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29 August 2022

s 9(2)(a)

By email: s 9(2)(a)
Ref: H2022009122

Tēnā koe s 9(2)(a)

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) to Manatū Hauora (Ministry of Health) on 1 August 2022. You asked:

> *"In line with your "recommendations" for mask use in schools (again - forever shifting the goal posts it seems), I'd like to see the studies that back the "public health advice" for mask use in schools please. I'd also like to know who has funded the study as that usually brings to light many more questions and interesting observations."*

Please note that Manatū Hauora does not conduct scientific studies and we cannot comment on the funding of published articles. Manatū Hauora has identified one document within scope of your request. It is an evidence briefing on masking in schools and the affect this has on prevention and control of COVID-19. A copy of the document is enclosed. This information has been released to you in full.

I trust this information fulfils your request. Under section 28(3) of the Act, you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Manatū Hauora website at: www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests.

Nāku noa, nā

Dave Henderson
Group Leader, Intelligence, Surveillance and Knowledge
Public Health Agency, Ministry of Health

Masking mandates and Infection control in Schools

Date:	10 June 2022
To:	Covid-19 Assessment Committee
From:	Science, Surveillance, and Insights
For your:	Information

Purpose of report

- This report sets out the science, surveillance and behavioral insights of mask use and infection control in schools.
- This report assumes that the aim of public health measures in schools to prevent transmission of SARS-CoV-2 has three main aims.
    - To reduce the short- and long-term harm of COVID-19 to (protecting the individual) and to ensure that children's education and wellbeing is maintained.
    - To minimise reduce the risk of transmission within schools driving community spread of disease
    - To protect the educational workforce required to provide children with an appropriate education.

Summary

Scientific evidence for mask use

1. The evidence that mask wearing decreases the rate of transmission of SARS-CoV-2 (and other airborne respiratory viruses) is substantial.
2. Not all masks have the same efficacy in preventing transmission of SARS-CoV-2 to a contact (protection) or preventing transmission of SARS-CoV-2 from a case (source control).
3. Mask wearing is only one of a range of public health measures which can be used to reduce the risk of transmission.

Surveillance data for infections in schools

1. Datasets are not able to provide sufficient direct information regarding the benefit of compulsory mask use in schools.

2. Available data, which agrees with anecdotal reports, indicates that the educational sector is under considerable stress due to teacher absences from COVID-19 (and other ILI).
3. There is no strong evidence to suggest that infections in schools are or are not a significant driver of infection within the community. However, based on transmission patterns reported in the literature, schools tend to reflect and not drive transmission in the community.

Sector feedback regarding mask mandates

1. Sector feedback is that mask mandates would substantially improve the ability of schools to encourage and effect mask wearing
2. To ensure maximum uptake from a mask mandate, additional measures such as education programmes and the provision of masks to students and teachers would be both practical and equitable.

Behavioural insights on mask use

1. Mask mandates are a public health intervention which require all individuals within a specific setting to wear masks, unless they have a valid exemption.
2. To be effective, the imposition of mask mandates should be accompanied by measures which enable compliance. It would be inequitable to introduce compulsory measures which are associated with a significant burden, as those with the least resources will be least able to comply.
3. The measures that need to be in place to achieve an improvement in public health behaviour, such as educational programmes, behaviour modelling, targeted public health advice, data collection and distribution and the provision of resources (such as masks) can be implemented without the addition of a (legal) mandate. However, public health theory would suggest that education and advice, while necessary to implement change, is insufficient to result in significant changes in behaviour.
4. While mandates can be effective intervention in the short term, to modify and encourage behaviour change, the continuation of the use of enforcement once behaviour modification is achieved should be reviewed.

Additional measures to reduce the risk of infections in schools

1. In addition to the health burden from COVID-19, infections such as influenza, RSV and others also result in interruptions to childhood education and may warrant interventions specifically targeted at these conditions.
2. Improving the relatively low rate of vaccination in children aged 5 – 11 could provide additional protection from infection. However, the ability of current vaccines to protect against infection from Omicron, particularly in children, may be limited.

3. The ventilation programme in schools is well advanced and can demonstrate that natural ventilation is able to provide levels of ventilation which are currently accepted to be effective in decreasing the risk of infection.
4. Targeted, frequent testing in schools may provide additional protection from infection.

