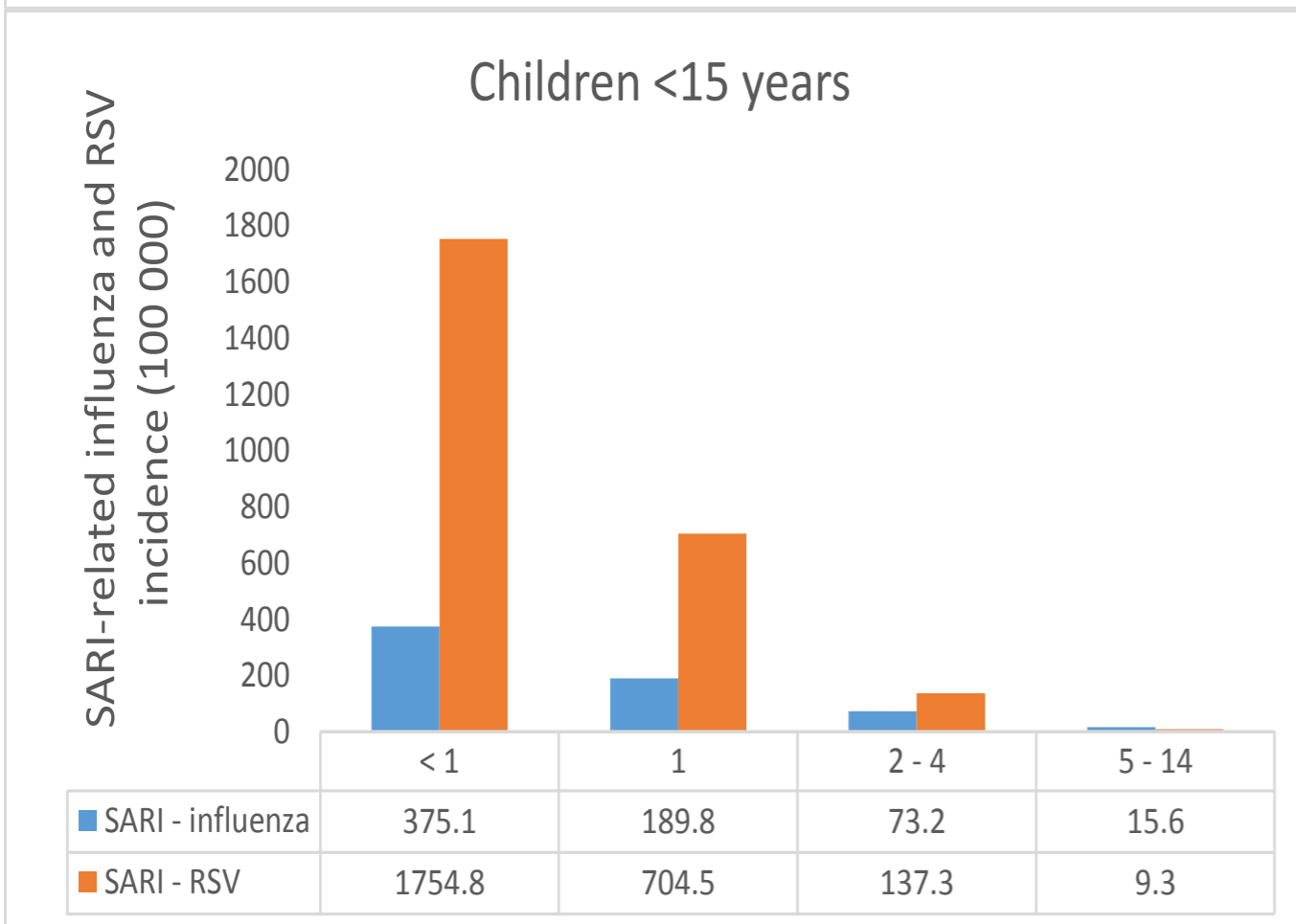


# SARI & ILI influenza and RSV Incidence in children



## ILI related flu and RSV incidence:

- <1 yr: 5 times more RSV > flu
- 1 yr and 2-4 yrs: similar RSV & flu
- 5-14 yrs: more flu > RSV

