Attachment: Science regarding COVID-19 spread in schools

1. Children are at low risk of infection and have lower risk of hospitalization and death

The infection rate in children is low. In the US, 22% of the population is less than 18 years, but only 1.7% of cases are from that age group. (Bialek et al.2020). In China, where over 10% of population is younger than 10 years of age, less than 1% of the initial 72,314 cases were in children in that age group. (Wu and McGoogan, 2020). In addition, there is significantly lower susceptibility to infection for children aged under 10 years compared to adults given the same exposure. (Goldstein, Lipsitch and Cevik, 2020). Children typically have a better immune response to COVID-19 than adults, showing mild to no symptoms. (Mallapaty, 2020). Viner et al found that children are less susceptible to infection than adults (Viner *et al.*, 2020). In addition, they also transmit less (Lewis, 2020). In general, children with COVID-19 are less likely to have severe symptoms than adults or experience an asymptomatic infection – meaning they do not have any signs or symptoms of disease. They also have much lower risk of hospitalization and death compared to adults. (CDC, 2020b).

2. Children do not appear to be drivers of SARS-CoV-2 virus transmission

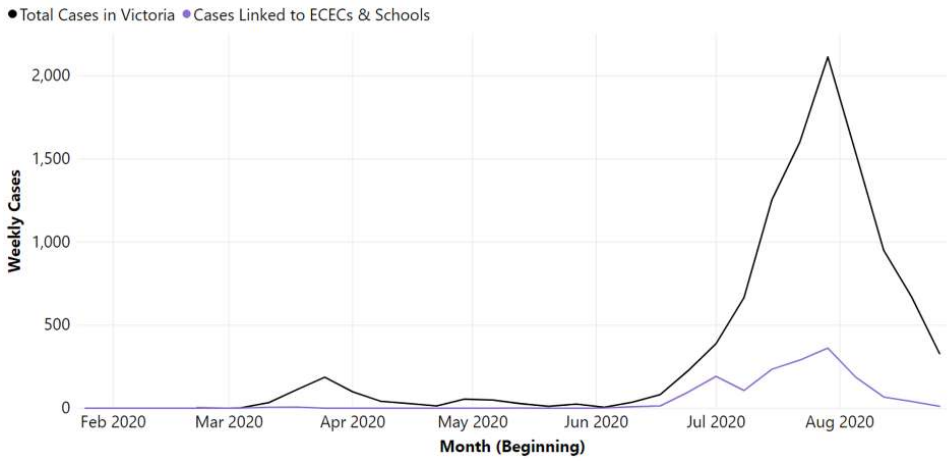
The analysis of surveillance data from Schools in Ireland found no evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020. (Heavey *et al.*, 2020). A systematic review by L Jonas concluded that children are unlikely to be the main drivers of the pandemic and opening up schools and kindergartens is unlikely to impact COVID-19 mortality rates in older people. (Ludvigsson, 2020).

3. Schools are not COVID Hotspots or Superspreaders

One of the largest studies, led by Brown University economist Emily Oster, PhD, analyzed in-school infection data from 47 states over the last two weeks of September. Among more than 200,000 students and 63,000 staff who had returned to school. The study reported an infection rate of 0.13% among students and 0.24% among staff.(*The Atalantic*, 2020). Association of American Medical College (AAMC) after review of one year into pandemic stated that school outbreaks typically come from the community — not vice versa (AAMC, 2020). In New York City Public Schools out of 10676 tests there were only 18 positives after nearly three weeks of an in-person. (The New York Times, 2020). The study conducted in 11 school districts in North Carolina with nearly 100,00 students/staff open for 9 weeks of in person instruction, tracking secondary transmission of SARS-Co-V-2 found within school infections extremely rare. (Zimmerman *et al.*, 2021). The researcher concluded that schools can reopen safely adhering to prevention policies. In a separate study in the US of more than 57,000 open day care providers exposure to child care was not associate with elevated risk for COVID-19 transmission to providers and that care was safe as long as basic safety measures, including small groups and mask-wearing in place (Gilliam *et al.*, 2021). In a prospective cohort study in Australia in 15 schools and 10 child care setting children and teachers did not contribute significantly to COVID-19 transmission via attendance in educational settings. (Macartney *et al.*, 2020)

