



# PREDICTING RISK OF VACCINE PREVENTABLE DISEASES IN TARANAKI 2022

Dr Rachel Bol  
Senior House Officer (Public Health Unit attachment)  
29 December 2021

## ABSTRACT

---

**Introduction:** The aim of this report is to identify vaccine preventable disease which may pose the highest risk for resurgence in 2022 in Taranaki. This information is used to guide recommendations for reducing risk.

**Methods:** Relevant vaccine preventable diseases to New Zealand were identified. Childhood immunisation, influenza vaccination and vaccination in pregnancy data was analysed to identify high risk groups. A risk assessment matrix was constructed to assess the population health risk of the remaining vaccine preventable diseases should cases occur in Taranaki in 2022. Finally, a literature review was completed to further inform risk.

**Results:** Two very high-risk vaccine preventable disease were identified – influenza and measles, two high risk diseases were identified – pertussis and rotavirus. Low childhood immunisation rates in 2021 and low rates of vaccination in pregnancy were also identified as areas of concern.

**Conclusion:** Influenza, pertussis, measles, and rotavirus all disproportionately affect Māori low socioeconomic communities, placing these groups at higher risk of complication and co-infection. We need to focus on maintaining the childhood immunisation schedule and catching up those who may have been missed over the past 2 years, especially for the priority groups.

## INTRODUCTION

---

Since the development for the first formal vaccine in 1798 against Small Pox<sup>1</sup> to the rapid development of the COVID-19 vaccine in 2020, vaccinations have saved millions of lives<sup>2</sup> and have enabled significant reduction or even eradication of previously wide-spread and debilitating diseases<sup>3</sup>.

The COVID-19 virus was first identified in Wuhan, China in December 2019<sup>4</sup>. The virus and resulting pandemic is predicted to have caused over five million deaths at time of writing<sup>4</sup>. Fortunately, the

production and ongoing development of several vaccines in 2020/2021 and continual progress in the treatment is providing us with some defence against this everchanging disease<sup>5</sup>.

However, while the inevitable national spread of COVID-19 and roll out of the vaccine is in the forefront of New Zealand health workforces minds, we have to consider other vaccine preventable diseases which could return. The combination of an overburdened workforce, plummeting vaccine rates and chronic inequities in immunisation coverage are predicted to cause a public health crisis when New Zealand's borders re-open in 2022<sup>6</sup>.

The purpose of this report is to examine which vaccine preventable diseases pose the highest population health risk for Taranaki in 2022, and provide recommendations to help mitigate this risk.

## METHODS

---

Vaccine preventable diseases (VPDs) listed in the National Immunisation Schedule were identified and case numbers in the past ten years assessed, disease with nil or negligible cases in the previous ten years based on ESR data were excluded. These included – diphtheria, polio, and tetanus.

Vaccination data for the Taranaki region and New Zealand was obtained, reviewed and consolidated to assess trends and identify at risk populations based on age, reported ethnicity and location. Childhood immunisation data is available from the National Immunisation Registry on the Ministry of Health website, Influenza immunization data for 2020 and 2021 was obtained directly from the Ministry of Health, vaccination in pregnancy data was based on two local audits.

A risk assessment matrix was constructed including a number of variables to assess the population health risk of the remaining vaccine preventable diseases should cases occur in Taranaki in 2022. Population health risk is defined as the risk of a disease to a population, considering the likelihood of occurrence, severity of disease, and impact on healthcare.

The risk assessment matrix considers:

- Risk of transmission considering R-values
- Number of cases per year nationally, based on ESR surveillance data
- Number of hospitalisations nationally, based on ESR data and literature reporting hospitalisation rates
- Risk of increased cases beyond expected number, considering historic disease trends
- The risk of death or long-term complication
- Taranaki's rate each disease compared to historic national rates

Finally, immunisation coverage and the risk matrix were combined to determine which disease poses the greatest risk to the Taranaki region in 2022, bearing in mind this is likely to occur concurrently with COVID-19 cases. Throughout the process, health equity was considered to ensure the impact on priority population in our region were assessed.

