

# A measles epidemic in New Zealand: Why did this occur and how can we prevent it occurring again?

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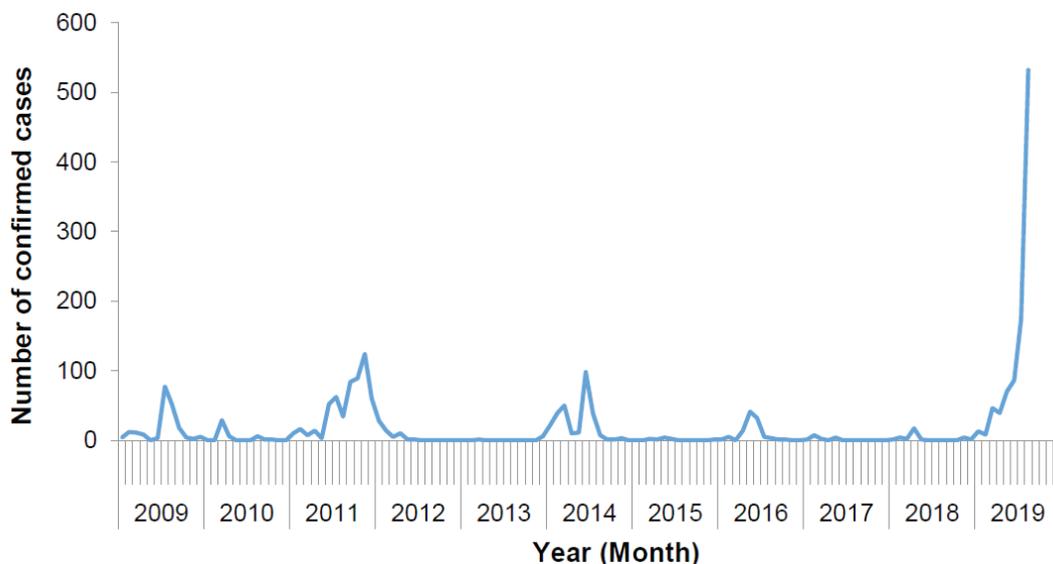
In 2019 New Zealand has seen an upsurge in measles cases, the largest for more than two decades (refer Figure 1). From 1 January to late September 2019 there have been over 1,500 confirmed cases of measles notified across the country of which over a third have been hospitalised.<sup>1</sup> As of September, rates of measles in New Zealand were the second highest in the Western Pacific region at 152.4 per million, with only the Philippines having higher rates at 612.1 per million.<sup>2</sup> With multiple imports and more than 12 recognised outbreaks in the first five months of this year affecting most regions,<sup>3</sup> this should appropriately be called an epidemic.

## The pattern of the epidemic

Cases have been reported in 16 of the 20 DHBs. The majority of these have been controlled with effective public health measures. However, in the Auckland metropolitan region, particularly centred on the Counties Manukau District Health Board (DHB) area numbers from two separate outbreaks quickly multiplied and overwhelmed the ability of public health services to control the spread.

Up to September more than 80% of the notifications in 2019 have been from the Auckland metropolitan region, of which over two-thirds have been from Counties

Figure 1: Number of measles notifications Jan 2019 to Sept 2019.



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Manukau DHB. The burden of disease is highest in young infants, particularly under two years of age, followed by teenagers and young adults under the age of 30 years. Disease in those over 50 years of age is rare with only 25 (1.6%) notifications to date. Māori and Pacific ethnicity populations are disproportionately affected with Pacific being 36% and Māori being 39.6% of those hospitalised.<sup>1</sup> The circulating genotype distribution are B3 (62%) and D8 (38%).<sup>1</sup> These are the dominant circulating genotypes in this region with B3 in the Philippines, D8 in Vietnam and a mix of the two in other countries in the region.<sup>2</sup> By vaccination status, nearly 14% of non-hospitalised cases were fully vaccinated (includes children under four years with only one dose), while a significantly lower number at 6.7% of hospitalised cases were fully vaccinated. This is consistent with other literature showing that secondary vaccine failure is associated with modified clinical illness.<sup>4</sup>

