

Rapid review: Risks and benefits to children and whānau attending school during COVID-19 Alert Level 3

Dr Karen Wright, Public Health Medicine Specialist, May 7, 2020 (updated May 11, 2020)

Peer review by: Dr Rhys Jones

Disclaimer: Rapid review undertaken on date above using methods indicated below. This is not a comprehensive review and findings are subject to change depending on accumulation of additional evidence over time.

Research questions:

- What is the risk of children returning to school acquiring COVID-19 during COVID-19 Alert Level 3?
- What is the risk of COVID-19 transmission for the whānau (family) of children attending school during COVID-19 Alert Level 3?
- What are the benefits and equity implications to whānau of children returning to school during COVID-19 Alert Level 3?

Key points

- Children are less severely affected than adults by COVID-19
- Evidence surrounding the likelihood of children acquiring and transmitting SARS-CoV-2 is emergent and remains unclear. Recent evidence suggests that children may be less likely to acquire and transmit disease and, therefore, may have a more limited role than in previous pandemics
- School-based physical distancing measures under COVID-19 Alert Level 3 align with international guidelines
- There is limited evidence to support school closure de-escalation decision making. Diverse country and community socioeconomic contexts and COVID-19 strategies mean de-escalation policies are likely to be country and community specific
- The role of children in transmitting COVID-19 to whānau and others is unclear. Emerging evidence suggests that the risk of transmission may be low
- Prolonged school closures have the potential to exacerbate adverse social and health consequences for children living in poverty
- Restarting schools has the potential to ensure social, economic, cultural, health and wellbeing supports reach those students who may have been most disadvantaged by lockdown measures including school closure.

Context

Globally, the scale and rapidity of school closures in the SARS-CoV-2 (COVID-19) pandemic is unprecedented. As of May 5, 2020 an estimated 177 countries have implemented national school closure policies, affecting nearly three quarters of the global student population.¹ In New Zealand (NZ) all education facilities were closed during COVID-19 Alert Level 4 from March 26 to April 28 and distance learning implemented. With the move to Level 3 early learning centres and schools are now open for children in years 1-10 for children who do not have a caregiver at home. Distance learning continues for those who have a caregiver at home.

Public health measures for education facilities are required during Level 3 and are detailed on the Unite COVID-19 website.² They include ensuring children and staff stay home if they are sick, increasing the space per child and reducing contact between groups of children. Children will be in bubbles of up to 10 children and could increase up to 20 children once processes are in place and operating smoothly. Measures to prevent congregations include staggered entry times to classes and breaks. Hygiene measures include frequent hand washing and daily cleaning of all surfaces. In school, physical distancing of 1m at all times and 2m outside is required. In early learning centres physical distancing will not be possible to implement and so measures are primarily focused on managing the number of children in a room and ensuring environments reduce the risk of infection. The minimum licensed indoor space for children has been increased from 2.5m²/child to at least 3m²/child; food must not be shared; indoor temperature increased to a minimum of 18 degrees; and surfaces and toys disinfected regularly.

Due to the speed at which evidence has been produced during the ongoing and evolving pandemic, studies are of variable quality and some have not been peer reviewed. Studies are frequently observational and include small numbers. Heterogenous denominators make comparison challenging. Therefore, findings from many studies, particularly those that have not been peer reviewed, must be interpreted with caution.

Although studies generally refer to 'social distancing' I have used the terminology 'physical distancing' to emphasise the importance of physical rather than social distancing to prevent transmission of SARS-CoV-2.

Method

This rapid review is constrained by limited time. Although following a systematic search strategy, it is not a systematic review and full quality appraisal is not included. LitCovid, WHO COVID databases and PubMed have been searched between April 30 to May 1 for school and education related literature. Unite COVID-19, CDC and WHO websites have been reviewed. Titles were scanned and then abstracts and full texts of relevant articles reviewed for relevant information. Additional studies were identified through hand searching of references and from evidence reviews.

Summary of literature

What is the risk of children returning to school acquiring COVID-19 during COVID-19 Alert Level 3? Epidemiology and transmission

The first case of COVID-19 in NZ was identified on February 28. As of May 5, 2020, 10% of the 1,486 cases in NZ have been in those aged 0-19 years [n=153; 2% (n=34) 0-9 years; 8% (n=119) 10-19 years].³ There has been one confirmed cluster in a school setting in New Zealand at Marist College, Auckland. Details surrounding the Marist College cluster of 94 cases are unavailable.