4. School does not have significant impact on community spread

Data from European Union, the United Kingdom, Taiwan, Hong Kong and South Korea suggests that reopening schools in the context of mitigation measures has not been associated with increase in community transmission. School transmission reflects community transmission shown in the data from Victoria, Australia. The study showed very few cases in school when community cases were low, and infections peaked when community transmission was high suggesting that infections in school are driven primarily by transmission in the broader community. (Russell *et al.*, 2020)



5. In-person, remote or hybrid schooling have no significant impact on community rates

The evidence from the study in Michigan and Washington found that having school be remote versus hybrid versus in-person generally did not have a statistically significant impact on community case rates. In-person schooling modalities do not appear to contribute to COVID spread above and beyond what is already occurring in the community at low-to-medium levels of spread. (Goldhaber *et al.*, 2020). Analysis of 2.87 million cases in the US CDC found aggregate COVID-19 incidence among general population where K-12 school offers in person education (401.2 per 100,00) is like those in counties offering only virtual education (418.2 per 100,000). The study also reported that despite high level (62% of K-12 school districts) of in person (full or hybrid) learning outbreaks reported within K-12 school is limited. (Leidman *et al.*, 2021). Also, data collected in nation's largest Catholic school system in Chicago found a low risk for in-person learning in public schools. The incidence rate was lower than in the surrounding community. (Fricchione, Seo and Arwady, 2020).

6. A single case in a school would not warrant closing the entire school

In most instances, a single case of COVID-19 in a school would not warrant closing the entire school. Community spread and how much contact the person with COVID-19 had with others, as well as when such contact took place, need to be considered. These variables should also be considered when determining how long a school, or part of the school, stays closed. If the spread of SARS-CoV-2 within a school is higher than in the community, or if the school is the source of an outbreak, administrators should work with local health officials to determine if temporarily closing the school building is necessary. (*Frequently Asked Questions (FAQs) regarding K-12 Schools and COVID-19*, 2020).

7. Evidence from other countries to keep schools open (Australia, South Korea, UK, Sweden, Norway, Denmark, Italy, and Singapore)

In Australia, the transmission rate in school was very low. The overall secondary transmission rate was 0.9% (33/3,641) for all settings: 1.1% in high schools, 0.4% in primary schools and 0.7% in ECEC services. The likelihood of cases in educational settings is related to the level of community transmission of SARS-CoV-2. (*COVID-19 in schools and early childhood education and care services-the Term 3 experience in NSW*, 2020). This is consistent with findings from Victoria, Australia (Russell *et al.*, 2020) and from South Korea studies. (Yoon *et al.*, 2020). A prospective cross-sectional study conducted in England found SARS-CoV-2 infections and outbreaks were uncommon in educational settings. The study found strong association with regional COVID-19 incidence emphasizes the importance of controlling community transmission to protect educational settings. (Ismail *et al.*, 2020). In Sweden despite schools are kept open low incidence of severe COVID-19 were observed. Only 15 children diagnosed as having COVID-19 including seven with MISC-C out of 1.95 million children aged between 1 to 16 years admitted to ICU (1 child in 130,000). All recovered fully. The study conducted in Norway found minimal transmission of SARS-Co-V-2 in primary schools. The low transmission between child-to-child (0.9%, 2/234) and child-to-adult (1.7%, 1/58) transmission, supporting that under 14 year old are not the drivers of SARS-CoV-2 transmission (Brandal *et al.*, 2021). In Denmark and Norway return of all students (up to age 16) did not result in increased transmission. (Stage *et al.*, 2020). In Italy, more than 65,000 schools reopened in September, as case numbers were climbing in the community. But only 1,212 campuses had experienced outbreaks four weeks later. In 93% of cases, only one infection was reported, and only one secondary school had a cluster of more than 10 infected

people.(Buonsenso *et al.*, 2020). Singapore schools remained open and have not been a source of transmission of the disease, with just eight known infections of school-age-children, none of which were school related. (Policy Institute *et al.*, 2020)