Scientific Evidence for mask use

Evidence of Mask efficacy at reducing transmission of SARS-CoV-2

There is a considerable amount of data on the efficacy of masks in preventing transmission of SARS-CoV-2[1]. A summary of the information is provided in multiple sources including on the Ministry of Health Website[2].

Although much of this data is observational and therefore subject to bias from multiple real-life confounders, taken together the efficacy of masks is robust.

A large, representative study, with robust methodology, analysing the benefit of masks and ventilation in schools was undertaken in the Autumn of 2020 in Georgia, United States[3]. Mask requirements for teachers and staff decreased the rate of infection in schools (RR = 0.63, 95% CI 0.47 – 0.85). The use of masks by children did not significantly decrease the risk of infection (RR= 0.79, 95% CI 0.50 – 1.08). Improved ventilation also resulted in a decrease in the rate of infection (RR = 0.61, 95% CI 0.43 – 0.87), which was similar to the improvement seen with mask wearing in teachers. Notably, the use of dilution only, which involved opening doors and windows, was effective (RR 0.65, 95% CI, whereas using air-purifiers only did not statistically decrease the rate of infection.

Masking is not the only public health measure which can influence the rate of COVID-19 infection. The relative contribution of various public health measures in schools to prevent COVID-19 was published in 2021[4]. This study analyzed data collected from 2,142,887 total respondents in 50 US states and Washington, DC. during this period, 576,051 (26.9%) reported at least one child in pre-K through high school living in their household.

The study identified that increasing the number of interventions decreased the risk of transmission.

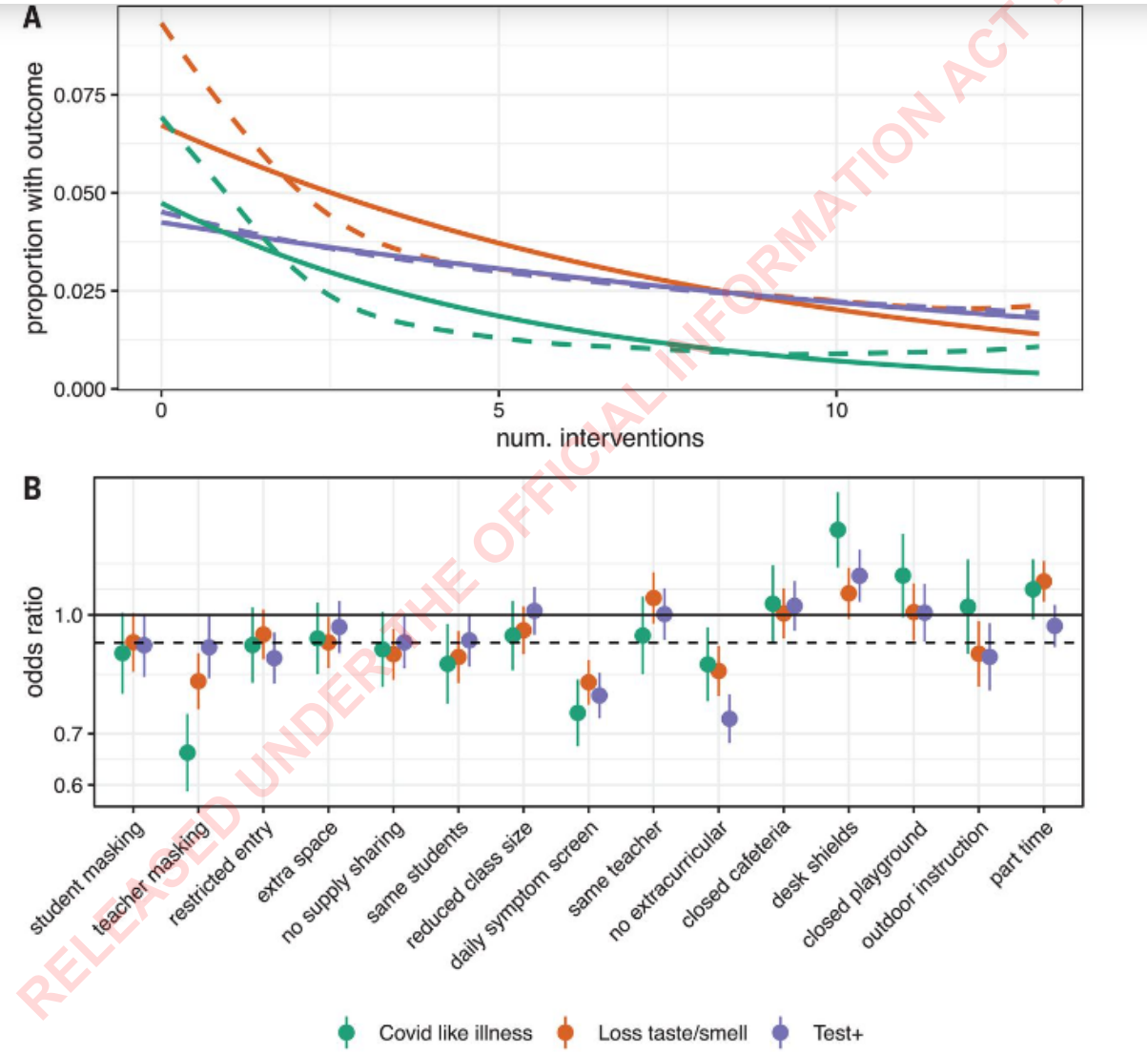
[1] Talic S, Shah S, Wild H, Gasevic D, Maharaj A, Ademi Z, et al. Effectiveness of public health measures in reducing the incidence of covid-19, SARS-CoV-2 transmission, and covid-19 mortality: systematic review and meta-analysis. BMJ. 2021;375:e068302.