Evidence is emergent and much remains unknown regarding transmission and infectivity of SARS-CoV-2 in children. Based on the current evidence, the mode of transmission is thought to be primarily via respiratory droplet. Airborne spread has not been reported by the World Health Organization (WHO) at the time of writing and evidence surrounding faecal-oral transmission, although less clear, appears to be low.⁴ Virus can remain viable on surfaces for up to three days, suggesting that fomites can transmit SARS-CoV-2.⁵

Evidence to date indicates that children are significantly less affected by COVID-19 than adults in terms of disease severity and burden of disease. Children and young people are more likely to experience mild clinical manifestations or be asymptomatic.⁶ For example, an observational cohort study of 36 children with COVID-19 in Zhejiang, China found just under half of children and young people aged 1-16 years were asymptomatic or had mild acute upper respiratory symptoms.⁷ Severe disease, although possible, is unlikely and death is rare.⁸ Low case numbers have been seen in China⁴ and Europe.⁶ Transmission in schools and education institutes does not appear to be a significant feature of this pandemic to date.^{6,9} The study from Zhejiang, China found the route of transmission was either close contact with family or history of travel to an endemic area.⁷

There is some conflicting evidence as to the likelihood of children acquiring COVID-19. The current position of the WHO and European Centre for Disease Control (ECDC) is that children are as likely to be affected as adults. A recent peer reviewed retrospective cohort study from Shenzhen, China supports this position and found no significant difference between the close contact infection rate in children <10 years (7.4%) and the population average (6.6%), although there was some suggestion of elevated attack rates in older age groups.¹⁰ A non-peer reviewed analysis of viral load in cases found no significant difference by age category.¹¹ In contrast, some retrospective cohort studies, albeit non-peer reviewed, have found lower attack rates for children in Japan (7.2% in males and 3.8% females aged <19 years compared to 22.2% in males and 21.9% females aged 50-59)¹² and Zaoyang and Chibi, China (4% of household contacts aged <18 years compared to 17.1% in adults).¹³ Peer reviewed analysis of contact tracing data for Wuhan and Shanghai found children 0-14 years to be less susceptible to SARS-CoV-2 than adults aged 15-64 years (odds ratio 0.34, 95%CI 0.24-0.49).¹⁴ In addition, several countries have undertaken widespread community testing and found low attack rates in children and young people. For example, in Iceland targeted and population SARS-CoV-2 testing, of in total 6% of the population, found children under 10 years were less likely to have a positive result.¹⁵ In fact, of the 848 children under 10 years in the population-screening group none had a positive result compared to 0.8% of those 10 years and older (95% CI, 0.7 to 1.0). In the Italian town of Vo', testing of 85% of the population at the time of lockdown being implemented found no positive cases in children aged <10 years and only 3 cases aged 11-20 (1.2%).¹⁶ At this time 2.6% of the total sample had a positive test.

Low attack rates and low case numbers, if testing is extensive and representative of true population prevalence, suggest that children may be less likely to acquire disease and have a more limited role than in previous pandemics, such as H1N1 in 2009.

Physical distancing in schools

There was little evidence identified to support decision making around de-escalation of physical distancing measures, consistent with findings from the Center for Disease Control (CDC)¹⁷ and the ECDC.⁶ Public health institutions, including the ECDC,⁶ are now analysing the optimal approach to de-escalation. There are many challenges to developing de-escalation policies for school closures. First, de-escalation is likely to be based on community transmission, the identification of which requires extensive testing. As of May 5, New Zealand has completed over 155,000 tests (rate 15.4 per 1,000

population as of April 18, 2020). Second, there is ongoing uncertainty around pathogen epidemiology and transmissibility that is central to understanding the effectiveness of school closures and physical distancing. A 2014 Public Health England scientific evidence base review suggests that school closures are likely to have greatest effect if virus has low transmissibility and if age-specific attack rates are higher in children than in adults.¹⁸ As the transmissibility of SARS-CoV-2 becomes more apparent, the effectiveness of school closures may also become more apparent. Third, much evidence has emerged from early analysis of data from China and other countries in Asia. Many of these countries have significantly different historical contexts and social and cultural norms compared to NZ. China, for example, has a history of policies limiting the number of children and subsequently family size. Community mask wearing is also routine in many Asian countries in contrast with NZ. Fourth, few countries are in a position comparable to New Zealand where an elimination strategy has been implemented rather than a mitigation strategy focussing on flattening the curve. It is possible that de-escalation in NZ may look significantly different to other countries if community transmission is low or absent.