## FINDINGS

### Population health risk assessment matrix

	Notifiable disease	Immunisation schedule	Vulnerable groups	Transmissibility <sup>a</sup>	Cases per year nationally <sup>b</sup>	Number of hospitalisations nationally <sup>c</sup>	Risk of increased case numbers <sup>d</sup>	Risk of long-term complications or death <sup>e</sup>	Taranaki's rates <sup>f</sup>	Overall population health risk <sup>g</sup>
				[Low, moderate, high, very high]	[Low, moderate, high, very high]	[Low, moderate, high, very high]	[Low, moderate, high, very high]	[Low, moderate, high, very high]	[Lower, similar, higher]	[Low, moderate, high, very high]
<b>Influenza</b>	No	Age >65 Age <65 with comorbidities Pregnancy	Pregnancy Comorbidities – asthma, cardiac, respiratory Obesity Age: <1, >65	Moderate	Very high	High	High	Moderate	Similar	Very high
<b>Measles</b>	Yes	12 months 15 months	Immunocompromised Pregnancy Age: <5, >20 Māori and Pacifica High deprivation	Very high	Low – High	Moderate – High	Very high	Moderate	Lower	Very high
<b>Rotovirus</b>	No	6 weeks 3 months	Young children	High	High	Moderate	Moderate	Low	Similar	High
<b>Pertussis</b>	Yes	6 weeks 3 months 5 months 4 years 11 years Pregnancy	Infants High deprivation	High	High	Moderate	High	Moderate	Similar	High
<b>Invasive Pneumococcal disease</b>	Yes	6 weeks 5, 12 months	Age <2 and >75 Māori and Pacifica Immunocompromised	Low	Moderate	Low – Moderate	Low	High	Similar	Moderate
<b>Varicella</b>	No	15 months	Immunocompromised Pregnancy Unborn infants	High	Very high	Moderate	Low	Moderate	Likely similar	Moderate

<b>Human Papilloma Virus</b>	No	11/12 years	Sexually active people Maori	High	Very high	High	Low	Moderate	Likely similar	<b>Moderate</b>
<b>Hepatitis B</b>	Yes	6 weeks 3, 5 months	Immunocompromised IV drug users Sexually active people Māori, Pacifica, Asian	Moderate	Low	Low	Low	High	Similar	<b>Low</b>
<b>Mumps</b>	Yes	12 months 15 months	Adolescents and young adults	High	Moderate	Low	Low	Low	Similar	<b>Low</b>
<b>Rubella</b>	Yes	12, 15 months	Pregnancy	High	Low	Low	Low	Rubella – Low CRS <sup>h</sup> – Very high	Similar	<b>Low</b>
<b>Haemophilus influenzae type b</b>	Yes	6 weeks 3 months 5 months 15 months	Age <5 Immunocompromised Overcrowded households	Low	Low	Low	Low	High	Similar	<b>Low</b>

- a. Based on predicted R-value
- b. Cases per year in New Zealand (Low <100, Moderate 100 – 999, High 1000 – 10,000, Very high >10,000)
- c. Hospitalisations per year (Low <100, Moderate 100 – 499, High >500)
- d. Risk of increased case numbers (greater than expected/baseline) – based on disease trends
- e. Risk of long-term complication or death assuming treatment in NZ hospital
- f. Taranaki's rate of disease compared to the national rates over past 20 years (Higher, lower, same)
- g. Defined as the risk of a disease to a population, considering the likelihood of occurrence, severity of disease, and impact on local health resource.
- h. Congenital Rubella Syndrome

## Results:

Ten vaccine preventable diseases were analysed to predict their risk to the Taranaki population in 2022. Two were assess as very high population health risk – influenza, and measles, two high risk – pertussis and rotavirus.

Analysis of childhood vaccination rates demonstrates a significant drop in achieving full vaccination by 18 months of age with Maori children most affected. Childhood vaccination at 6 months is also generally poor, with lower rates for Maori children. Influenza vaccination rates for under 20 year old's in 2021 have approximately halved compared to 2020, while the rate for all over 65's and 20-64 remains the same.

## DISCUSSION

---

The aim of this report was to identify vaccine preventable diseases (VPDs) in New Zealand which could pose a high population health risk for Taranaki in 2022. The highest risk diseases identified were influenza and measles. Other high-risk diseases were pertussis and rotavirus. These risks are exacerbated by poor vaccination coverage, immunity gaps created by the pandemic, the resumption of international travel and health inequities.