8. CDC, American Academics of Pediatrics and National Academies of Science and Engineering and Medicine recommend in-person schooling

The best available evidence from countries that have reopened schools indicates that COVID-19 poses low risks to school-aged children – at least in areas with low community transmission. (CDC, 2020b). American Academy of Pediatrics and National Academies of Science, Engineering, and Medicine agree that children should attend in-person school when possible.(National Academies of Sciences, Engineering, 2020). CDC recommend that K-12 are first to open and last to close. (Honein *et al.*, 2020)

9. What benefits would school re-opening provide?

School closures have clear negative impacts on child health, education and development, family income and the overall economy (WHO, 2020). The decision to reopen schools should include consideration of the following benefits:

- Allowing students to complete their studies and continue to the next level
- Essential services, access to nutrition, child welfare, such as preventing violence against children
- Social and psychological well-being
- Access to reliable information on how to keep themselves and others safe
- Reducing the risk of non-return to school
- Benefit to society, such as allowing parents to work

References

AAMC (2020) *Kids, school, and COVID-19: What we know — and what we don't*. Available at: https://www.aamc.org/news-insights/kids-school-and-covid-19-what-we-know-and-what-we-don-t (Accessed: 11 January 2021).

Brandal, L. T. *et al.* (2021) 'Minimal transmission of SARS-CoV-2 from paediatric COVID-19 cases in primary schools , Norway , August to November 2020', *Eurosurveillance*. European Centre for Disease Prevention and Control (ECDC), 26(1), pp. 3–8. doi: 10.2807/1560-7917.ES.2020.26.1.2002011.

Buonsenso, D. *et al.* (2020) 'SARS-CoV-2 infections in Italian schools: preliminary findings after one month of school opening during the second wave of the pandemic', *medRxiv*, p. 2020.10.10.20210328. Available at: https://doi.org/10.1101/2020.10.10.20210328.

CDC (2020a) *Operating schools during COVID-19: CDC's Considerations*. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html (Accessed: 14 January 2021).

CDC (2020b) *Operating schools during COVID-19: CDC's Considerations | CDC*. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html (Accessed: 4 January 2021).

COVID-19 in schools and early childhood education and care services-the Term 3 experience in NSW (2020).

Frequently Asked Questions (FAQs) regarding K-12 Schools and COVID-19 (2020).

Fricchione, M. J., Seo, J. Y. and Arwady, M. A. (2020) 'Data-Driven Reopening of Urban Public Education Through Chicago's Tracking of COVID-19 School Transmission', *Journal of Public Health Management and Practice*, Publish Ah(00), pp. 1–4. doi: 10.1097/phh.0000000000001334.

Gilliam, W. S. *et al.* (2021) 'COVID-19 Transmission in US Child Care Programs', *Pediatrics*, 147(1), p. e2020031971. doi: 10.1542/peds.2020-031971.

Goldhaber, D. *et al.* (2020) *To What Extent Does In-Person Schooling Contribute to the Spread of COVID-19? Evidence from Michigan and Washington*.

Goldstein, E., Lipsitch, M. and Cevik, M. (2020) 'On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community', *The Journal of Infectious Diseases*. doi: 10.1093/infdis/jiaa691.

Heavey, L. *et al.* (2020) 'No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020', *Euro Surveill*, 25(21), p. 1. doi: 10.2807/1560-7917.ES.2020.25.21.2000903.

Honein, M. A. *et al.* (2020) 'Summary of Guidance for Public Health Strategies to Address High Levels of Community Transmission of SARS-CoV-2 and Related Deaths, December 2020', *MMWR. Morbidity and Mortality Weekly Report*. Centers for Disease Control MMWR Office, 69(49), pp. 1860–1867. doi: 10.15585/mmwr.mm6949e2.