[2] https://www.health.govt.nz/covid-19-novel-coronavirus/covid-19-health-advice-public/covid-19-use-face-masks-community

[3] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8158891/

[4] https://www.science.org/doi/full/10.1126/science.abh2939

Teacher masking and daily symptom screening appeared to be most effective at preventing infection in schools, with benefit also observed from student masking, cohorting and restriction of extracurricular activities (Figure 1). Reduced class sizes had less of an effect, and desk shields appeared to increase the risk of infection, which re-enforces the importance of airborne transmission and ventilation in managing COVID-19.



(**A**) Relationship between number of mitigation measures and percent reporting COVID-19–related outcomes using a log-linear (solid lines) and spline (dashed lines) model. (**B**) Odds ratio of COVID-19–related outcomes by mitigation measure in multivariable model including all measures versus the reduction resulting from a generic mitigation measure (dashed line).

There is conflicting advice regarding the success of mask mandates in decreasing the risk of transmission of SARS-CoV-2 in schools. There are multiple reasons why there may or may not be a change in the rate of infections with the imposition or removal of mandates.

1. Mandates are often included as part of a raft of policy changes and do not necessarily reflect the changes due to alterations in mask behaviour
2. The type of mask used may vary widely
3. Compliance with the mask mandate is not assessed.

Adherence to mask wearing requirements in the United States during the periods these studies were performed was required by federal law. This mask mandate was politically contentious and was overturned in mid-April 2022. A study was published in May 2022 assessing the relationship between local mask wearing policies and the adherence to mask wearing in 126 cities in the United States[5]. Having a local mask mandate increased the odds of wearing a mask 3-fold (OR = 2.99, P = .0003) compared to no recommendation. People observed in non−commercial areas were least likely to wear masks. Correct mask use was greatest in December 2020 and remained high until June 2021 (P < .0001).

Why masks work and don't work

Types of masks

The material that a mask is made of can greatly affect its efficacy in reducing the risk of COVID-19 infection. Cloth masks are the least effective followed by moderate efficacy of surgical masks and N95 masks being the most effective[6].