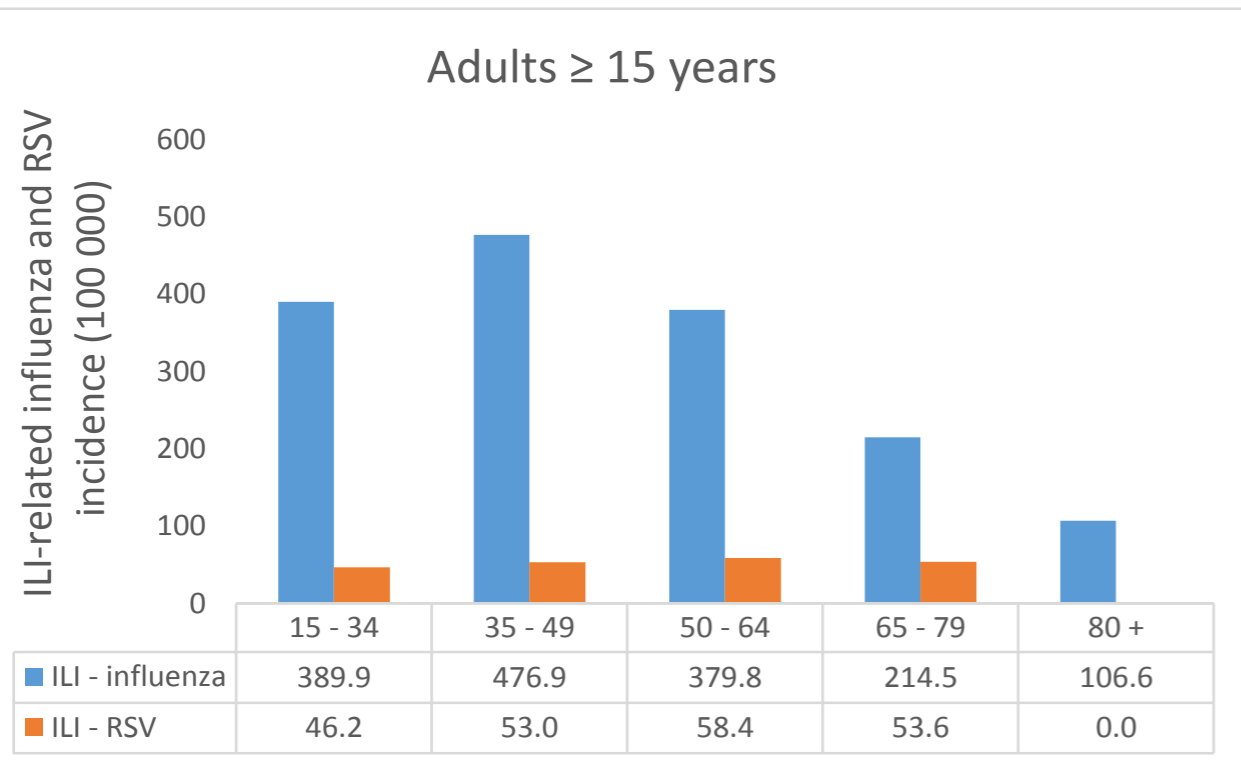


## SARI related flu and RSV incidence:

- SARI-flu & RSV: both declining when age increase
- <1 yr: 5 times more RSV > flu
- 1 yr: 4 times more RSV > flu
- 2-4 yrs: 2 times more RSV > flu
- 5-14 yrs: 2 times more flu > RSV