The New Zealand target for childhood immunisations is for 95% of children to be fully vaccinated by two years of age<sup>7</sup>. New Zealand has not met this target for the past 10 years, and a fall in vaccination rates in 2021 mean even more children are vulnerable to VPD's today. Māori children are less likely to complete their childhood immunisations at each audited age. For those under 6-months of age, 30% of all Taranaki children and 44% of Taranaki Māori children remain vulnerable to disease such as pertussis, haemophilus influenzae type B, invasive pneumococcal and rotavirus<sup>7</sup>. A reduction in childhood vaccination has also been seen globally since the arrival of COVID-19<sup>8,9</sup> and its noted while the baseline rate of vaccination uptake normalises post lockdown, missed vaccinations typically are not adequately "caught-up"<sup>9</sup>. If New Zealand follows this trend, there is potential to leave gaps in our vaccination coverage in older groups.

Prior to the vaccination, most children had experienced rotavirus by age five. Introduction of the rotavirus vaccine in New Zealand has resulted in a dramatic reduction in the number of hospitalisations with rotavirus, from 510-822 admissions per year in 2010 – 2013, to just 80 in 2019<sup>8</sup>. An overall reduction in community rotavirus and gastroenteritis in all age groups has also been noted<sup>7</sup>. Unfortunately, declining vaccination rates particularly in the under 6-month age group as the two-dose course must be completed by 25 weeks of age<sup>7</sup>, and the highly contagious nature of this disease may result in increasing case numbers in 2022.

Measles is a high risk VPD due to its high transmissibility and cyclical nature of outbreaks every 2-3 years. Endemic measles was eradicated from New Zealand in 2017<sup>7</sup> however international cases can still be imported and result in outbreaks<sup>7</sup> as occurred in 2019 with over 2000 cases nationally<sup>10</sup> As measles often the first disease to resurge when immunization rates are low<sup>9</sup> and MMR rates are down both locally and internationally<sup>9</sup>, risk of introduction and outbreak is high. This risk is further exacerbated due to a large pool of susceptible children and adults<sup>11</sup>. A number of young adults have only partial or no MMR vaccination coverage, due to changes in the immunization schedule in 2001, unfounded claims of MMR causing autism and poor vaccination rates in the 90's<sup>11</sup>.

Pertussis vaccination is 81-85% effective at preventing infant pertussis in a three-dose regime, however this cannot be completed until 5 months of age<sup>7</sup>. Vaccination of pregnant people which provides protection up to 3 months of age by the passage of antibodies and herd immunity is essential to allow time for the child to receive the first two doses<sup>7</sup>. Low vaccination rates at 6 months of age and very poor rates of vaccination in pregnancy is a particularly concerning risk for pertussis, as it the very young we aim to protect - 1 in 6 infants admitted to ICU will die or have long term brain or lung damage<sup>12</sup>. Pertussis remains endemic, with epidemics occurring every 2-5 years<sup>7</sup>. Large local outbreaks of pertussis have the potential to put a large strain on our paediatrics department; half of children aged under 1<sup>7</sup> and 10%<sup>12</sup> of all cases, require hospitalization. The need for respiratory support and careful isolation of both pertussis and COVID-19 patients in hospital would further contribute to this strain.

The potential for a large influenza epidemic has been highlighted a concern to New Zealand and the rest of the world in 2022<sup>13</sup>. Prior to COVID, it was predicted over 200,000 New Zealanders had

influenza each year, contributing to 500 deaths annually<sup>14</sup>. Due to the success COVID control measures and border closures also have on influenza, New Zealand has lived through two influenza seasons with exceptionally low numbers of flu<sup>13,15</sup>, however due to this lack of exposure New Zealanders will likely have much lower immunity against influenza in Winter 2022<sup>15</sup>. As restrictions are relaxed internationally and influenza is reintroduced to New Zealand there is potential for widespread and severe influenza, as seen with respiratory syncytial virus in Winter 2021<sup>15</sup>. COVID-19 and influenza have similar health resource requirements which must be considered when planning for a double epidemic<sup>13</sup>. Focus on improving our influenza coverage for 2022 is essential to preventing large numbers of influenza cases should an epidemic occur. In the United Kingdom, childhood influenza immunisation has been expanded to include all children aged 2-15 years, in an effort to reducing rates of circulating influenza following predictions their there may be up to 50% more cases than years prior to COVID-19<sup>16</sup>.

Taranaki has performed well in 2021 to maintain influenza vaccination rates for over-65's given national rates have declined. However, overall influenza immunisation rate for over 65's in Taranaki remains below the national target of 75%. Māori are less likely to have received an influenza immunization across all age groups. For the under-20's, vaccination rates have halved in 2021 compared to 2020. As only those with comorbidities are funded in this age group<sup>7</sup>, it can be assumed this group is likely to have risk factors increasing their chance of severe influenza.