Similarly, searching identified limited evidence for the effectiveness of school-based physical distancing measures in school during a pandemic, such as those being implemented under Alert Level 3. Recent systematic review of school closures and management during coronavirus outbreaks, including COVID-19, indicates that there is limited policy-relevant data on the implementation of social distancing in schools.¹⁹ A 2018 literature review of school-based influenza physical distancing interventions and policies identified theoretical benefits to social distancing measures from simulation studies.²⁰ However, real world implementation and evidence was absent from the review. Of interest, only half of the included influenza guidance documents mentioned at least one school practice to promote physical distancing suggesting that physical distancing is not routinely included in these plans. Peer reviewed commentary has identified that implementation of effective and centrally coordinated contact tracing, isolation, quarantine and testing are essential to controlling transmission and may prevent the need for extensive school closures.²¹

The Australian Health Protection Principal Committee (AHPCC) considers early childhood learning centres essential services and currently recommends continuation of services with risk mitigation measures.⁹ CDC recommendations are consistent with a mitigation strategy and include consideration of school closures as part of a wider physical distancing strategy when substantial community transmission is present.¹⁷ AHPCC,⁹ CDC,¹⁷ and WHO²² key prevention and control measures align with the NZ Level 3 measures outlined above. The WHO also recommends targeted health information, addressing mental health/psychosocial support needs and supporting vulnerable populations.²²

What is the risk of COVID-19 transmission for the whānau of children attending school during COVID-19 Alert Level 3?

The role of children in transmitting COVID-19 to others is similarly unclear, particularly given the apparently high proportion of asymptomatic cases. Emerging evidence suggests transmission from children to others may be low. The WHO-China Joint Mission team could not recall episodes during contact tracing where transmission occurred from children to adults.⁴ Literature review of studies from China, Singapore, South Korea, Japan and Iran found that 9% (2/23) of household transmission clusters (excluding those with a travel history) had a paediatric index case, a significantly lower proportion than previous novel influenza/coronavirus outbreaks.²³

Evidence describing the impact of household size and composition on transmission and secondary attack rates was not identified. One study of the characteristics of household transmission in China

describes a median household size of 4 (25th to 75th percentile, 3 to 6).¹³ Stratified analysis of secondary attack rate by household size was not included.

What are the benefits and equity implications to whānau of children returning to school during COVID-19 Alert Level 3?

The impacts of school closures, and therefore the benefits from returning to school, are broad. Adverse effects of school closures include economic harm, limited healthcare workers, loss of productivity, potential transmission to vulnerable caregivers, loss of education, harms to child welfare, nutritional problems for those receiving meals at school, and psychological harms from social isolation.¹⁹

Evidence in this area specific to the COVID-19 pandemic is limited and further research indicated.²⁴ A recent modelling study in the US has estimated that approximately 15% of the US health care workforce requires childcare during school closures.²⁵ The study found that as infection mortality rate increases, there is likely to be a tipping point where school closures will lead to a greater number of deaths than they will prevent.

Returning to school provides the opportunity to reduce the risk of school closure related longer-term child wellbeing adverse effects, particularly for those already experiencing adverse learning or wellbeing outcomes. Research indicates that children are at increased risk of weight gain and inactivity when out of school.²⁶ Ethnic minorities and children already experiencing an unhealthy weight are at greater risk. Concerns have also been raised that screen time is likely to be increased during lockdown and many children may be experiencing higher-calorie ultra-processed diets in response to stocking up on shelf-stable food items.²⁶ Summer holidays are also associated with loss of academic achievement for children in low socioeconomic areas.²⁷ Children in low-income households are more likely to live in conditions that make distance learning more difficult where, for example, access to online learning, suitable books, study space and heating may be more limited.²⁷ Little is known regarding the long-term mental health impacts of widespread disease outbreaks on children.²⁸ For those with pre-existing mental health or special education needs, important supports and coping mechanisms such as services and routines may be removed and time sensitive intervention windows missed.²⁸ Prolonged school closures have the potential to exacerbate adverse social and health consequences for children living in poverty.²⁷