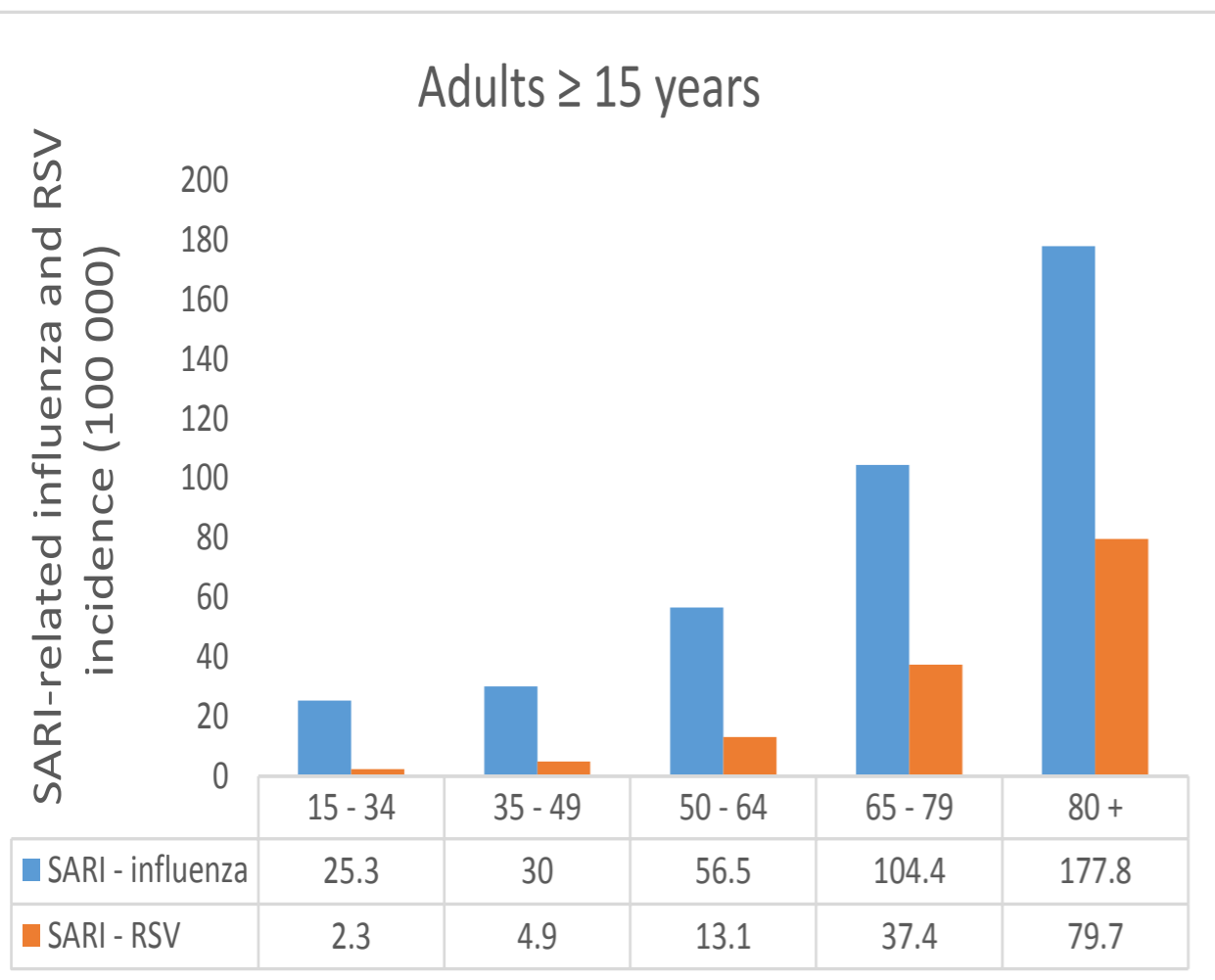


# ILI & SARI influenza and RSV Incidence in adults



## ILI related flu and RSV incidence:

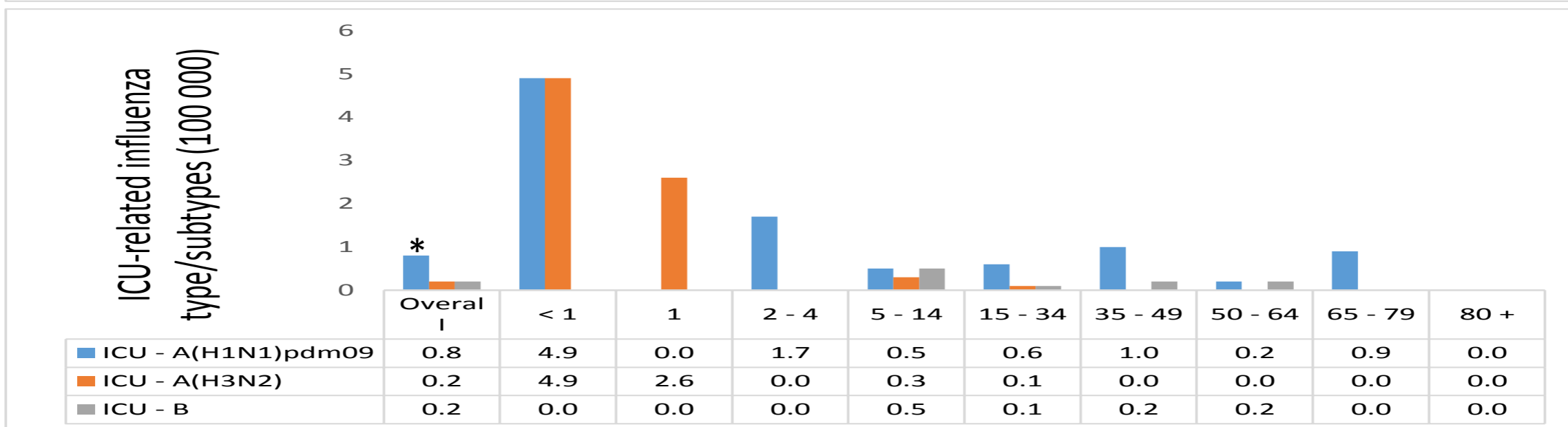
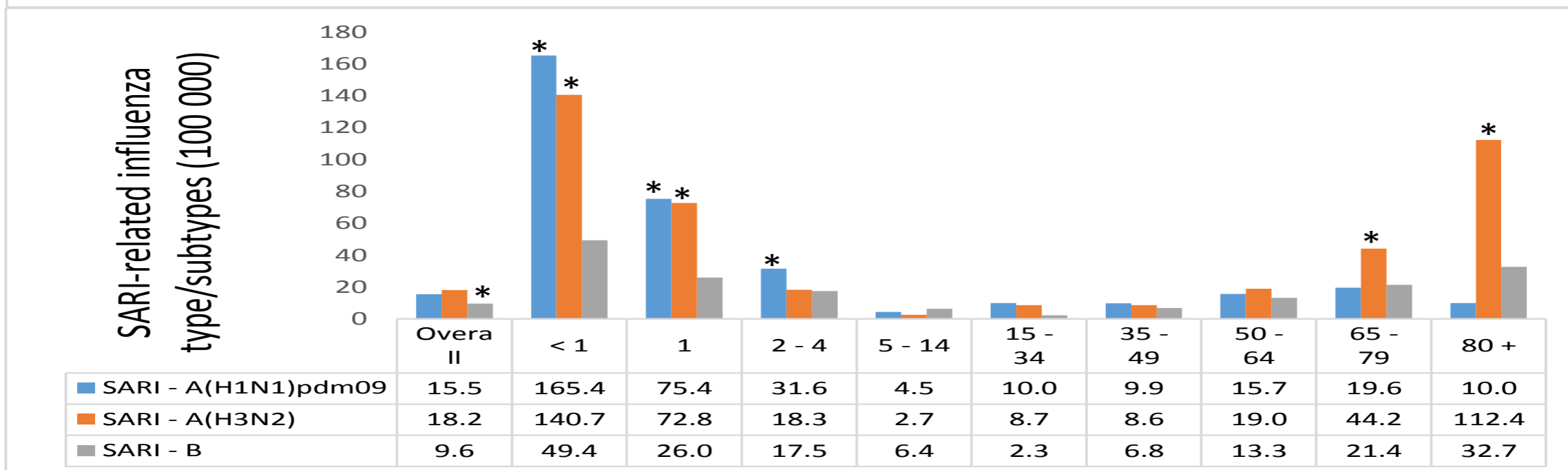
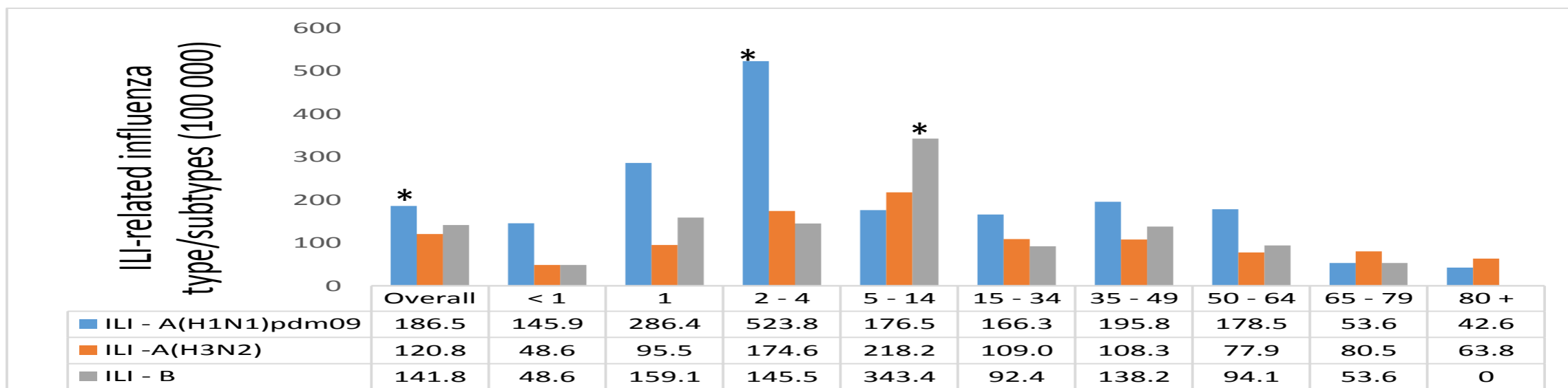
- 4-9 times more flu > RSV
- ILI-flu: declining when age increasing (>35 yrs)
- ILI-flu: 35-49 yrs > 15-34 yrs. Child-bearing?
- ILI-RSV: similar incidence 15-79 yrs.
- ILI-RSV: 0 incidence for 80+ yrs



## SARI related flu and RSV incidence:

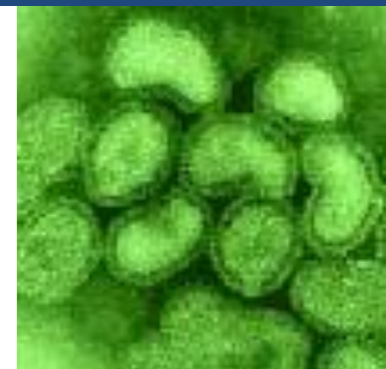
- SARI-RSV & flu: both increasing when age increasing
- 15-64 yrs: 4-11 times more flu > RSV
- ≥65 yrs: 2-3 times more flu > RSV

# Comparisons of SARI & ILI & ICU related influenza type/subtypes





## 2. Vaccine effectiveness:



- A case test negative control design: estimate VE
- Case: a SARI/ILI patient tested positive for influenza virus
- Control: a SARI/ILI patient tested negative for influenza virus
- VE data in 2013-2015 from SHIVERS: contributed to WHO/AIVC process for vaccine strain selection for Southern Hemisphere