Reductions in both childhood and influenza vaccination rates in 2021 could be attributed to the effects of COVID-19 lockdown, vaccine rollout and service delivery changes. For example, reduction staff availability due to the need to administer COVID vaccinations, lack of opportunistic counselling or administration due to a shift to telehealth, the need for multiple appointments for COVID and Influenza vaccination as they initially were not administered together, and an increased public discussion around COVID-19 vaccine safety may have translated to other vaccinations. However, it is important to note Māori childhood vaccination rates have been trending down since a peak in 2016-17, suggesting more chronic inequities contributing to low vaccination coverage in this group, such as socioeconomic, culture and vaccine specific concerns<sup>17</sup>.

It is interesting to note, that while large scale outbreaks have occurred nationally in recent years of measles in 2019<sup>12</sup>, mumps in 2017<sup>13</sup>, and meningococcal in the early 2000's, Taranaki has reported lower rates during these outbreaks than nationally. Reasons for this postulated could include relatively less social deprivation and overcrowded housing than other risk areas of New Zealand, the travel habits of New Zealanders with larger volumes of travel down the centre of the North Island compared to the west coast, a lower population density with a high outdoor based lifestyle, and proximity to international airports.

In conclusion, several vaccine preventable diseases could pose a risk to the Taranaki region alongside COVID-19 in 2022. Influenza, pertussis, measles and rotavirus all disproportionately affect Māori low socioeconomic communities, placing these groups at higher risk of complication and co-infection. We need to focus on maintaining the childhood immunisation schedule and catching up those who may have been missed over the past 2 years, especially for the priority groups. While Taranaki previously been relative unscathed in national outbreaks, we never know when our luck may run out.

## Recommendations

1. Focus of improving childhood vaccination
  - a. Māori lead
  - b. Multiple small interventions, Walker et al. review shows many interventions increase uptake however one is unlikely to reach all individuals
  - c. Multiple opportunities and acceptable locations for administration to improve access: Home visits, school/ Kōhanga Reo, drive through, Marae
  - d. Simultaneous immunization of COVID-19 with other vaccinations once childhood COVID vaccine rolled out
2. Increased focus on influenza vaccination roll out for 2022
  - a. As above, plus
  - b. Offer influenza vaccination routinely with COVID booster vaccination
  - c. Influenza vaccination advertising must not be neglected despite COVID focus
  - d. Nationally we could consider funding influenza vaccination for children to prevent transmission to adults, and prevent young children being infected with both COVID and influenza while they are ineligible for COVID vaccination
3. Further evaluation to investigate low rates of vaccination in pregnant people in New Plymouth
  - a. Possible opportunity currently as midwife shortage puts a much larger number of well pregnancies under DHB care, making data collection easier
  - b. Consider opportunities where education can be provided to all pregnant people, i.e. Anatomy ultrasound is routine in all pregnancies
  - c. Consider incentivization of vaccination for pregnant patients/midwives
  - d. Increase vaccination opportunity – antenatal vaccination clinic only open 1 hour per week

## Strengths/Limitations

This report considers the trends of VPDs over a twenty-year period and considers multiple variables which may contribute to a vaccine preventable disease returning. Further consultation with local childhood and influenza vaccination coordinators could have helped identify specific local barriers to vaccination.

## ACKNOWLEDGEMENTS

---

Dr Jonathan Jarman – Medical Officer of Health  
Dr Carolyn Aird – Medical Officer (Public Health)  
Dr Yu-Ching Yu – Medical Officer (Public Health)  
Ministry of Health – National Immunisation Registry staff