School closures and lockdown place additional stressors on whānau, such as social isolation, psychological risks and economic vulnerability, that may increase the risk of intimate partner violence (IPV).²⁸ Concerningly evidence is emerging globally suggesting an increase in IPV that puts children, and disproportionately women, at risk of violence.²⁹ It is suspected that lockdown and the “stay at home” message is preventing escape, help-seeking, and ways of coping for victims of IPV. In NZ, Police figures report a 22% increase in family harm investigations compared to before lockdown and, similarly, Women’s Refuge has had a 20% increase in calls related to domestic violence.³⁰

Children attending ECE and primary schools in NZ have access to a range of additional supports. The Ministry of Education provides early intervention, communication, physical disability and behaviour services.³¹ Up to 21,000 students in 120 schools receive free and healthy school lunches. Immunisations are offered in schools to year 7 and 8 children and some schools have visiting school nurses that provide sore throat, skin swabbing and other services. Kohanga Reo (Māori immersion preschool) and Kura Kaupapa (Māori immersion schools) provide access to Māori tikanga (protocol and ways of doing), te reo (language) and whanaungatanga (relationship and connection) that may not be available at home for some students. Returning to school, assuming all services continue to be

delivered, provides access to education, social, cultural, health and nutrition supports that may not otherwise be accessible to families.

In summary, it will be important to follow emerging international evidence regarding the incidence, infectivity and transmission of COVID-19 in children and to understand these factors in the local context. Aotearoa New Zealand case and cluster analyses, particularly the Marist College cluster, are indicated to understand the potential impacts and benefits of opening schools for children and whānau. Furthermore, as COVID-19 Alert Levels are reduced to Level 2 and 1 it will be necessary to understand the risks to teachers that increasingly return to school, particularly at Kohanga Reo and Kura Kaupapa where many Kaiako (teachers) are Kaumatua (elders) and may be at greater risk of severe COVID-19 disease.

References

1. UNESCO. COVID-19 impact on education: UNESCO; 2020 [Available from: <https://en.unesco.org/covid19/educationresponse> accessed 5 May 2020.
2. Ministry of Education. Alert Level 3 FAQs for schools and early learning centres: Ministry of Education; 2020 [Available from: <https://education.govt.nz/covid-19/alert-level-3-faqs-for-schools-and-early-learning-centres> accessed 4 May 2020.
3. Ministry of Health. COVID-19 current cases: Ministry of Health; 2020 [Available from: <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-current-situation/covid-19-current-cases> accessed 5 May 2020.
4. World Health Organization. Report of the WHO-China joint mission on coronavirus disease 2019 (covid-19), 2020.
5. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *New England Journal of Medicine* 2020
6. ECDC. Coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK - seventh update, 25 March 2020. Stockholm, 2020.
7. Qiu H, Wu J, Hong L, et al. Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study. *The Lancet Infectious diseases* 2020 doi: 10.1016/s1473-3099(20)30198-5 [published Online First: 2020/03/30]
8. Shen KL, Yang YH, Jiang RM, et al. Updated diagnosis, treatment and prevention of COVID-19 in children: experts' consensus statement (condensed version of the second edition). *World journal of pediatrics : WJP* 2020 doi: 10.1007/s12519-020-00362-4 [published Online First: 2020/04/26]
9. AHPPC. A statement from the Australian Health Protection Principal Committee about COVID-19 in children and early childhood and learning centres.: Australian Health Protection Principal Committee, 2020.
10. Bi Q, Wu Y, Mei S, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: a retrospective cohort study. *The Lancet Infectious diseases* 2020 doi: 10.1016/s1473-3099(20)30287-5 [published Online First: 2020/05/01]
11. Jones T, Muhlemann B, Veith T, et al. An analysis of SARS-CoV-2 viral load by patient age. Berlin: Charité - Universitätsmedizin Berlin, 2020.
12. Mizumoto K, Omori R, Nishiura H. Age specificity of cases and attack rate of novel coronavirus disease (COVID-19). *medRxiv* 2020 [published Online First: March 13, 2020]
13. Li W, Zhang B, Lu J, et al. The characteristics of household transmission of COVID-19. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* 2020 doi: 10.1093/cid/ciaa450 [published Online First: 2020/04/18]

