

## The urgent need for a Covid-19 Action Plan for Schools in Aotearoa New Zealand

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At the onset of the Omicron outbreak in Aotearoa New Zealand (NZ) in early 2022, the Government announced a policy for schools that was essentially a business-as-usual approach, advising that schools would stay open through the outbreak. However,

**P** protections to prevent Covid-19 transmission were incomplete and there have been significant adverse consequences for school communities. NZ's pandemic policy for schools needs to pivot to a whānau-centred approach that takes in-school transmission seriously. As winter arrives, NZ should urgently introduce a Covid-19 Action Plan for Schools to support children's access to education and to protect children, school staff, and their families from Covid-19 and from the return of other winter respiratory infections.

### Current policy settings for Covid-19 in schools

During Term 1 2022, the Ministry of Education advised schools (<https://bulletins.education.govt.nz/bulletin/he-pitopito-korero/issue/update-29-march-2022/date/2022-03-29>) to reassure parents that transmission in school settings would be low. At the start of term, Covid-19 in children had been described in news media as an "asymptomatic or mild illness" for most, with full recovery likely after a few weeks. These assurances seemed overly optimistic. Children aged 5-11 years only became eligible for their first vaccine dose two weeks before Term 1 began, key ventilation and monitoring equipment had not been delivered (<https://www.stuff.co.nz/national/education/127587775/covid19-government-negligent-over-school-ventilation-as-omicron-arrives>), child-sized respirator masks (eg, KF94) were not widely available in NZ, and younger school years were not required to wear masks. Furthermore, the international evidence (<https://blogs.otago.ac.nz/pubhealthexpert/longer-term-harm-from-covid-19-in-children-the-evidence-suggests-greater-efforts-are-needed-to-protect-children-in-aotearoa-nz-from-infection/>) was clear that longer-term symptoms of Covid-19 infection in children were a real and rising concern and that Omicron was spreading in school settings.<sup>1</sup>

As the outbreak reached peak transmission levels it became increasingly difficult for parents and staff to make meaningful and science-based risk assessments about schools. The transition away from elimination-era PCR testing and meticulous contact tracing meant that communities could not track the progress of local outbreaks. At Phase 3 of the Covid Protection Framework ([https://covid19.govt.nz/prepare-and-stay-safe/about-covid-19/our-response-to-omicron/?gclid=cj0kcgjwvg\\_itbhdrarisad3ib5ht133qhozshc2s5yk9yn02qw071hdij5-52zucrygp0nunwydmtzcaasslealw\\_wcb#phase-3](https://covid19.govt.nz/prepare-and-stay-safe/about-covid-19/our-response-to-omicron/?gclid=cj0kcgjwvg_itbhdrarisad3ib5ht133qhozshc2s5yk9yn02qw071hdij5-52zucrygp0nunwydmtzcaasslealw_wcb#phase-3)), children were not required to isolate (<https://bulletins.education.govt.nz/bulletin/he-pitopito-korero/issue/covid-19-update-24-february-2022/date/2022-02-24>) if a close contact at school was a confirmed case, and schools were not required to inform parents when there had been a positive case in their child's class. The lack of information about contact events was highly concerning for families with immune compromise or disabilities, and many felt compelled to withdraw their children from face-to-face learning. These concerns were exacerbated by advice from the Ministry of Education that schools should mark absence as 'unjustified' (<https://bulletins.education.govt.nz/bulletin/he-pitopito-korero/issue/covid-19-update-22-february-2022/date/2022-02-22#updated-information-on-contact-tracing>) if families chose to keep children at home to reduce infection risk.

The true number of Omicron cases in school communities is thus unknown. Official figures (<https://github.com/minhealthnz/nz-covid-data>) show that during Term 1 there were just under 100,000 confirmed cases aged 0-9 years and over 147,000 cases aged 10-19 years, but these figures are likely to be substantially underestimated. Media reports described high case numbers in schools (<https://www.newsroom.co.nz/one-town-one-doctor-and-a-peaking-pandemic>) and education records show that on 11 March 2022, over 250,000 (<https://www.rnz.co.nz/news/national/464178/school-attendances-plummet-as-pupils-affected-by-omicron-surge>) children were absent from school.