Masks prevent transmission of SARS-CoV-2 infection by filtering the air prior to inhalation or after exhalation[7]. The primary predictor for mask efficiency is described as the filtered filtration efficiency (FFE)). A 3-layer cotton mask has been estimated to have an FFE of 26.5%, and a single-layer nylon masks and 2-layer nylon mask 39.3% and 44.7% respectively. Surgical masks ranged from 38.5% (with ear loops) to 71.5%

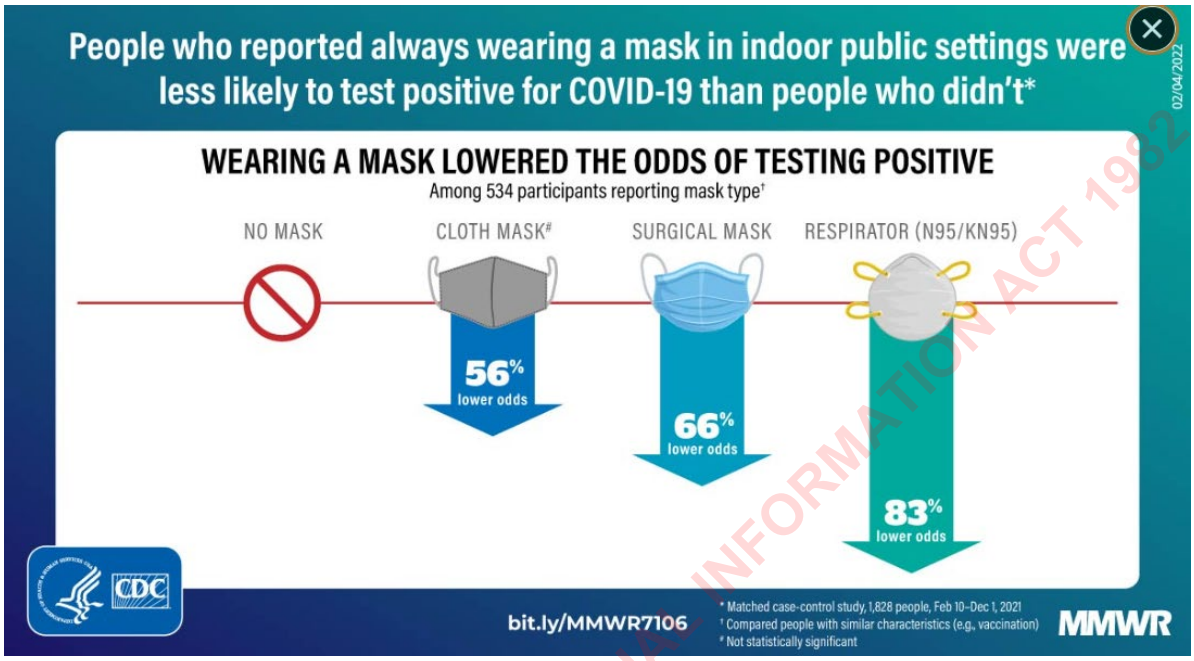
[5] https://www.sciencedirect.com/science/article/pii/S0196655322004023
Eric J. Puttock, et al
Association of masking policies with mask adherence and distancing during the SARS-COV-2 pandemic, American Journal of Infection Control, 2022,

[6] The Impact of Community Masking on COVID-19: A Cluster-Randomized Trial in Bangladesh https://www.poverty-action.org/sites/default/files/publications/Mask_Second_Stage_Paper_20211108.pdf.pdf

[7] Evaluation of Cloth Masks and Modified Procedure Masks as Personal Protective Equipment for the Public During the COVID-19 Pandemic https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2774266

(with ties). However, the greatest FFE was seen with a NIOSH-approved N95 respirator which had a 98.4% FFE.

The relative performance of different types of masks have been reported from a study of mask use in California in 2021. (Fig 2)



Masks worn over a period of time may become wet due to respiratory droplets exhaled during breathing and the high humidity of exhaled breathe. Wet masks are harder to breathe through, less efficient at filtering inhaled air and can vent more around the edge of the mask. It is recommended that N95 masks are replaced when they become damp or after more than four hours of continuous use.[8,9]

- **The availability and supply of effective masks is likely to improve the efficacy of mask use as a public health measure.**
- **N95 masks (or similar provide the best protection against infection.**

Fit testing and fit checking

For masks to provide maximal efficiency, all inhaled or exhaled air should be filtered through the mask. Consequently, even a highly efficient mask will not provide benefit unless there is a good seal to the skin. As individuals have different shaped faces, it testing, which assesses the best type of mask for an individual, is recommended for

[8] https://www.health.vic.gov.au/sites/default/files/migrated/files/collections/factsheets/b/bushfire-guidelines-for-use-face-masks.docx
[9] https://www.nursingtimes.net/news/research-and-innovation/research-reveals-optimal-usage-time-and-effectiveness-of-different-face-masks-19-08-2021/

the use of N95 masks when used in a healthcare setting[10]. The process is time consuming and was not achieved for many border workers or others within various sectors who were required to wear masks. It is highly unlikely that fit testing would be possible within the education environment. Fit checking, which is analogous to testing swimming goggles for an airtight fit is recommended and outside of a high-risk healthcare environment, it is likely to be sufficient to provide significantly improved protection from N95 masks.