Turner et al: *Vaccine*. 2014; 32(29):3687-93

Turner et al: *Euro Surveill*. 2014 Aug 28;19(34). Pii:20884

Turner et al: *Euro Surveill*. 2014;19(42). Pii:20934

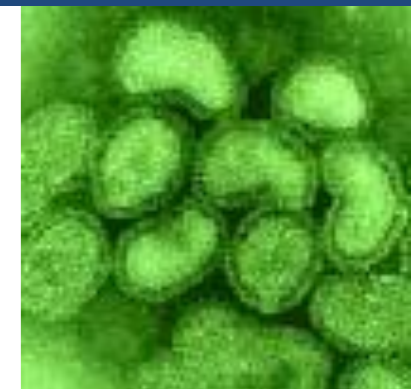
**SHIVERS**

# VE estimate for ILI & SARI cases, 2015

Influenza type & age group	Influenza positive			Influenza negative			Unadjusted		Adjusted*	
	Number vaccinated	Total	%	Number vaccinated	Total	%	VE %	95%CI	VE %	95%CI
<b>SARI</b>										
Overall	44	152	29	140	490	29	-2	-52 to 32	40	2 to 63
6 mo-17 yrs	3	42	7	25	270	9	NA	NA	NA	NA
18-64 yrs	23	81	28	48	126	38	36	-18 to 65	37	-17 to 66
≥65 yrs	18	29	62	67	94	71	34	-58 to 72	42	-44 to 76
A(H3N2)	16	56	29	140	490	29	0	-84 to 46	50	-3 to 76
Influenza B	11	47	23	140	490	29	24	-54 to 62	42	-30 to 74
<b>ILI</b>										
Overall	74	462	16	117	503	23	37	13 to 54	42	16 to 60
6 mo-17 yrs	10	205	5	20	214	9	50	-9 to 77	56	1 to 80
18-64 yrs	48	235	20	68	258	26	28	-9 to 53	32	-6 to 56
≥65 yrs	16	22	73	29	31	94	82	-2 to 97	66	-115 to 95
A(H3N2)	38	184	21	117	503	23	14	-30 to 43	24	-24 to 53
Clade 3C.2a	8	52	15	117	503	23	40	-31 to 73	57	-15 to 84
Any influenza B	21	196	11	117	503	23	60	35 to 76	60	31 to 77
B/Victoria	5	55	9	117	503	23	67	15 to 87	61	-7 to 86
B/Yamagata	8	99	8	117	503	23	75	43 to 89	75	43 to 89