The decision to prioritise school attendance without also providing strong protections and transparent outbreak information has had a range of unintended consequences such as significant educational disruption as well as exposure of students, staff, and their household members to both acute and longer-term risks of Covid-19, including long Covid in children (<https://blogs.otago.ac.nz/pubhealthexpert/longer-term-harm-from-covid-19-in-children-the-evidence-suggests-greater-efforts-are-needed-to-protect-children-in-aotearoa-nz-from-infection/>) and adults (<https://blogs.otago.ac.nz/pubhealthexpert/long-covid-a-crucial-reason-for-vax-mask-and-distance/>), with concerning implications for their health now and in the future. Children with persisting symptoms from Omicron infection are already being seen in NZ.

This policy has placed an unnecessarily heavy burden on school staff, requiring them to take on a pandemic management role in addition to their many existing commitments. And as the recent Human Rights Commission inquiry (<https://www.hrc.co.nz/news/inquiry-finds-omicron-response-put-disabled-people-risk/>) reports, people who are immune compromised or disabled have been put at risk, experiencing a range of negative impacts from the lack of support in education settings.

## Rationale for a Covid-19 Action Plan for schools

As winter approaches, NZ needs to take in-school transmission of SARS-CoV-2 and other respiratory diseases more seriously. In this section we outline the rationale and evidence which supports the need for a Covid-19 action plan for schools.

The UK provides an example of what could happen in NZ if Covid-19 transmission in schools is not controlled. Case numbers in UK schools have been high over a longer period than NZ and school absenteeism in the UK has been significant, indicating that attempting to enforce in-school learning throughout pandemic outbreaks may have the unintended consequence of reducing access to education while imposing a large burden of chronic illness (<https://www.nature.com/articles/d41586-022-00334-w>) on the child population.

There are rising concerns in the UK about the occupational risk to teachers, who are experiencing high rates of acute infection (<https://amp.theguardian.com/education/2022/apr/17/almost-half-of-uk-teachers-had-covid-last-term-survey-suggests>) from Covid-19. The ONS survey shows that 'teaching and education' is now one of the top three occupational groups at risk of long Covid symptoms.<sup>2</sup> Teachers are reported to be leaving the profession (<https://inews.co.uk/news/teachers-quit-covid-treatment-safety-measures-lack-support-1366581>), citing concern about the lack of protective measures in schools and the impact of long Covid on their capacity to work.

The above experiences confirm the challenges of providing a safe and supportive learning environment during a pandemic. Current uncertainty about the future of the pandemic indicates the need for a flexible and precautionary approach.<sup>3</sup> This approach requires a shift from insisting on in-person attendance as the major policy goal, to a whānau-centred (<https://blogs.otago.ac.nz/pubhealthexpert/protecting-new-zealand-children-from-the-developing-omicron-outbreak/>) approach that aims to support the wellbeing of children, staff, and families in all settings.

There are three main types of evidence showing that without effective protection measures, Covid-19 transmits very readily in schools. Examples of these evidence types (outbreak investigations, studies showing effectiveness of in-school protections, and coherence with knowledge about other infectious diseases) are shown in the Appendix, along with notes about evidence-informed action for NZ schools.

Schools provide a number of wellbeing supports in addition to their education role, and current absentee numbers are highly concerning. There are individual children whose wellbeing depends on support from outside the home and these children are undoubtedly better off in school. But this observation should not be extended out to a population-level conclusion that all children should be in school during the most intense infectious disease epidemic NZ has experienced in over 100 years.

Similarly, evidence from countries with school closures lasting several months should not be used to imply that a short circuit-breaker would cause serious harm to children. In a number of populations, including NZ, returning to school after weekends or holidays has been associated with increased incidence of severe mental distress and feeling unsafe,<sup>4-6</sup> increased incidence of infectious diseases (see Appendix), and asthma exacerbation,<sup>7</sup> indicating that schools are not always the positive environments that we would wish them to be. Great care needs to be taken not to over-generalise the many benefits of school attendance and assume that benefits outweigh harms for every child at every level of community transmission. Instead, the emphasis should shift to ensuring all children are connected to resources to sustain physical, social, emotional, environmental, and cultural wellbeing and that they are able to access learning throughout the pandemic.