- **Ideally, N95 masks or similar should be fit tested. However, even in the absence of fit testing N95 masks provide substantially increased protection compared to cloth masks and some medical masks.**

Duration (% of time worn)

The greater the time worn, the better the efficacy, but even wearing a mask some of the time is better than not wearing it at all[11].

- **While continuous mask use provides the best protection from infection, intermittent mask use is also beneficial.**

Behaviour change in the short and long term

Effective behaviour change in the short term can be achieved with a "stick" approach – making mask wearing a requirement – for a few weeks perhaps months. Especially, when the threat is seen and felt by parents and/or children to be real and immediate. In many situations this is a very useful approach to signal the danger as well as enhance protection of the population very quickly. In school settings, student behaviour is heavily influenced by the expectations of their peers. This means that if mask use is not required, the decision to wear one or not is likely to depend on the behavior and expectations of peers[12].

Over the longer term however, as we have observed in New Zealand, the message that Omicron is less severe and the scaling back of public health measures, has required the general public to take more personal ownership of their health, safety, and wellbeing. Anecdotally, it has been noted that complacency has set in in the population with low levels of compliance with public health recommendations.

10 https://www.health.govt.nz/system/files/documents/pages/the_role_of_medical_masks_and_particulate_respirators_110821.pdf

11 https://www.cdc.gov/mmwr/volumes/71/wr/mm7106e1.htm

12 https://www.sciencedirect.com/science/article/pii/S2352250X21001846

However, in those settings where mask use is still mandated (for example supermarkets) anecdotal reports are that compliance remains high.

Surveillance data and infection trends in school aged children

It is difficult to determine from the available data if the removal of mask mandates from schools after the move from CPF red to orange impacted on the rate of transmission within schools for several reasons. Most importantly, the removal of mask mandates was associated with a large number of changes in public health measures used to control the transmission of COVID-19 infection. In addition, the Omicron outbreak was rapidly changing, resulting in changes to the underlying community prevalence, which will influence infection rates within schools. Thirdly, school holiday periods and attendance data must be included in any analysis of the rate of infections in children or staff.

However, some indirect evidence regarding any varying risk of infection within schools may be obtained by a comparing the rate of infection in teachers or school age children with similar cohorts. This could indicate that schools are a "location of interest" in the transmission of COVID-19 within the community.

The following analysis looks at cases in susceptible populations of school aged children and adults from 03 April to 05 June. This provides us with a weekly incidence rate among susceptible populations (i.e., those who haven't had a previous infection). Age breakdowns within children are to match different school settings; primary, intermediate, and high school.

Figure 3 shows the case rates in school aged children and adults aged 18-44. The beige block represents school terms. Term 1 finishes 14 April and Term 2 begins 2 May. The broken orange line marks the change to CPF (COVID-19 Protection Framework) Orange from Red which included the change to remove mask mandates in schools.

Initially we observe a steady decline in case rates among school aged children and adults during school term 1. The decline in cases among susceptible school aged children continues during school term break as well. However, for adults the trend changes from 14.4 per 1000 susceptible in the week ending 17 April to 15.5 per 1000 susceptible in the week ending 24 April after which it continues to decline.

In adults, apart from in the first week of the school holidays, the decline has continued though until 5 June. However, for school aged children, there were substantial increases in rates in the first three weeks after their return to school. A basic tenant of infectious disease epidemiology is that prevalence drives incidence, but given adult rates were falling, this would not appear to be the explanation for

school aged children having increased rates in mid-May. Furthermore, rates were declining before school holidays, when there was risk from mixing of school children; with the return of school children and mixing, their rates increased; these trends suggest that masking reduced the risk of acquiring COVID-19 in school settings.