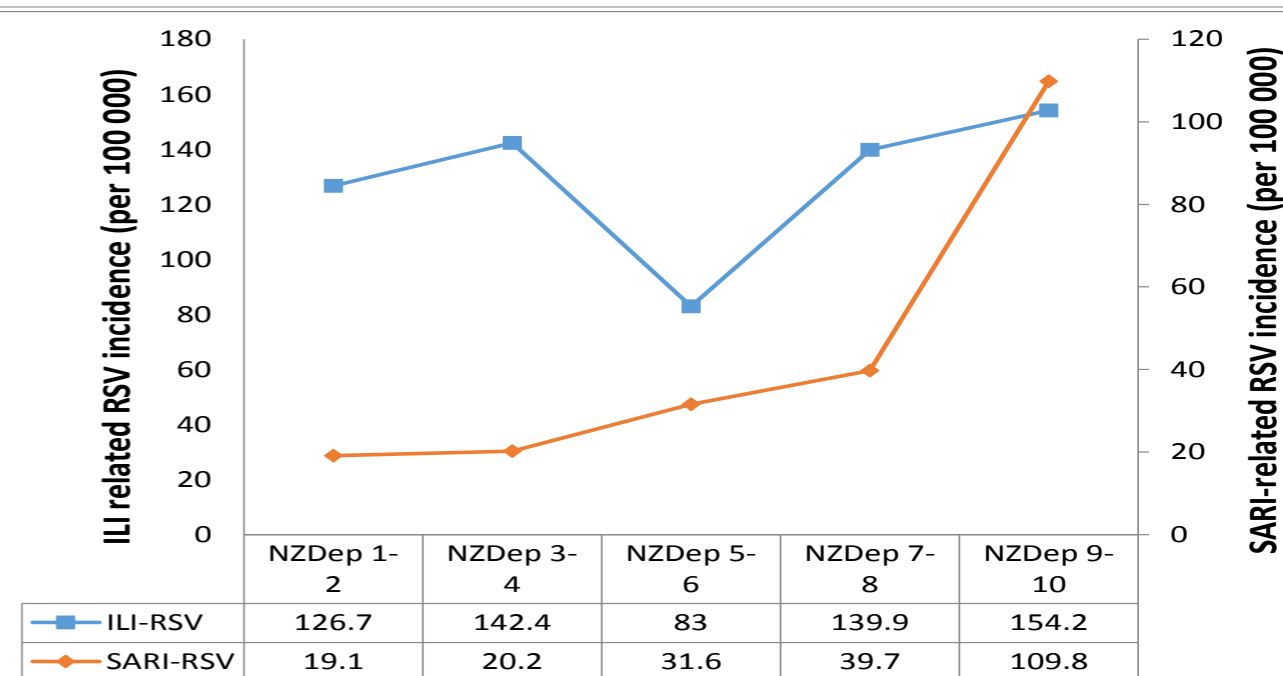
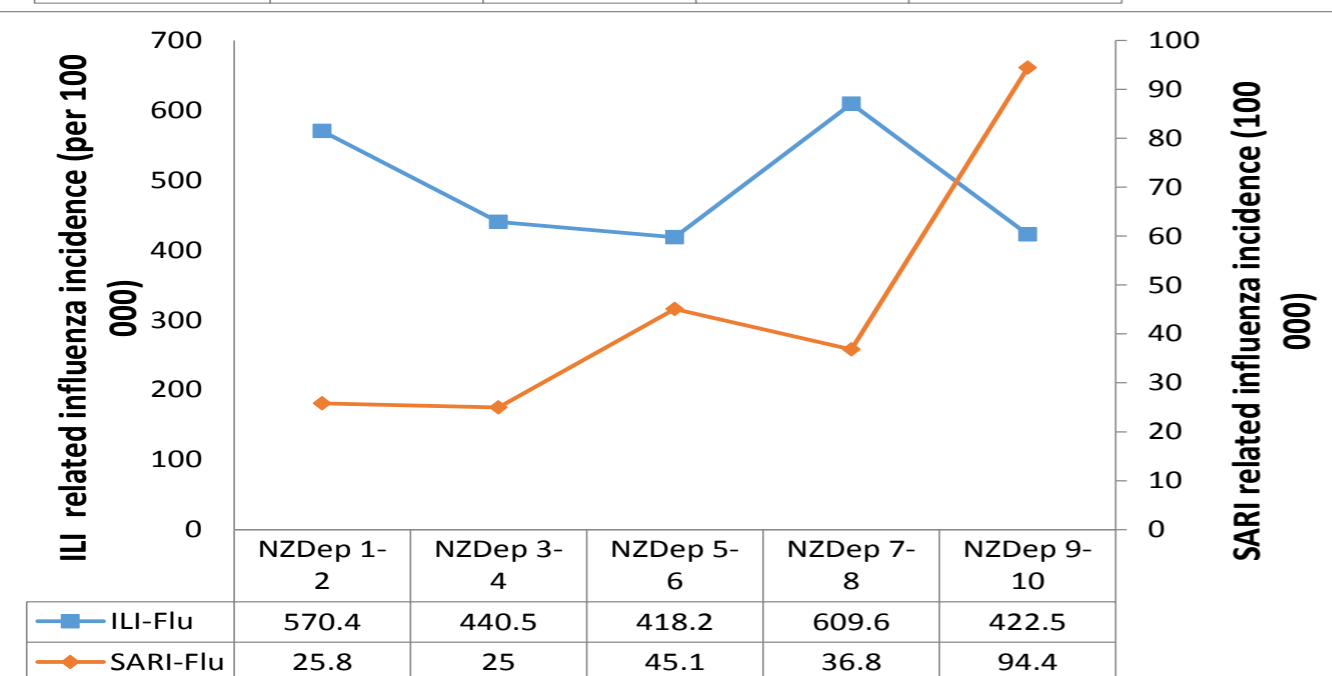
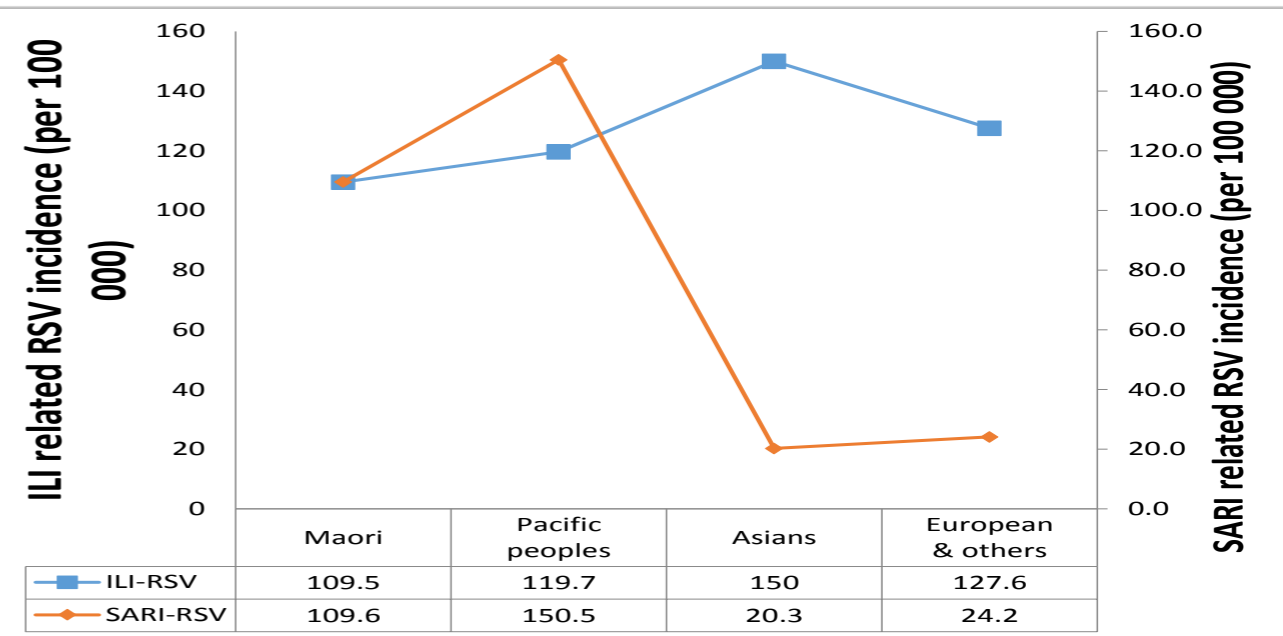