## REFERENCES

---

1. The Immunisation Advisory Centre. (2020, Jan). *A brief history of vaccination*. Retrieved from The Immunisation Advisory Centre: <https://www.immune.org.nz/vaccines/vaccine-development/brief-history-vaccination>
2. WHO. (2021, July 15). *Immunization Coverage*. Retrieved from World Health Organization: <https://www.who.int/en/news-room/fact-sheets/detail/immunization-coverage>
3. The College of Physicians of Philadelphia. (2018, January 25). *Disease Eradication*. Retrieved from The History of Vaccines : <https://www.historyofvaccines.org/content/articles/disease-eradication>
4. WHO. (2021, November). *WHO Coronavirus (COVID-19) Dashboard*. Retrieved from World Health Organization: <https://covid19.who.int/>
5. WHO. (2021, November). *Timeline: WHO's COVID-19 response*. Retrieved from World Health Organization: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline>
6. Gabel, C. (2021, December 1). *Childhood vaccines: Report calls for urgent changes to protect Maori children from 'lethal' diseases*. The New Zealand Herald.
7. Ministry of Health. (2020). *Immunisation Handbook 2020*. Wellington: Ministry of Health.
8. Ackerson, B. S., Qian, L., Oark, C., Riewerts, R., & Jacobsen, S. (2021). Pediatric Vaccination During the COVID-19 Pandemic. *Pediatrics*, [https://watermark.silverchair.com/peds\\_2020047092.pdf?token=AQECAHi208BE49Ooan9kkhW\\_Ercy7Dm3ZL\\_9Cf3qfKAc485ysgAAAwYwggMcbgkqhkiG9w0BBwagggLzMIIC7wIBADCCAUGGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMO-kV5BtDk7uGt8csAgEQgIICuS1iY-I\\_S1E9m4qgcqob\\_opP5rDgpFt3qk6B5iz](https://watermark.silverchair.com/peds_2020047092.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAwYwggMcbgkqhkiG9w0BBwagggLzMIIC7wIBADCCAUGGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMO-kV5BtDk7uGt8csAgEQgIICuS1iY-I_S1E9m4qgcqob_opP5rDgpFt3qk6B5iz).
9. WHO. (2021, July 15). *COVID-19 pandemic leads to major backsliding on childhood vaccinations, new WHO, UNICEF data shows*. Retrieved from World Health Organization: <https://www.who.int/news/item/15-07-2021-covid-19-pandemic-leads-to-major-backsliding-on-childhood-vaccinations-new-who-unicef-data-shows>
10. ESR. (2020, February). *Measles weekly report Week 8: 15–21 February 2020*. Retrieved from ESR: [https://surv.esr.cri.nz/PDF\\_surveillance/MeaslesRpt/2020/measlesReport20200224.pdf](https://surv.esr.cri.nz/PDF_surveillance/MeaslesRpt/2020/measlesReport20200224.pdf)
11. Turner, N. (2019). A measles epidemic in New Zealand: Why did this occur and how can we prevent it from occurring again? *New Zealand Medical Journal* , 8-12.
12. ESR. (2021, July 30). *Notifiable Diseases in New Zealand Annual report 2019*. Wellington: ESR. Retrieved from ESR: [https://surv.esr.cri.nz/PDF\\_surveillance/AnnualRpt/AnnualSurv/2019/2019AnnualNDRReport\\_FINAL.pdf](https://surv.esr.cri.nz/PDF_surveillance/AnnualRpt/AnnualSurv/2019/2019AnnualNDRReport_FINAL.pdf)
13. Balakrishnan, V. (2020). In preparation for a COVID-19-influenza double epidemic. *The Lancet Microbe*, [https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(20\)30130-0/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(20)30130-0/fulltext).

14. Morton, J. (2021, September 29). *NZ is still flu-free - here's the problem with that*. Retrieved from The New Zealand Herald: <https://www.nzherald.co.nz/nz/nz-is-still-flu-free-heres-the-problem-with-that/MMHFMFUXHIN7Y32NGH4TISOIA4/>
15. Grant, C. (2021, August 13). *Is NZ ready for what comes after RSV?* Retrieved from Newsroom: <https://www.newsroom.co.nz/ideasroom/is-nz-ready-for-what-comes-after-rsv>
16. England Public Health. (2021, August). *The national influenza immunisation programme 2021 to 2022*. Retrieved from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1018779/Influenza\\_vaccination\\_information\\_document\\_for\\_healthcare\\_practitioners.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018779/Influenza_vaccination_information_document_for_healthcare_practitioners.pdf)
17. Walker, L., Ward, E., & Gambitsis, D. (2015). *Improving New Zealand's Childhood Immunisation Rate: Evidence Review*. <https://www.health.govt.nz/system/files/documents/publications/improving-new-zealands-childhood-immunisation-rates-sep19.pdf>
18. Ministry of Health. (2021, October). *National and DHB immunisation data*. Retrieved from Ministry of Health: <https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-coverage/national-and-dhb-immunisation-data>
19. Ministry of Health. (2021, November). *National and Taranaki Influenza Coverage 2020/21*. Retrieved via email correspondence on 24 November 2021
20. Wingate, L. (2013). *Rates of Pertussis and Influenza Vaccination in pregnant Taranaki women: an audit*. University of Auckland.
21. Thummata, F., & Lu, W. (2021). *Antepartum influenza and pertussis vaccination rates*. The University of Auckland.