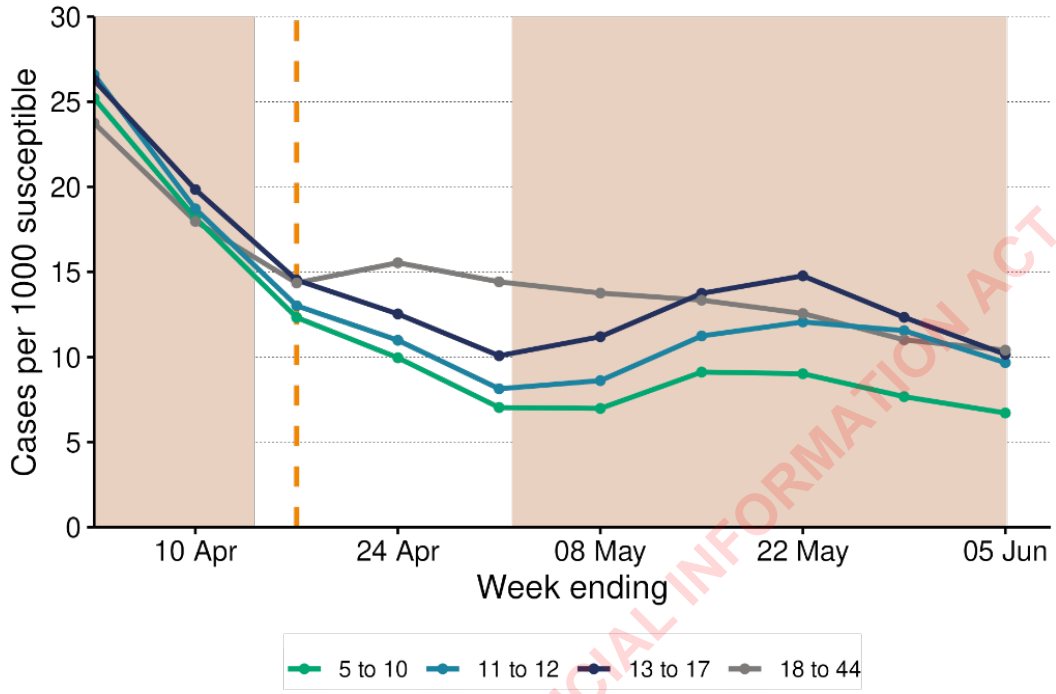


Figure 3 COVID-19 case rates in school aged children and adults aged 18-44

Teacher absences due to COVID-19

The Ministry of Education collects information on teacher absences due to COVID-19, as special arrangements for sick leave are provided for teachers due to COVID-19 infection. A comparison between the rate of infection in teachers compared to the total population would indicate that as a group, their rate of infection is higher than that of the general population (Figure 4). The pattern of the rate of infection, particularly the increase in the rate of infection after the school holidays, during a time in which the rate of infection in the population in general was stable or falling, would indicate transmission in the school environment.