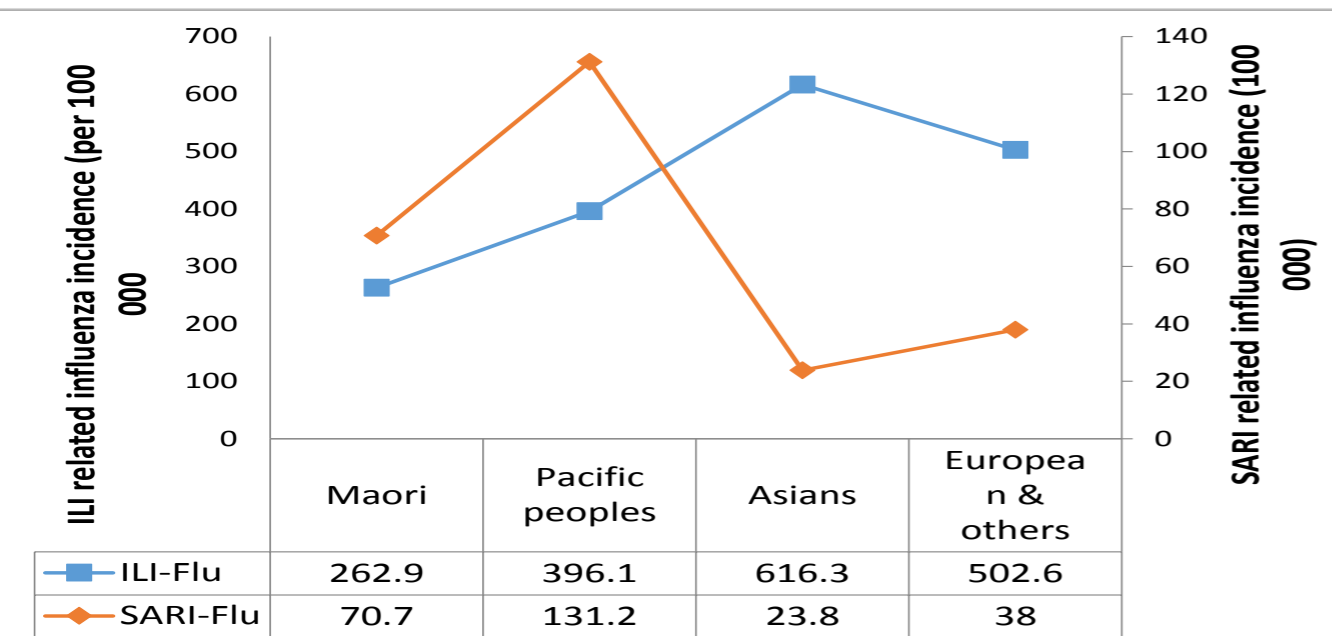
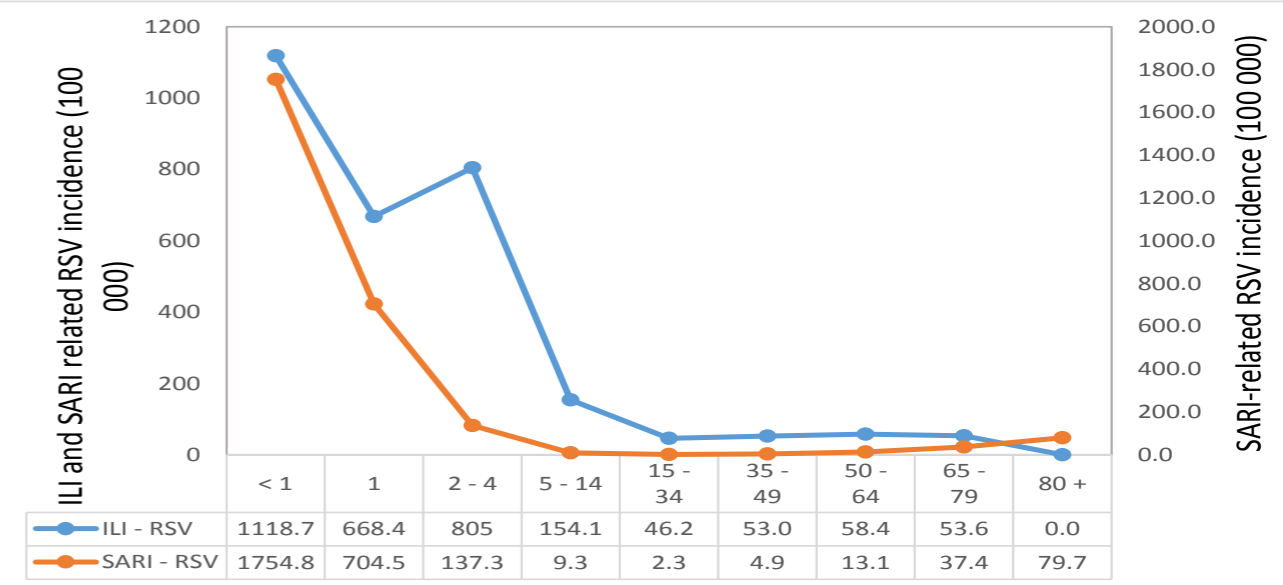
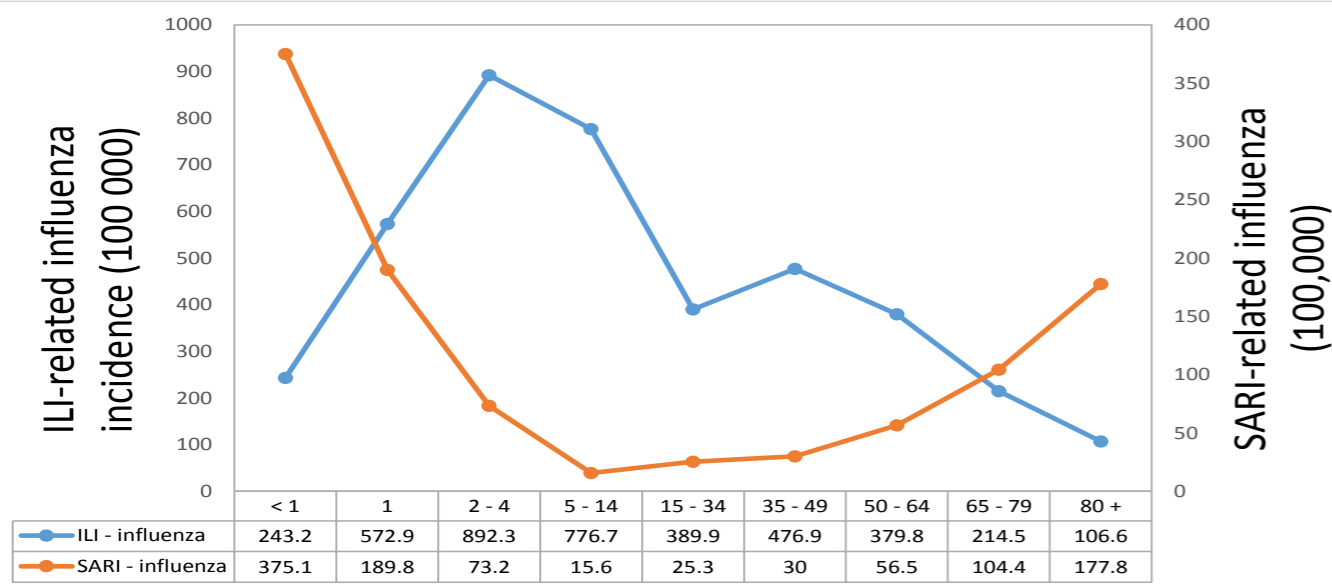