Ismail, S. A. *et al.* (2020) 'Articles SARS-CoV-2 infection and transmission in educational settings: a prospective, cross-sectional analysis of infection clusters and outbreaks in England', *The Lancet Infectious Diseases*. doi: 10.1016/S1473-3099(20)30882-3.

Leidman, E. *et al.* (2021) 'COVID-19 Trends Among Persons Aged 0 – 24 Years — United States ', 70, pp. 1–7.

Lewis, D. (2020) 'Why schools probably aren't COVID hotspots', *Nature*, 587(7832), p. 17. doi: 10.1038/d41586-020-02973-3.

Ludvigsson, J. F. (2020) 'Children are unlikely to be the main drivers of the COVID-19 pandemic-a systematic review Short title: Children and COVID-19 transmission'. doi: 10.1111/APA.15371.

Macartney, K *et al.* (2020) 'Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study', *Articles Lancet Child Adolesc Health*, 4, pp. 807–823. doi: 10.1016/S2352-4642(20)30251-0.

Mallapaty, S. (2020) 'How do children spread the coronavirus? The science still isn't clear', *Nature*. NLM (Medline), pp. 127–128. doi: 10.1038/d41586-020-01354-0.

National Academies of Sciences, Engineering, and M. 2020 (2020) *Reopening K-12 Schools During the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities*, *Reopening K-12 Schools During the COVID-19 Pandemic*. Washington, DC: The National Academic Press. doi: 10.17226/25858.

Policy Institute, L. *et al.* (2020) *Policy Brief: Reopening Schools in the Context of COVID-19: Health and Safety Guidelines From Other Countries*.

Russell, F. *et al.* (2020) 'COVID-19 in Victorian Schools: An analysis of child-care and school outbreak data and evidence-based recommendations for opening schools and keeping them open', *JMIR Pediatrics and Parenting*, 3(2), pp. 1–9. Available at: https://www.dhhs.vic.gov.au/sites/default/files/documents/202009/Report-summary-COVID-19-in-victorian-schools-pdf.pdf.

Stage, H. B. *et al.* (2020) 'Shut and re-open: the role of schools in the spread of COVID-19 in Europe', *arXiv*, pp. 1–28. doi: 10.1101/2020.06.24.20139634.

The Atalantic (2020) 'Schools Aren't Super-Spreaders'. Available at: https://www.theatlantic.com/ideas/archive/2020/10/schools-arent-superspreaders/616669/ (Accessed: 12 January 2021).

The New York Times (2020) *In NYC Schools, Only 18 Positive Coronavirus Tests Out of 10,676*. Available at: https://www.nytimes.com/2020/10/19/nyregion/schools-coronavirus.html (Accessed: 12 January 2021).

Thompson, L. A. and Rasmussen, S. A. (2020) 'One Year Later, How Does COVID-19 Affect Children?', *JAMA Pediatrics*. American Medical Association. doi: 10.1001/jamapediatrics.2020.5817.

Viner, R. M. *et al.* (2020) 'Susceptibility to SARS-CoV-2 infection amongst children and adolescents compared with adults: A systematic review and meta-analysis', *medRxiv*. doi: 10.1101/2020.05.20.20108126.

WHO (2020) *Considerations for school-related public health measures in the context of COVID-19*. Available at: https://www.who.int/publications/i/item/considerations-for-school-related-public-health-measures-in-the-context-of-covid-19 (Accessed: 5 January 2021).

Yoon, Y. *et al.* (2020) 'Stepwise School Opening and an Impact on the Epidemiology of COVID-19 in the Children', *Journal of Korean Medical Science*, 35(46), pp. 1–13. doi: 10.3346/jkms.2020.35.e414.

Zimmerman, K. O. *et al.* (2021) 'Incidence and Secondary Transmission of SARS-CoV-2 Infections in Schools', *Pediatrics*. doi: 10.1542/peds.2020-048090.