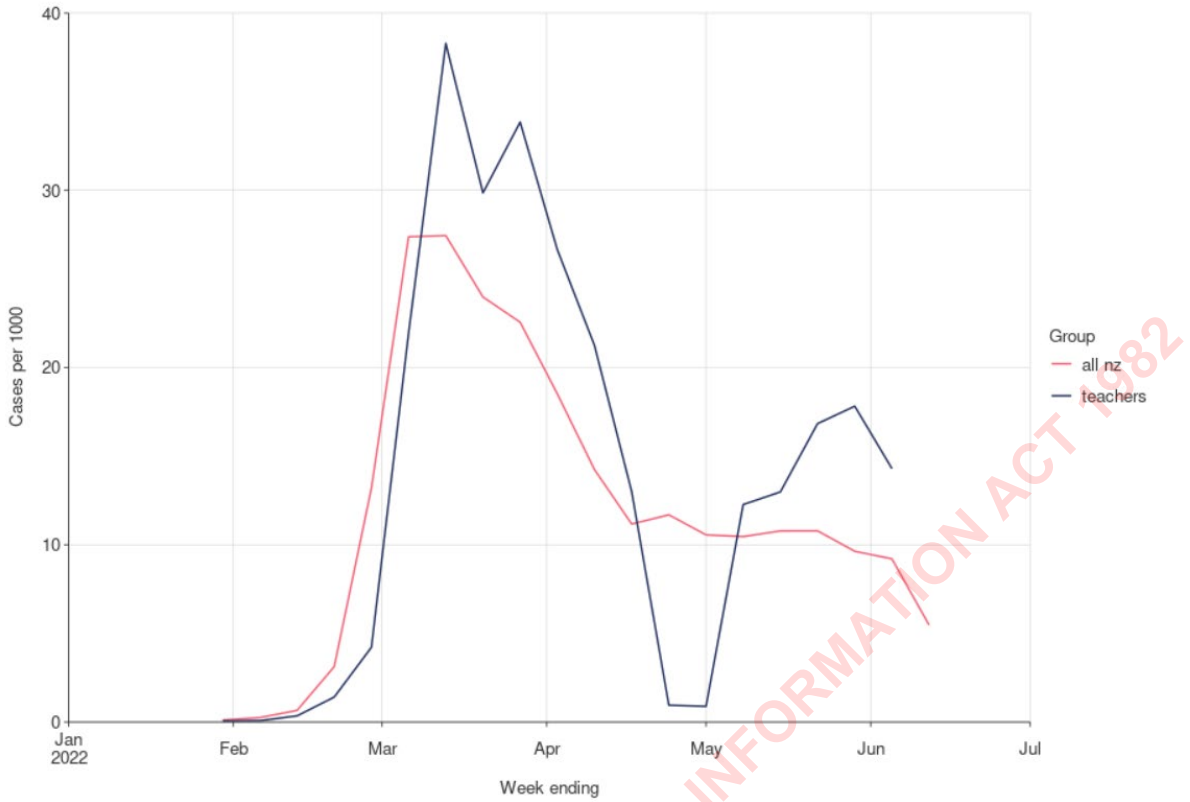


Figure 4. The rate of infection in teachers compared to all of NZ.

Note that the figures for late April reflect the school holiday break, when absences from school due to COVID-19 were not collected.

Sector Feedback

A brief summary of Public Health and Education feedback sourced by NITC is provided below:

1. During the period of mask mandates, masks were well tolerated by children particularly if there was strong modelling behaviour from adults.
2. Reports from PHUs and MoE regional directors indicate that only a very small minority of principals believe masks inhibit learning.
3. Since removal of the mandates, developing and implementing mask use policies has been challenging due to competing demands on time and pressures from parents/whānau. This has meant that for many schools their policy decisions have not been made based on an objective risk assessment.
4. Schools who have maintained mask use policies have reported greater difficulties with getting students to wear masks since the mandates were removed. They have also reported that trying to enforce this by "strongly encouraging" is not working practically. This is particularly difficult in High Schools to enforce.

5. PHUs have reported that most principals supported mask mandates being reinstated. Most schools have indicated they would prefer that school mask-usage decisions should be made at the centre by the Ministry of Education; this would remove the burden on schools to attempt to negotiate policies themselves.

Behavioural Insights

Mandates are not the only tool available for encouraging adherence to public health measures.

The use of additional measures, such as improved ventilation and vaccination, will influence the potential benefits from a mandate

1. Ventilation in schools can usually be achieved through natural ventilation, CO2 monitoring and alignment of the use of the space to the ventilation possible in that space
2. Management of additional respiratory pathogens, such as influenza and RSV, which impact on a child's education. For example, the provision of free influenza vaccination for all children and staff. (Consideration for the use of a free vaccine for extended family, or even the entire population could also be considered)
3. The effective use of COVID-19 vaccination, including boosters in the eligible population
4. The use of a robust strategy of early detection, using rapid antigen testing, to identify individuals with COVID-19 early and minimise the risk of transmission within schools with a decrease in the requirement for closure of whole schools or classrooms.

The voluntary rate of adherence to a public heath intervention, particularly if it is very high, will determine the potential additional benefit from a mandate.

- Strengthening the language used to encourage mask use in schools but both staff and students

The ability of individuals to adhere to a mandate, particularly if doing so involves additional cost in time or financial resources will influence the adherence to a policy.