The likely future course of the Covid-19 pandemic needs to be considered when planning prevention and control measures for schools. The pattern is likely to be influenced by key virus factors (new variants [\\_ \(https://www.nature.com/articles/s41579-022-00722-z\)](https://www.nature.com/articles/s41579-022-00722-z) that evade existing immunity), host factors (waning immunity and lack of vaccination), and environmental factors (inadequate infection control measures and response fatigue). The most likely scenarios are for repeated waves of infection, which we are seeing internationally. To minimise this risk and its health consequences in NZ, we need to use all of the opportunities available to modify these factors where we can. As this blog summarises, schools are a critical part of the solution.

## **A Covid-19 Action Plan for schools**

NZ needs a Covid-19 Action Plan for schools that gives effect to the Government's obligations to protect the wellbeing of students, staff, and whānau. Similar recommendations could also be adapted (in an age-appropriate manner) to the early childhood education and tertiary settings.

In this final section we discuss principles that can guide development and implementation of the Action Plan for schools. Further details are provided in the Appendix, including three indicators of safe school environments that school communities need to see. We then identify some areas for immediate action to protect children during Term 2 and beyond.

### **Key principles for design and implementation of the Action Plan**

Aotearoa NZ's current child population needs special consideration because these children are the pandemic generation: they are growing and learning alongside severe threats to their wellbeing and that of their families. This generation is at risk of long-term harms to their life chances when Government policy does not adequately uphold their right to health and education.

Some key principles are described in the Appendix. Briefly, they include reorientating NZ's school-based Covid response to be whānau centred (<https://blogs.otago.ac.nz/pubhealthexpert/protecting-new-zealand-children-from-the-developing-omicron-outbreak/>), and actively equity-promoting rather than protecting the status quo. And instead of

contributing to community transmission, schools should be models of science-informed best practice, providing optimal environments for children and empowering students to contribute to safe communities by modelling key values, eg, wearing a mask to protect others (<https://www.stuff.co.nz/pou-tiaki/128523403/mask-wearing-at-schools-should-be-mandatory-for-students-says-disability-rights-commissioner>). Developing a transparent and trusted pandemic response will require a robust, NZ-wide child data system that provides Government, schools, and whānau with clear and timely information for action. Finally, the Action Plan should be transformative in its scope. For example, ensuring a high standard of indoor air quality in schools has the potential to deliver substantial improvements in population health, supporting children to stay focused on learning tasks and protecting them from current and future infectious disease threats.<sup>8</sup>

### Seven areas for immediate action

As outlined above and in the Appendix, an Action Plan for Schools needs to be founded on sound public health principles and evidence. The immediate focus should be on a **'Vaccines Plus'** (<https://vaccinesplus.nz/>) **approach**<sup>9</sup> that aims to minimise infectious disease transmission in schools. Reducing transmission in schools benefits children and staff and beyond them, their families and communities, with the potential to make a substantial contribution to NZ's pandemic response. As outlined in the Appendix, protections need to be optimised to a high standard of efficacy and accessibility. Specific aims include:

- **Sustained high indoor air quality:** based on optimal methods, including ventilation and filtration, plus effective monitoring
- **Routine, ideally mandated, mask use indoors:** providing protection against emerging Covid-19 variants and other respiratory infection for all, regardless of their immune status
- **High Covid-19 vaccination coverage:** including intensive health promotion from trusted community leaders to ensure families are well-informed and to counter disinformation; greater accessibility of vaccines; and urgent action to address the high inequities in vaccine coverage
- **Effective isolation and quarantine:** supporting students and staff to stay at home if they are symptomatic, if they are close contacts of a case of Covid-19 or any other infection, or if they need to shield whānau during a major outbreak. All school staff (teaching and non-teaching) need adequate sick leave provision to enable them to stay home while infectious and to support a full recovery. Testing approaches should be aligned with these aims. These measures are needed not only to support whānau during Covid-19 outbreaks, but may also be required in the event of outbreaks of RSV, measles, meningococcal disease, or influenza that are increasingly likely as border protections are removed.<sup>10</sup>
- **Having an epidemic management contingency plan:** The education system needs to explicitly plan for short circuit-breaker closures when case numbers reach defined thresholds, with a shift to high quality remote teaching and additional community-based wellbeing support as needed
- **Maintaining effective communication and engagement with all parties:** Staff, students, parents and whānau are far more likely to support the Action Plan if they understand its rationale and are engaged in its development and operation
- **Ensuring monitoring and evaluation to guide use of control measures and quality improvements:** The plan needs ways of tracking how it is operating and outcome measures to guide operational decisions about control measures such as intensifying ventilation (eg, if CO<sub>2</sub> levels are above certain thresholds) or temporary closure (eg if infections and absenteeism reach certain levels).