A September report on the 380 hospitalisation cases in the Auckland metropolitan region records an overall hospitalisation rate of 36%, but up to 52% in infants under four years of age and highest in the Counties Manukau DHB. Nearly half of all hospitalised were Pacific ethnicity.<sup>5</sup> Overall 22% were considered complicated and included three cases of encephalitis all in young children, 65 with pneumonia, most in young children and five pregnant women of whom two had second trimester fetal losses. There have been no deaths reported to date. While not as high as these rates, previous New Zealand outbreaks have also noted higher rates than other international figures; in the 2013/2014 outbreak, 23% were hospitalised.<sup>6</sup> These hospitalisation rates are higher than most internationally quoted figures of around 10–20%. Internationally published figures report around 30–40% of cases results in one or more complications with the highest rates in children, pregnant women and adults over 20 years of age. These are consistent with this current pattern.<sup>7,8</sup> The one exception is the high encephalitis rate,<sup>9</sup> however the numbers are small.

## Background

Prior to 2019, the most recent measles epidemic in New Zealand occurred in 1991 with an estimation of tens of thousands of cases, followed by 1997 with 2,169 cases

notified. Since then smaller outbreaks have occurred in 2009, 2011, 2014 and 2016, with the largest of these being in 2011 with 489 cases.<sup>9</sup>

New Zealand was verified by the World Health Organization (WHO) as having eliminated endemic measles in October 2017 having demonstrated the absence of local transmission for more than three years. However, it was acknowledged at the time there was at risk of further transmission due to known immunity gaps across the population.<sup>10</sup>

New Zealand historically had low immunisation coverage in the childhood programme with significant equity gaps. In 1991 less than 60% of children were fully immunised for all the Schedule vaccines by two years of age with only 42% of Māori and 45% of Pacific children fully immunised. Gains were made over the following years so that by 2005, 77% of children were fully immunised by the two years milestone.<sup>11</sup> These historic figures suggest there are likely to be large numbers of young and mid-life adults with inadequate or no immunity to measles. The amount of catch up that may have occurred is unknown, and records are frequently absent. Confirming the immunity gap, a 2014/2015 serosurvey showed systematically lower measles seropositivity for the birth cohort from 1980 to 1999 with IgG seropositive or equivocal sitting at around 83.4 to 84.6%.<sup>3</sup>

The National Immunisation Register (NIR) was instigated for birth cohorts from 1995. This shows MMR coverage of dose one (MMR1) was around 86% for those born in 2006 rising to over 93% in 2012, but in more recent years a 1–2% drop off. The second dose MMR (MMR2) rose from 82.6% for those born in 2006 to 87.7% for the 2012 cohort. Coverage rates got close, but have never reached the national target of 95%, and equity gaps persist by ethnicity, socio-economic status and region.<sup>3</sup>

Most of the historic low coverage was due to a poorly performing immunisation programme.<sup>11</sup> This had possibly been aggravated with some loss of confidence in the late 1990s following the discredited hypothesis of a link between MMR and autism. The current New Zealand programme performs well, although not fully reaching the national coverage targets,

with slippage in the past three years in the infant programme, particularly for Māori.<sup>12</sup> A lot of media attention has been given to the possibility of increasing fears creating hesitancy and delay in accepting vaccination both internationally and in New Zealand. Current data on those who chose to decline vaccination on the NIR record has increased by 1 to 1.5% since 2017, suggesting a small added contribution.

### So why do we have so much measles?

Overall, the world has made tremendous progress in the control of measles and by 2019, 43% (89 of the total 194 countries) have achieved elimination status. Deaths from measles have decreased by 80% from 2000 to 2017 as a result of vaccination, averting about 21 million deaths since 2000. Despite this progress, vaccination coverage has levelled off in the past eight years and since 2017 there has been a resurgence of measles with outbreaks in many parts of the world and resultant importations to many countries.<sup>13</sup> Reasons for these outbreaks include increased conflict and migration, climate change, increasing inequities in wealth, health and security, alongside increasing circulation of misinformation leading to distrust and reduced vaccination uptake.<sup>14</sup>

In the New Zealand context there are two clear issues. Firstly, the historically low immunisation coverage has left a legacy of large numbers of adolescents and young adults who are under or unimmunised, particularly of Māori and Pacific ethnicity, often with unknown immunisation records. Secondly, recent declines in immunisation coverage and increasing equity gaps in the infant programme. The pattern of this epidemic and the groups most affected is consistent with these two concerns. However, there are particularly high rates of hospitalisation for Pacific communities. Other broader issues are likely to be a factor such as insecure and crowded housing and high-density urban settings in Auckland.