- The provision of high-quality masks to schools who wish to implement a masking policy, especially those schools with children from deprived backgrounds.

Additional public health measures to prevent Infection

Current mask use requirements

Under the CPF at orange, face mask use is encouraged whenever an individual leaves the house. Mask use is required in a range of settings, such as transport, retail, public facilities and healthcare. Masks are not required to be used in schools.

Under green, there will be no requirement to use face masks in any indoor spaces.

The identification of spaces where masks may be beneficial and may be mandated could be based on the following parameters.

Essential services

Access to essential services must be protected. Education, like healthcare, access to food and transport could be considered as essential services as they are essential to the normal function of society.

Risk of infection or transmission.

The rate of infection in either teachers or students at schools compared to the general population appears to be greater than the risk within the general population

The general pattern of transmission within schools indicates that transmission between adults is the highest risk with transmission from adults to children next most likely. Transmission from children to adults is less common as is transmission from child to child.

This pattern of infection with the evidence presented above, suggests that it is *scientifically* valid to introduce separate requirements for staff and students.

Vaccination status of population

Children, particularly those aged 5- 11 are not a highly vaccinated population but may have some protection from infection. Adults who were a highly vaccinated group as a result of the vaccine requirement, will be experiencing some waning of protection. Children under the age of 5 are not vaccinated. The rate of vaccination in children aged 5 – 11 is approximately 55% .

Prevention of infection from Omicron after two doses of Pfizer in children aged 5-11 ranges from 31% to 68%[13,14]. Multiple studies have evidence of a significant reduction in the efficacy of the Pfizer vaccine in 5 to 11 years in preventing infection against Omicron compared to the 90.7% reported before the emergence of Omicron

[13] Effectiveness of 2-Dose BNT162b2 (Pfizer BioNTech) mRNA Vaccine in Preventing SARS-CoV-2 Infection Among Children Aged 5–11 Years and Adolescents Aged 12–15 Years — PROTECT Cohort, July 2021–February 2022 - PMC (nih.gov)

[14] BNT162b2 Protection against the Omicron Variant in Children and Adolescents | NEJM

during a high Delta prevalence[15]. Furthermore, a preprint study has shown evidence that the effectiveness of the Pfizer vaccine may wane more rapidly in 5–11-year-olds than other age groups[16]. Adolescents (12-15 years) are afforded a greater level of protection thank against infection from Omicron by the Pfizer vaccine[17]. Therefore, it must be considered that significant waning against infection from Omicron may occur in children and adolescents[18].

COVID-19 testing

Frequent testing is an alternative strategy for the rapid identification of cases in schools. New York schools have adopted a surveillance programme, which has also been adopted in other areas. The frequent testing, which is associated with compulsory mask use, has been reported by the New York Mayor to be the reason why New York schools have managed to remain open even while rates of infection within the community have been high.

Uptake of other public health measures

Physical distancing

The modern teaching environment for children aged 5 - 11 in New Zealand Aotearoa is not usually based around children sitting in a single location at their desk for the school day. There is inevitably some close interaction between children during mealtimes and in the playground.

Ventilation

A substantial programme of work is underway which aims to improve the ventilation in schools using CO2 as a measure of effective ventilation. Rooms with suboptimal ventilation can be repurposed or used intermittently. This programme is robust and has demonstrated that almost all school classrooms can be well ventilated by using passive ventilation.

[15] Evaluation of the BNT162b2 Covid-19 Vaccine in Children 5 to 11 Years of Age | NEJM

[16] Effectiveness of the BNT162b2 vaccine among children 5-11 and 12-17 years in New York after the Emergence of the Omicron Variant | medRxiv

[17] Effectiveness of 2-Dose BNT162b2 (Pfizer BioNTech) mRNA Vaccine in Preventing SARS-CoV-2 Infection Among Children Aged 5–11 Years and Adolescents Aged 12–15 Years — PROTECT Cohort, July 2021–February 2022 - PMC (nih.gov)

[18] Vaccine effectiveness with BNT162b2 (Comirnaty, Pfizer-BioNTech) vaccine against reported SARS-CoV-2 Delta and Omicron infection among adolescents, Norway, August 2021 to January 2022 | medRxiv