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### APPENDIX

In the Appendix we provide additional content about:

- The evidence for school-based transmission of infectious disease and what this means for NZ schools
- Three key indicators of school safety and transparency in communication that families and school staff need to see
- Key principles to guide development and implementation of the Action Plan

## Evidence for transmission of Covid-19 and other infections in schools

**Table 1. Summary of evidence for school-based transmission of Covid-19 and implications for Aotearoa New Zealand in 2022.**

| Evidence type  | Some examples   | Implications for action   |
|--|---|---|
| <ul style="list-style-type: none"> <li>• School-based outbreak investigations using genomic and standard epidemiology</li> </ul> | <ul style="list-style-type: none"> <li>• Covid-19 outbreak investigations show that in-school transmission occurs from children to other children and adults,<sup>11,12</sup> within classrooms,<sup>11,13</sup> and from school to home.<sup>11,12</sup></li> <li>• A recently published investigation of a primary school Omicron outbreak in Geneva<sup>1</sup> concluded that “children appear to be an important source of extra-household infections and have a key role in community transmission”.</li> </ul>   | <ul style="list-style-type: none"> <li>• This evidence highlights the need to have protection settings where children congregate</li> <li>• Children appear to transmit Covid-19 at lower rates relative difference by age is not a key factor for risk at schools, where the absolute number of daily contacts. Ultimately, pandemic impact derives from absolute number of people affected, not ratio measures (percentage relative risks)</li> <li>• Transmission from school to home is a reminder of the fact that school children do not live alone and that they risk exposing and younger household members to infection where school contacts are high. This source of infection is a particular concern for multigenerational households.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Policy and intervention studies</li> </ul>  | <ul style="list-style-type: none"> <li>• Mask policies and <u>effective ventilation</u> (<a href="https://www.reuters.com/world/europe/italian-study-shows-ventilation-can-cut-school-covid-cases-by-82-2022-03-22/">https://www.reuters.com/world/europe/italian-study-shows-ventilation-can-cut-school-covid-cases-by-82-2022-03-22/</a>) are associated with substantial reductions in case numbers in schools (eg,<sup>14,15</sup>)</li> <li>• These studies would not show effects if transmission within schools was naturally low</li> <li>• Like outbreak investigations, intervention studies also show that school cases do more than simply ‘reflect’ community transmission. A large and well-designed study in the US found not only that the introduction of school mask policies significantly reduced cases, but also that in the time period before mask policies were introduced, Covid-19 incidence rates were frequently higher in schools than in the local community.<sup>14</sup></li> </ul> | <ul style="list-style-type: none"> <li>• This type of evidence is important because it demonstrates that school-based policies and interventions to reduce transmission of Covid-19 can be highly effective in reducing case numbers</li> <li>• An important caveat is that most of these studies date from before Omicron outbreaks, so effectiveness in NZ schools during Omicron outbreaks may be lower</li> <li>• An additional caveat is that most NZ children and schools do not have access to highly effective masks (eg, N95-type masks) that are widely used in other countries</li> <li>• The majority of NZ schools rely on <u>natural ventilation</u> (<a href="https://blogs.otago.ac.nz/pubhealthexpert/ventilation-during-the-omicron-wave-results-from-a-preliminary-study/">https://blogs.otago.ac.nz/pubhealthexpert/ventilation-during-the-omicron-wave-results-from-a-preliminary-study/</a>) (keeping windows and doors open) rather than mechanical ventilation and/or air filtration. This means if windows are closed/can't be open (i.e. cold weather, wind, noise) then ventilation is reduced.<sup>16</sup></li> <li>• These limitations may mean that during peak outbreaks schools cannot be made safe for all students even with adherence to opening windows to increase ventilation, wearing masks, and other protections. If a specific building cannot meet a safe standard of ventilation together with adequate ventilation, spending several hours per day in such a setting is not in the best interests and the building should not be used for classes.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Coherence with other</li> </ul>   | <ul style="list-style-type: none"> <li>• Schools are known to be a key transmission setting for a wide range of infections including</li> </ul>   | <ul style="list-style-type: none"> <li>• Lifting border restrictions means that many seasonal infections will soon be returning, and without airbor</li> </ul>  |

childhood  
infectious  
diseases

influenza, RSV, common upper respiratory tract infections, and many more.<sup>10 17-19</sup>