## Appendix

### Childhood Immunisation Data

Data obtained from the Ministry of Health: National and DHB immunisation data, October 2021<sup>18</sup>.

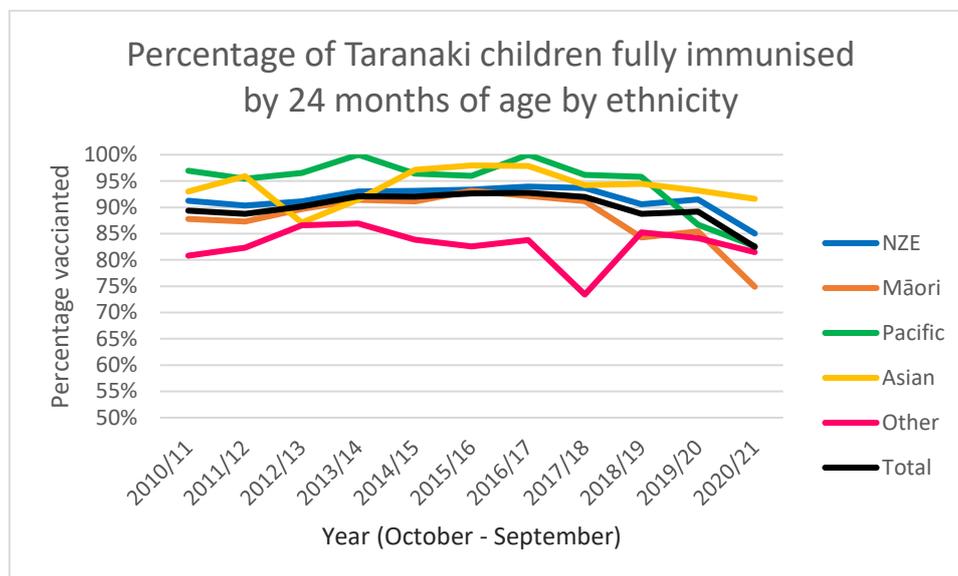


Figure 1

From October 2010 to September 2020 the Percentage of Taranaki children fully immunised at 24 months of age was between 88.8% and 92.6% (Figure 1), which is similar to the national coverage for the same time period. In the 12-month period from October 2020 to September 2021, the percentage of children in Taranaki fully vaccinated dropped to 82.5% (Figure 1). A similar trend is seen nationally, with coverage by 24 months of age now 87.5% compared to 91% this time last year. In the past year, Māori childhood vaccination coverage by 24-months has fallen from 85% to 75% (Figure 1), 10% below New Zealand European children.