The hospitalisation rate is surprisingly high. However, except for encephalitis, the rates of complications are in line with international expectations, and there have been no deaths to date despite over 1,500 cases. Reasons for hospitalisation are more likely to include differences in how New Zealand healthcare identifies and admits

cases compared to other countries. There is no evidence that the viruses in circulation are behaving differently from elsewhere. While secondary vaccine failure is seen, it does appear to modify the severity of the clinical illness.

### Management strategies

The New Zealand National Verification Committee (NVC) for measles and rubella was established in 2016. In May 2017 they reported there was a need to *ensure that existing significant pockets of susceptible individuals are identified and immunised to avoid or minimise further outbreaks... and to undertake MMR catch up/supplementary immunisation activities.*<sup>10</sup> A further report in July 2019 reported that the New Zealand elimination status was threatened due to the *lack of progress with closing immunity gaps, multiple measles importations and outbreaks in many parts of New Zealand.*<sup>3</sup>

The recent reduction in coverage rates and increase in equity gaps for the childhood programme is of considerable concern. The environment locally and internationally is changing. Immunisation is primarily delivered in general practice. The effects from socioeconomic deprivation have entrenched and increased in some New Zealand communities, creating issues such as crowding and housing instability. This affects enrolment, engaged relationships and ease of access to general practice. There can be challenges for working parents in accessing general practices usually only open weekdays. Internationally and locally, issues around trust—trust in governments and trust in health services—appear to be growing, amplified by social media connectivity. Outreach services report increasing challenges for families in accessing services, at times alongside some elements of fear and mistrust. The root causes are multifactorial and the solutions needs to be innovative, flexible and responsive to both health sector and community challenges.<sup>15</sup>

It is not easy to close historic immunity gaps. A national campaign targeting adolescents and young adults requires significant planning and resourcing. This includes adequacy of vaccine supply; increased support to busy front-line health service delivery; improved vaccination accessibility such as more use of pharmacy, pop-up clinics and occupational health providers.

Furthermore, this age group are notoriously hard to reach, motivate and vaccinate—they tend to have other life priorities! Calls for action can create overvaccination in ‘worried well’ and still miss the unvaccinated.

The community response to this epidemic has been strong and positive. For example, the national Healthline phone line reported an overall call volume up by 60–80%, the child Healthline (Plunketline) a nearly 50% increase and the healthcare provider line (0800 IMMUNE) 160% increase through the peak of the epidemic.<sup>16</sup> For a single issue these are dramatic call volume increases. Vaccine demand has also been very strong with the Ministry of Health reporting nearly a doubling of vaccine uptake in the months of August and September resulting in vaccine shortage.<sup>17</sup> International examples have shown public attention and support can be used to assist strengthening of national immunisation programmes.<sup>18</sup>

## Conclusions

With a mixture of increased transmission from international sources, ease of travel and a population with recognised immunity gaps, the current measles epidemic in New Zealand was not surprising. Ensuring better protection for the New Zealand community and moving towards effective long-term measles elimination will require both innovative new thinking to strengthen the current immunisation programme, particularly focusing on our higher-risk populations groups, alongside an active national approach to systematically close the immunity gaps in teenagers and young adults. This year the New Zealand population has demonstrated a high demand for measles-containing vaccine, an opportunity to build upon. Measles currently remains a risk both to the New Zealand population and also to our Pacific neighbours. There are clear opportunities to build on the strong public and health sector response to address these issues.

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### Competing interests:

Nil.

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