- An assertion that schools are not important settings for SARS-CoV-2 transmission would also need to explain why an airborne infection with a basic reproduction number around 1.3 (seasonal influenza) is able to spread rapidly in schools each winter while an airborne infection with a basic reproduction number estimated to be around 8 (Omicron variant)<sup>20</sup> would not manage to spread within that same environment.

measures in place, these infections will spread in school. Influenza rates are already climbing rapidly (<https://www1.health.gov.au/internet/main/publishing.nsf/content/131190main1248177main1248177>).

- NZ needs an integrated approach to protect children and other infections,<sup>8</sup> including ensuring a high standard of [quality in classrooms](https://blogs.otago.ac.nz/pubhealthexpert/improving-schools-a-key-protection-against-covid-19-outbreak-enduring-legacy-for-healthier-learning/) (<https://blogs.otago.ac.nz/pubhealthexpert/improving-schools-a-key-protection-against-covid-19-outbreak-enduring-legacy-for-healthier-learning/>).<sup>21 22</sup>
- Protections such as sick leave for staff and whānau, and learning support for close contacts of cases will be very important control measures for both Covid-19 and non-Covid-19 infections especially during winter months.

### Three indicators of safe school environments that school communities need to see

Students, school staff, and their whānau need assurance that schools will be safe to access during the pandemic. For assurance to be genuine and meaningful, the following conditions must be met:

- **Protections must be both effective and universally available.** Protections will not be particularly useful if they are effective but uptake is low. For example, vaccination in 5-11 year olds is effective but [in NZ](https://www.health.govt.nz/news-media/news-items/9843-community-cases-421-hospitalisations-10-icu-8-deaths) (<https://www.health.govt.nz/news-media/news-items/9843-community-cases-421-hospitalisations-10-icu-8-deaths>), just over half overall have had a first dose, and a quarter have had a second dose. Around 65% of tamariki Māori are still unvaccinated. Likewise, proposed protections will not provide substantive reassurance if availability is wide but effectiveness is in question. For example, the efficacy and feasibility of keeping windows slightly open without using air filtration has not yet been tested in NZ classrooms during a cold-weather Covid-19 outbreak. Mask use is potentially highly protective but its full benefit will not be realised unless the Government makes respirator masks freely available and mandates mask use in all schools.
- **Families/whānau need to see evidence of safety.** Sending a child to school during an outbreak rightly demands a high level of trust from families. This is particularly hard for families with disabled or otherwise vulnerable children. The effectiveness of in-school protections need to be evaluated and documented, eg, with CO<sub>2</sub> monitors in every classroom to provide real-time information for action. There also needs to be transparency about case and contact incidence to enable whānau to make appropriate and informed decisions. Families should be able to make decisions about their children's attendance without repercussions for the child and whānau.
- **A whānau-centred approach is needed** to demonstrate to school communities that the wellbeing of students, staff and whānau is paramount and that the goal is not simply protecting the status quo. The Ministry of Education's approach needs to shift from insisting on in-person attendance to supporting the wellbeing of children, staff, and families wherever they are.

### Key principles for development and implementation of the Action Plan

- **Schools policy needs to be reorientated to be whānau-centred and equitable.** Resources and support should follow children and whānau, rather than the reverse. We have [previously recommended](https://blogs.otago.ac.nz/pubhealthexpert/protecting-new-zealand-children-from-the-developing-omicron-outbreak/) (<https://blogs.otago.ac.nz/pubhealthexpert/protecting-new-zealand-children-from-the-developing-omicron-outbreak/>), a range of measures to uphold children's right to health and education, with a particular focus on structural inequities by ethnicity, family income, and disability as barriers to learning and wellbeing during the pandemic. The highly supportive, collective leadership of Covid-19 responses in [kōhanga reo](#)

(<https://ero.govt.nz/our-research/the-covid-19-story-of-kohanga-reo>) shows how much is possible when the pandemic response is centred on people rather than on the school system.