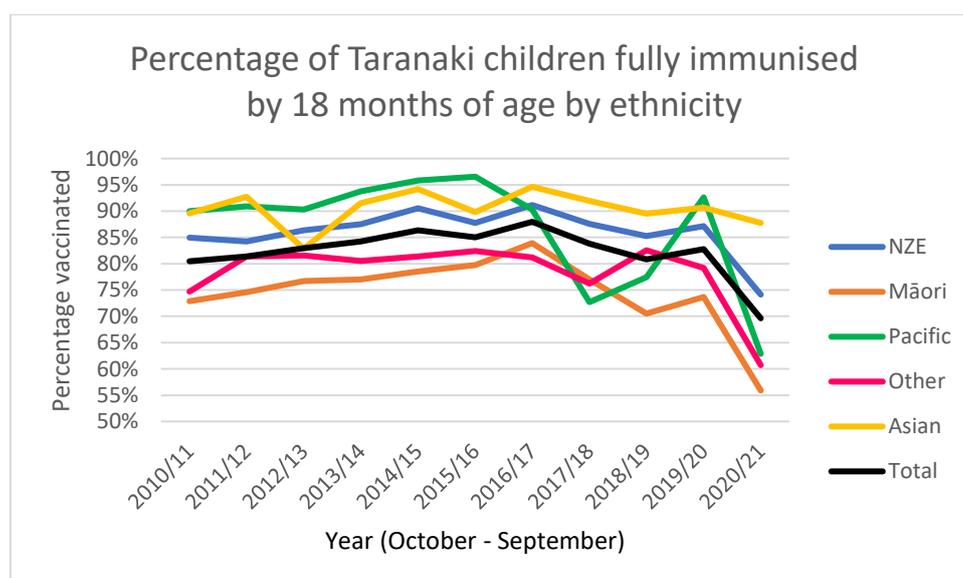


Figure 2

In Taranaki, historically immunisation coverage at 18 months is much lower than at 24 months (Figure 2) and coverage at 18 months has reduced even more so in the last year. Total vaccination coverage at 18 months is currently only 69.6% and Māori vaccination coverage 56% (Figure 2).

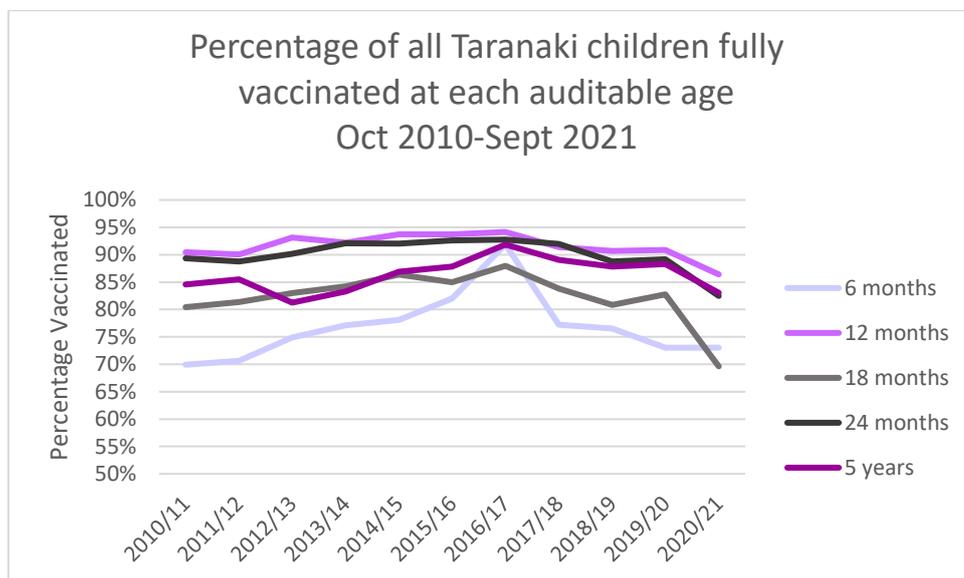


Figure 3

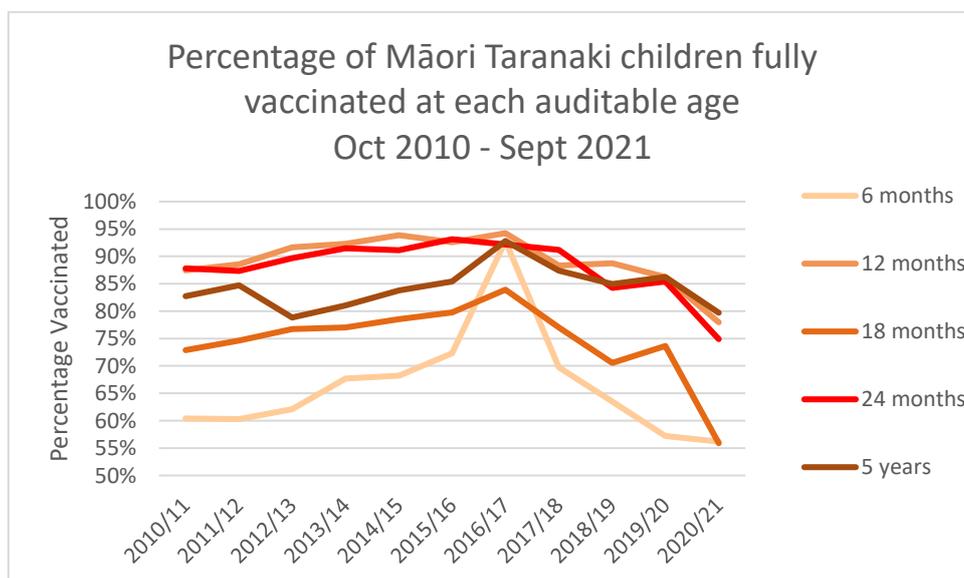


Figure 4

For most of the past decade, total Taranaki 6-month vaccination coverage has been less than 80% and is currently 69.6%. Māori immunisation coverage at 6 months is consistently below 75% and is currently 56% (Figure 4). The higher percentage of children immunised at the 12- and 24-month audit points compared to 6- and 18- month audit points, suggests many children are late in receiving immunisations.