14. Zhang J, Litvinova M, Liang Y, et al. Changes in contact patterns shape the dynamics of the COVID-19 outbreak in China. *Science (New York, NY)* 2020 doi: 10.1126/science.abb8001 [published Online First: 2020/05/01]
15. Gudbjartsson DF, Helgason A, Jonsson H, et al. Spread of SARS-CoV-2 in the Icelandic Population. *The New England journal of medicine* 2020 doi: 10.1056/NEJMoa2006100 [published Online First: 2020/04/15]
16. Lavezzo E, Franchin E, Ciavarella C, et al. Suppression of COVID-19 outbreak in the municipality of Vo, Italy. *medRxiv* 2020 [published Online First: Pre-print April 18, 2020]
17. CDC. Considerations for School Closure: Center for Disease Control; 2020 [updated April 14, 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/downloads/considerations-for-school-closure.pdf>.
18. Mangtani P. Impact of School Closures on an Influenza Pandemic: Scientific Evidence Base Review: Public Health England, 2014.
19. Viner RM, Russell SJ, Croker H, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *The Lancet Child & adolescent health* 2020;4(5):397-404. doi: 10.1016/s2352-4642(20)30095-x [published Online First: 2020/04/10]
20. Uscher-Pines L, Schwartz HL, Ahmed F, et al. School practices to promote social distancing in K-12 schools: review of influenza pandemic policies and practices. *BMC Public Health* 2018;18(1):406. doi: 10.1186/s12889-018-5302-3 [published Online First: 2018/03/29]
21. Pollock AM. Covid-19: local implementation of tracing and testing programmes could enable some schools to reopen. *BMJ* 2020;368:m1187. doi: 10.1136/bmj.m1187 [published Online First: 2020/03/27]
22. World Health Organization. Key Messages and Actions for COVID-19 Prevention and Control in Schools. Geneva: WHO, 2020.
23. Zhu Y, Bloxham CJ, Hulme KD, et al. Children are unlikely to have been the primary source of household SARS-CoV-2 infections. *MedRxiv* 2020 [published Online First: 30 March, 2020]
24. Armitage R, Nellums LB. Considering inequalities in the school closure response to COVID-19. *The Lancet Global health* 2020 doi: 10.1016/s2214-109x(20)30116-9 [published Online First: 2020/03/31]
25. Bayham J, Fenichel EP. Impact of school closures for COVID-19 on the US health-care workforce and net mortality: a modelling study. *The Lancet Public health* 2020 doi: 10.1016/s2468-2667(20)30082-7 [published Online First: 2020/04/07]
26. Rundle AG, Park Y, Herbstman JB, et al. COVID-19-Related School Closings and Risk of Weight Gain Among Children. *Obesity (Silver Spring, Md)* 2020 doi: 10.1002/oby.22813 [published Online First: 2020/04/01]
27. Van Lancker W, Parolin Z. COVID-19, school closures, and child poverty: a social crisis in the making. *The Lancet Public health* 2020 doi: 10.1016/s2468-2667(20)30084-0 [published Online First: 2020/04/11]
28. Lee J. Mental health effects of school closures during COVID-19. *The Lancet Child & adolescent health* 2020 doi: 10.1016/s2352-4642(20)30109-7 [published Online First: 2020/04/18]
29. Bradbury-Jones C, Isham L. The pandemic paradox: The consequences of COVID-19 on domestic violence. *Journal of clinical nursing* 2020 doi: 10.1111/jocn.15296 [published Online First: 2020/04/14]
30. RNZ. Domestic violence calls to police increase in lockdown RNZ2020 [Available from: <https://www.rnz.co.nz/news/national/415553/domestic-violence-calls-to-police-increase-in-lockdown> accessed 5 May 2020.
31. Ministry of Education. Practical information about education for parents and carers: Ministry of Education; 2020 [Available from: <https://parents.education.govt.nz/> accessed 5 May 2020.