- **Schools should be models of science-informed best practice** for their communities. Building on the success of sun safety and handwashing messaging, schools should promote and demonstrate a high standard of protection against airborne transmission of infections.<sup>22</sup> Schools can empower students to contribute to safe communities by modelling key values, eg, wearing a mask to protect others (<https://www.stuff.co.nz/pou-tiaki/128523403/mask-wearing-at-schools-should-be-mandatory-for-students-says-disability-rights-commissioner>).<sup>23</sup> This generation of children will experience further pandemics and they need to understand the value of pandemic protections.
- **NZ needs a coordinated system for Covid-19 child data surveillance, research, and communication** to close some critical knowledge gaps about direct and indirect impacts of the pandemic on children and their families. This knowledge will enable Government, schools, and whānau to use the best available science to protect children's wellbeing. The system should uphold tikanga Māori and be designed around the same whānau-centred principles as schools policy. Demonstrating evidence of effective infection control and generating up-to-date case numbers will support appropriate risk assessment, while understanding the multiple reasons why children are not in school is a key step in enabling them to stay connected to learning. Evaluation of air quality in classrooms can be undertaken as a citizen science initiative (<https://blogs.otago.ac.nz/pubhealthexpert/monitoring-co2-indoors-for-improving-ventilation-as-a-covid-19-control-tool/>), with active participation of students, but overall, development of the evidence base needs to be resourced and supported by Government, rather than placing the burden of public health data collection and decision-making onto individual schools.
- **Schools should be at the heart of transformative change in infectious disease control** to address the ongoing challenge of emerging infectious diseases. As we discussed in a recent paper (<https://ojs.victoria.ac.nz/pg/article/view/7500>),<sup>8</sup> many Covid-19 protections (eg, better air quality, mask wearing, staying at home when unwell) will have important co-benefits by preventing the spread of other infections in schools during the winter months.<sup>22</sup> Together with vaccines, these protections could contribute to a long-term improvement in winter season morbidity, mortality, and loss of work and school time. They will also protect against future epidemics and pandemics including the emergence of novel pathogens. These legacy benefits of the pandemic are likely to have long-lasting positive impacts on children's health and learning.