# 3. Risk factors



- Identify and quantify risk factors for getting influenza:
  - Host: socio-demography (Age, ethnicity, Sex, deprivation), underlying conditions (BMI, Diabetes, Asthma etc)
  - Healthcare: Antivirals/vaccinations, oxygen, ICU, healthcare utilization
  - Environmental factors: housing conditions, crowding
  - Behavioral factors: smoking, contact
- For socio-demographic risk factors: Population census data with good distribution data on age, sex, ethnicity, deprivation: disentangle the effect of ethnic and socio-economic gradients
- For specific risk factors (comorbidities, housing conditions): Case-control methods
  - Sero-survey participants (a cluster-stratified random sample) as a control group
  - SARI/ILI test negative patients as a control group

# SARI & ILI related influenza & RSV by age, ethnicity, SES, 2012-2015



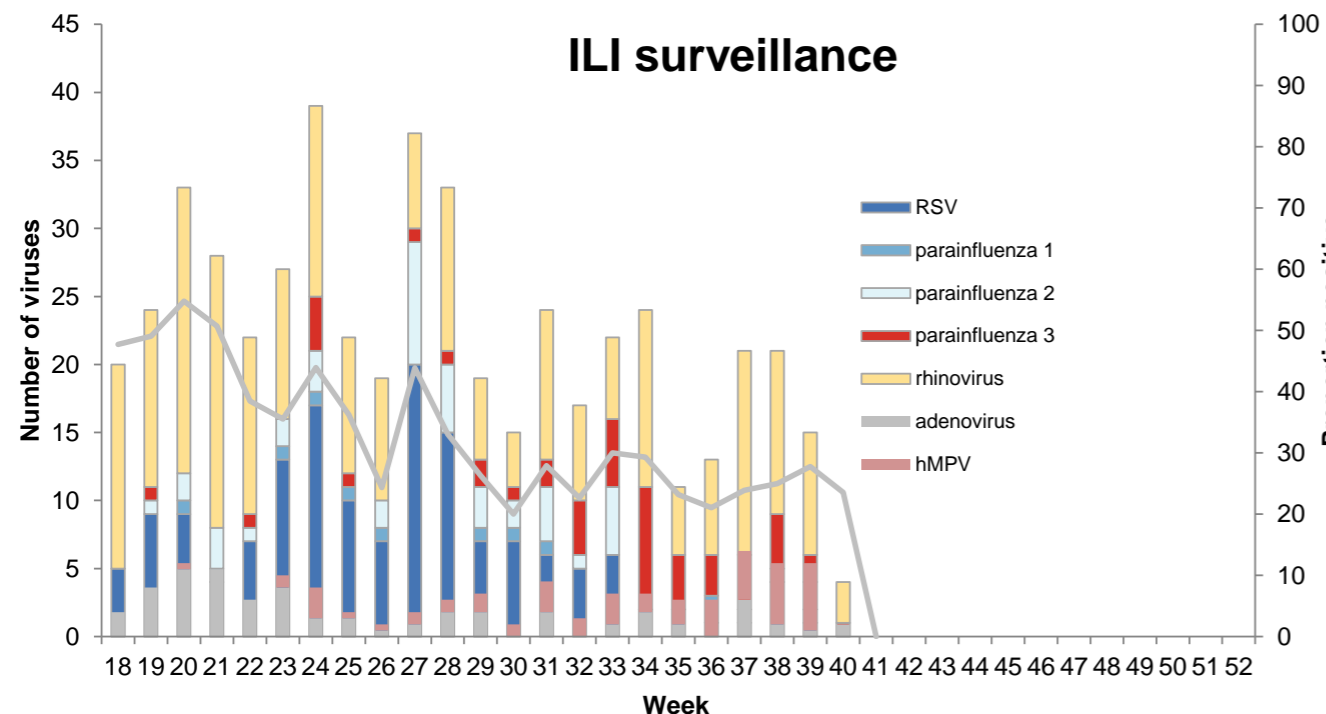
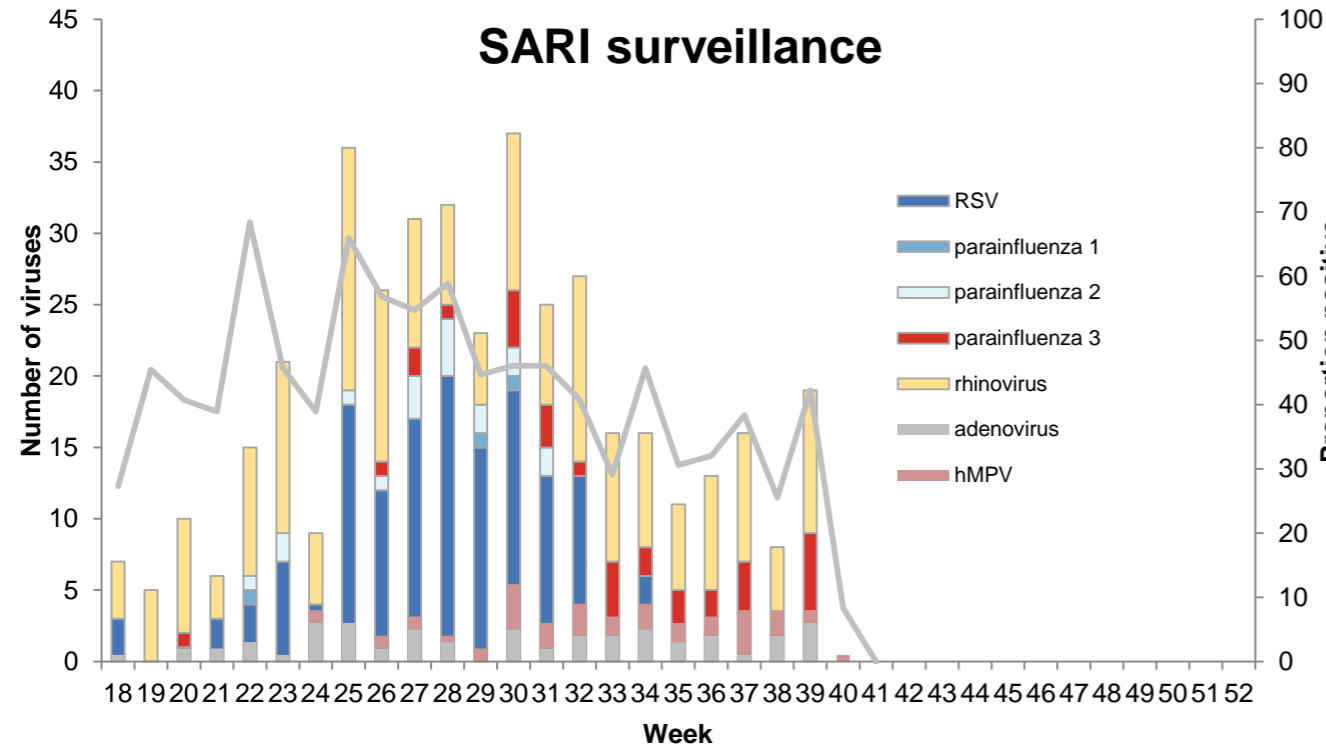