## Influenza vaccination data

The following data was obtained from the Ministry of Health via email correspondence on November 24<sup>th</sup>, 2022<sup>19</sup>

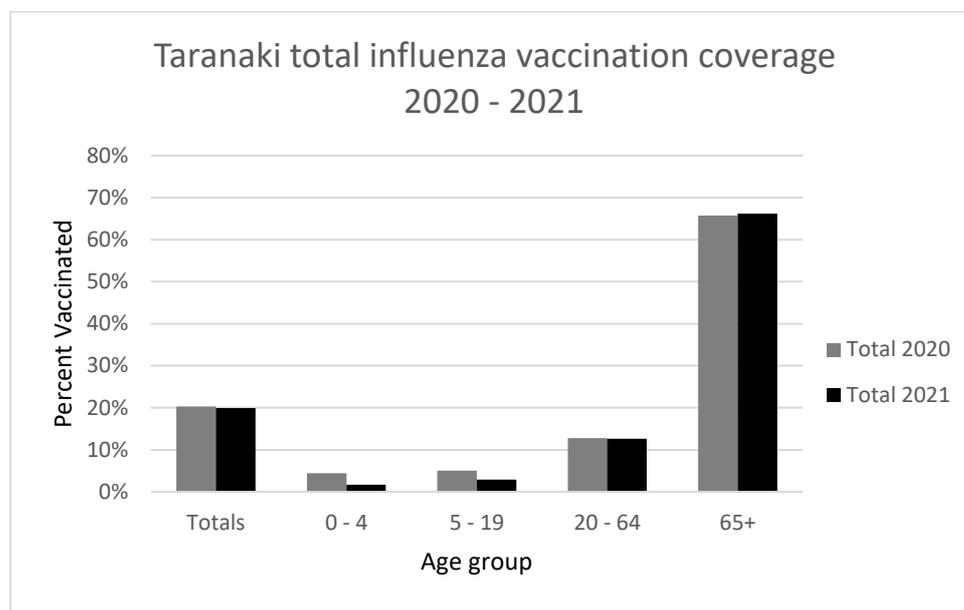


Figure 5

In Taranaki, overall influenza vaccination rates in 2021 for over 65s and 20-64 age groups are fairly unchanged from 2020 (Figure 5). The Taranaki Total coverage for over 65s is 66.2% compared to 65.7% last year (Figure 5) and Māori 48.6% compared to 49.7% last year (Figure 8). For the 20-64 age group, total coverage remains the same at 12.8% compared to 12.6% last year (Figure 5) but Māori have reduced rates 9.4% to 7.8%. Vaccination coverage for children and young people aged 4 to 19 has approximately halved (Figure 5). In 2021, 1.7% of under 4s have been vaccinated compared to 4.4% in 2020, 2.9% of 5-19 year old have been vaccinated this year compared to 5% last year (Figure 5). Nationally, influenza coverage is down for all age groups when compared to last year. The over 65's are the least affected, but the 0-4 and 5-19 age groups have halved and 20-64 age group falling from 17.1 to 11.1% (Figure 9).

## Vaccination in Pregnancy

Limited data is available in New Zealand regarding vaccination coverage of pregnant people. A small Taranaki based audit of 53 pregnant people in July 2013 demonstrated overall 32% were immunized against pertussis and 32% against influenza<sup>20</sup>. None of the 9 people who identified as Māori received either vaccination<sup>20</sup>. No women in the most deprived group were immunized against pertussis and 30% were vaccinated against influenza<sup>20</sup>. Almost 50% of respondents reported they did not receive immunizations as they did not recall this being discussed by their healthcare provider<sup>20</sup>.

A similar Taranaki audit was completed in August 2020 of 104 pregnant people. Overall, 34.6% were immunized against pertussis and 25.04% against influenza<sup>21</sup>. Of those who identified as Māori, 25% were immunized for pertussis and 15% for influenza<sup>21</sup>.