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## REFERENCES

1. Lorthé E, Bellon M, Berthelot J, et al. A SARS-CoV-2 omicron (B.1.1.529) variant outbreak in a primary school in Geneva, Switzerland. *The Lancet Infectious Diseases* doi: 10.1016/S1473-3099(22)00267-5
2. UK Office for National Statistics. Prevalence of ongoing symptoms following coronavirus (COVID-19) infection in the UK : 7 April 2022. 2022
3. Kvalsvig A, Russell J, Timu-Parata C, et al. Child-centred pandemic decisions: how the Precautionary Principle can generate better risk assessment in an era of uncertainty 2021 [updated 2021/12/12. Available from: <https://doi.org/10.21203/rs.3.rs-1149981/v1>.
4. Chandler V, Heger D, Wuckel C. The perils of returning to school—New insights into the impact of school holidays on youth suicides. *Economics of Education Review* 2022;86:102205. doi: <https://doi.org/10.1016/j.econedurev.2021.102205>
5. Blackburn R, Ajetunmbi O, Mc Grath-Lone L, et al. Hospital admissions for stress-related presentations among school-aged adolescents during term time versus holidays in England: weekly time series and retrospective cross-sectional analysis. *BJPsych Open* 2021;7(6):e215. doi: 10.1192/bjo.2021.1058 [published Online First: 2021/11/19]
6. Marsh L, McGee R, Nada-Raja S, et al. Brief report: Text bullying and traditional bullying among New Zealand secondary school students. *Journal of Adolescence* 2010;33(1):237-40. doi: <https://doi.org/10.1016/j.adolescence.2009.06.001>
7. Telfar Barnard L, Zhang J. The impact of respiratory disease in New Zealand: 2020 update. Wellington: Asthma and Respiratory Foundation NZ, 2021.
8. Kvalsvig A, Barnard LT, Summers J, et al. Integrated Prevention and Control of Seasonal Respiratory Infections in Aotearoa New Zealand: next steps for transformative change. *Policy Quarterly* 2022;18(1):44-51.
9. Covid-19: An urgent call for global "vaccines-plus" action. *BMJ* 2022;376:o1. doi: 10.1136/bmj.o1
10. Bin Nafisah S, Alameery AH, Al Nafesa A, et al. School closure during novel influenza: A systematic review. *J Infect Public Health* 2018;11(5):657-61. doi: <https://doi.org/10.1016/j.jiph.2018.01.003>
11. Stein-Zamir C, Abramson N, Shooob H, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. *Eurosurveillance* 2020;25(29):2001352. doi: <https://doi.org/10.2807/1560-7917.ES.2020.25.29.2001352>
12. Meuris C, Kremer C, Geerincx A, et al. Transmission of SARS-CoV-2 After COVID-19 Screening and Mitigation Measures for Primary School Children Attending School in Liège, Belgium. *JAMA netw* 2021;4(10):e2128757-e57. doi: 10.1001/jamanetworkopen.2021.28757
13. Baumgarte S, Hartkopf F, Hölzer M, et al. Investigation of a Limited but Explosive COVID-19 Outbreak in a German Secondary School. *Viruses* 2022;14(1):87.
14. Donovan CV, Rose C, Lewis KN, et al. SARS-CoV-2 Incidence in K–12 School Districts with Mask-Required Versus Mask-Optional Policies—Arkansas, August–October 2021. *Morb Mortal Wkly Rep* 2022;71(10):384.
15. Chernozhukov V, Kasahara H, Schrimpf P. The association of opening K–12 schools with the spread of COVID-19 in the United States: County-level panel data analysis. *Proceedings of the National Academy of Sciences* 2021;118(42):e2103420118. doi: [doi:10.1073/pnas.2103420118](https://doi.org/10.1073/pnas.2103420118)
16. Bennett J, Davy P, Trompetter B, et al. Sources of indoor air pollution at a New Zealand urban primary school; a case study. *Atmos Pollut Res* 2019;10(2):435-44. doi: <https://doi.org/10.1016/j.apr.2018.09.006>
17. Chao DL, Halloran ME, Longini IM, Jr. School opening dates predict pandemic influenza A(H1N1) outbreaks in the United States. *The Journal of Infectious Diseases* 2010;202(6):877-80. doi: 10.1086/655810
18. Coleman KK, Sigler WV. Airborne Influenza A Virus Exposure in an Elementary School. *Sci Rep* 2020;10(1):1859. doi: 10.1038/s41598-020-58588-1
19. Johnston SL, Pattermore PK, Sanderson G, et al. The relationship between upper respiratory infections and hospital admissions for asthma: a time-trend analysis. *American Journal of Respiratory and Critical Care Medicine* 1996;154(3):654-60. doi: 10.1164/ajrccm.154.3.8810601
20. Liu Y, Rocklöv J. The effective reproduction number for the omicron SARS-CoV-2 variant of concern is several times higher than Delta. *Journal of travel medicine* 2022:taac037. doi: 10.1093/jtm/taac037
21. Kvalsvig A, Bennett J, Russell J, et al. Improving ventilation in schools: a key protection against Covid-19 outbreaks and an enduring legacy for healthier learning. Public Health Expert Blog. Wellington: University of Otago Wellington, 2021.
22. Corsi R, Miller S, VanRy M, et al. Designing infectious disease resilience into school buildings through improvements to ventilation and air cleaning. *The Lancet Covid-19 commission task force on safe work, safe school, and safe travel* <https://static1.squarespace.com/static/5ef3652ab722df11fcb2ba5d/2021/60:1621348646314>.
23. Bokemper SE, Cucciniello M, Rotesi T, et al. Experimental evidence that changing beliefs about mask efficacy and social norms increase mask wearing for COVID-19 risk reduction: Results from the United States and Italy. *PLOS ONE* 2021;16(10):e0258282. doi: 10.1371/journal.pone.0258282

## ABOUT THE BRIEFING

Public health expert commentary and analysis on the challenges facing Aotearoa New Zealand and evidence-based solutions.

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