# Influenza associated risk in pregnant woman, 2012-2014

Pregnancy	Pregnant women (15-45 yrs)			Non-pregnant women (15-45 yrs)			RR (95% C.I)	p-value
	Flu +ve, No./Total (%)	No. of pregnant women	Influenza incidence (/100,000)	Flu +ve, No./Total (%)	No. of non-pregnant women	Influenza incidence (/100,000)		
Year 1	9/25 (36.0)	8894	101.2	34/150 (22.7)	184302	18.4	5.49 (2.31-11.68)	0.0000
Year 2	5/11 (45.5)	9148	54.7	24/127 (18.9)	190579	12.6	4.34 (1.29-11.60)	0.0060
Year 3	15/28 (53.6)	8842	169.6	67/209 (32.1)	190885	35.1	4.83 (2.56-8.55)	0.0000
Total	29/64 (45.3)	26884	107.9	125/486 (25.7)	565766	22.1	4.88 (3.14-7.36)	0.0000

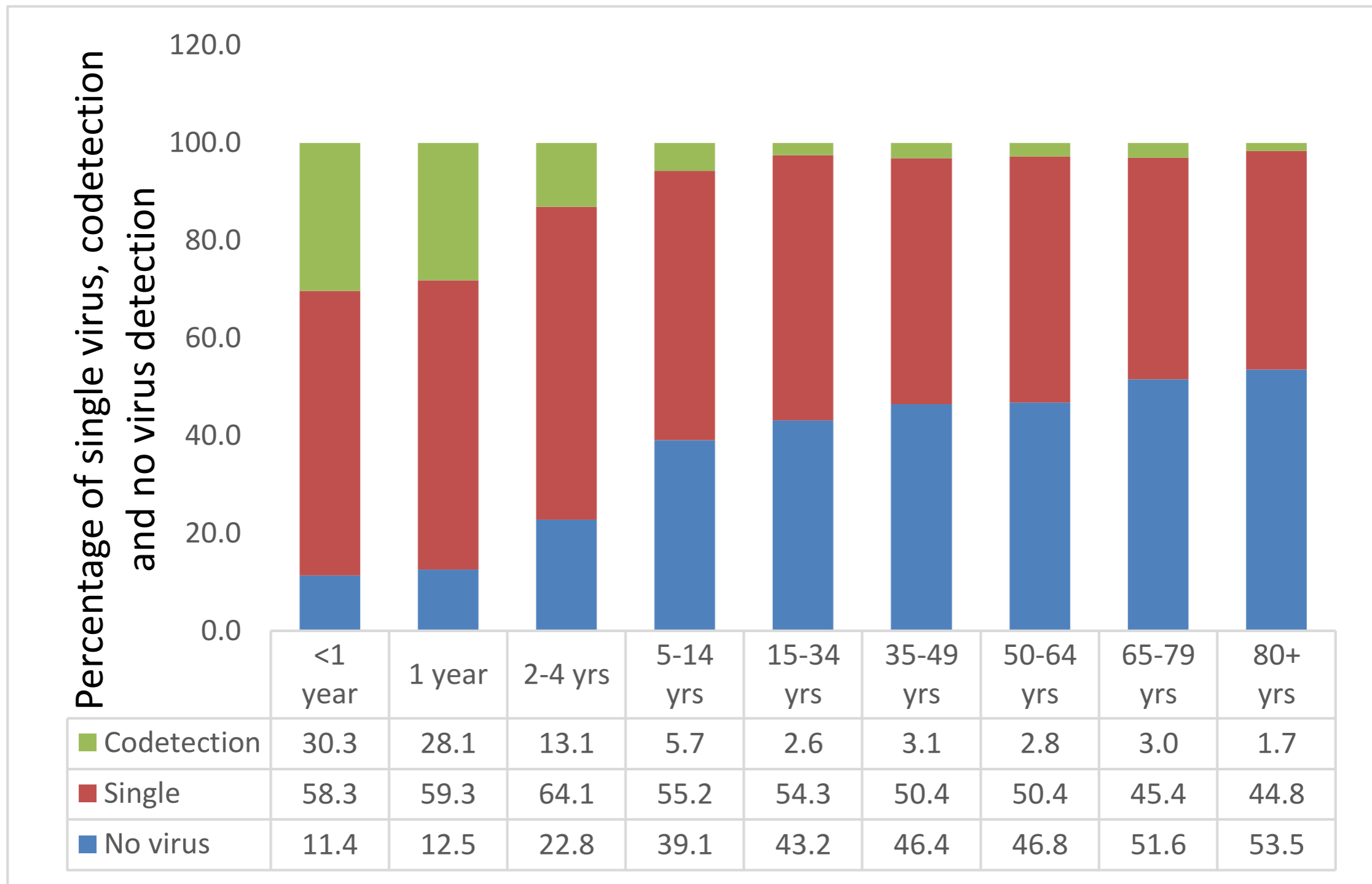


# 4. Etiology



- Seasonal influenza virus: antigenic drift
- Monitor non-flu respiratory viruses: under-recognized burden
- Early detection of non-seasonal influenza virus-A(H7N9) & emerging respiratory virus (MERS-CoV)
- Understand viral-viral, viral-bacteria co-detection

# Single vs codetection vs no virus by age



- <1 yr, 1 yr: up to 88-89% of SARI/ILI samples had viral detection
- <1 yr, 1 yr, 2-4 yrs: 30%, 28% and 13% of virus codetection
- When age increases, less codetection and more non-virus detection

# Conclusion

- SARI & ILI surveillance combined with NZ healthcare system and well characterised population subgroups: excellent for population-based research
- SARI & ILI allows studying burden of influenza and non-influenza viruses in severe & mild respiratory disease, severity, risk factors, impact, VE, clinical spectrum/outcomes and etiology
- SARI & ILI platforms can be developed as an integrated respiratory disease surveillance platform for both influenza (incl H7N9), MERS-CoV, and other endemic respiratory pathogen-associated diseases

# Acknowledgement

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- **US-CDC:** Mark Thompson, Marc-Alain Widdowson, Jazmin Duque  
Cress



# Thank you

## THE SHIVERS PROJECT

SOUTHERN HEMISPHERE INFLUENZA VACCINE EFFECTIVENESS, RESEARCH & SURVEILLANCE



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