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COLLEGE OF PUBLIC HEALTH



COVID-19 Back to School PlayBook: Guiding Principles to Keep Students, Teachers, and Staff Safe in K-12 Schools

SUPPLEMENTAL MATERIAL



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Appendix A: School Outbreak Reports and Investigations Supporting Children's Ability to Transmit SARS-CoV-2

Introduction: As K-12 school leaders across the United States are finalizing their plans to welcome students, teachers, and staff in the fall, lessons can be learned from international schools that have reopened over the last several months. Local community transmission rates vary significantly across the US: some small, rural towns have evaded any cases of COVID-19 to date, while a rise in cases in urban areas in the South and Southeast U.S. have exceeded local hospital capacity since loosening directive health measures. As detailed in UNMC's *COVID-19 Back to School Playbook: Guiding Principles to Keep Students, Teachers, and Staff Safe in K-12 Schools*¹, it is safest for schools to reopen when controlled community transmission (<50 cases/million/day) is achieved, and even then, partial reopening with reduced students in schools and extensive additional precautions are recommended. The one successful exception to the above threshold was Singapore which was at 70-80/million/day, had a strong downward trend, and a well-defined source of community spread.

Local public health determination of controlled community transmission may vary based on key factors such as test availability, contact tracing capacity, percent positive test rates and other capacity measures. Schools should determine relevant thresholds with local public health that drive decisions. Keeping schools open while limiting increased cases among students, teachers, families, and communities will require layered interventions and coordination with public health.

Below are key factors influencing recommendations that the risk of community transmission must be low (containment) before considering reopening schools (for example, by random testing of the population). If schools reopen in regions with a low risk of community transmission, measures should still be taken to protect teachers and students as outlined in the *Back to School Playbook*.

Most children do not become seriously ill with COVID-19. However, they sometimes do suffer severe disease, and children like everyone else play a role in community transmission. Children may have more contacts than adults (particularly at school) which may offset any reduced tendency to transmit the virus in younger children, if that is the case. Some studies suggest children pose a lower risk than adults, or even that children are less likely to be infected but have important limitations including that schools were often closed at the time of the study. As more is learned about COVID-19, it is extremely important that public health use and learn from well characterized data and research in order to best inform decisions to protect communities.

¹ https://www.unmc.edu/publichealth/news/UNMC_COPH_K-12_Playbookv1.pdf

Schools and Care Center Outbreak Reports

As expected, given the closure of schools around the world at the start of the pandemic, there is a shortage in the literature on transmission of SARS-CoV-2 in school settings.

Israel, May 2020. This study describes a COVID-19 cluster at a school in Israel encompassing 7th through 12th grades. It demonstrates a school outbreak that impacted its community. Among 151 staff and 1,161 students tested, over 260 people were infected within 10 days of reopening, 153 students (attack rate: 13%) and 25 staff (attack rate: 16%). Masks were mandated, but in the week prior to the outbreak, a heatwave occurred and masks were optional for 3 days. Classrooms were crowded, and social distancing was not possible. In the community, 87 cases were linked to the school cases during a period when before that community case rates were low.

<https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.29.2001352> (Published July 2020)

Chile, March 2020. This study tested SARS-CoV-2 antibody prevalence in staff and students at a school spanning pre-school through high school, early in Chile's experience with the virus so easier to attribute the cases to the school and its nearby community. The attack rates were similar to the Israeli experience, 10% of students and 17% of staff tested positive. Of these, 40% of students and 18% of staff were asymptomatic. Importantly, the cases were distributed across all grades (even pre-school). (Published July 2020)

<https://academic.oup.com/cid/article/doi/10.1093/cid/cia955/5869860>

France, April 2020. A report on a cluster at a high school in Northern France. About 6 weeks after two cases of COVID-19 were detected in a high school early in that community's experience with COVID-19, SARS-CoV-2 antibody prevalence was tested in students and staff. Attack rates higher than the Israeli and Chile experiences were identified, 38% of students, 43% of teachers, and 59% of other school staff. Parents and siblings who joined the study had seroprevalences of 11% and 10%, respectively. All of these results were much higher than the community blood donor seroprevalence of 3%. (Pre-print, April 2020)

<https://t.co/0HkOeOhTzC?amp=1>

North Carolina, July 2020. A case report of a COVID-19 cluster that began with a family gathering and subsequently affected 41 people from 9 different families and 8 different workplaces. This investigation found transmission from a 9-year-old child to grandparents and subsequently to an elderly neighbor.

<https://catawbacountync.gov/news/covid-19-in-catawba-county-a-case-study/>

Texas, July 2020. The Department of Health and Human Services reported at least 1,695 staff and children have tested positive from childcare facilities in the state as of July 6, a substantial increase from 950 reported cases by the end of June (<https://www.texastribune.org/2020/07/09/texas-day-care-coronavirus-risks/>). These cases were spread across more than a 1,078 reporting centers, but only a fraction of them were open by the time the numbers were reported. The true case count likely is higher, and the impact on subsequent transmission remains to be evaluated. It adds to mounting evidence that on a population level, childhood COVID-19 is under-appreciated in all age groups.

Community transmission and case investigations supporting children infected at similar rates as adults and have ability to transmit to others.

South Korea contact tracing study. This study evaluated contacts of identified COVID-19 patients. When the patient (index case) was aged 10-19 years, almost 1 in 5 household contacts were COVID-19 positive, versus just over 1 in 10 for all age groups. Where younger children (0-9 years) were the index case, 5.3% of household contacts had COVID-19. Author's note: "Although the detection rate for contacts of preschool-aged children was lower, young children may show higher attack rates when the school closure ends, contributing to community transmission of COVID-19." (Published July 2020)

<https://t.co/cBa58DUGJa?amp=1>

Study from Chicago found that young children (<5 years old) with mild to moderate COVID-19 had similar levels of viral RNA in their upper respiratory track as older children and adults. This is one piece of evidence among a growing body of literature debunking the idea that a child with COVID-19 cannot contribute to SARS-CoV-2 as well as any other patient. (Published July 2020)

<https://jamanetwork.com/journals/jamapediatrics/fullarticle/2768952>

China review of 391 cases and 1286 contacts. Evidence that in at least some settings (households, in this instance), children are just as likely to be infected as adults. (Published online April 2020)

<https://t.co/1vRfa2pjis?amp=1>

China cluster investigation of 4 families shows no difference in the proportion of children and adults infected with the novel coronavirus during quarantine. (Published online April 2020)

<https://t.co/DoX9x4pqGl?amp=1>

China study found that children were less likely to be infected than adults in households. However, all household members were promptly quarantined immediately when index cases were confirmed for 14 days in special housing designated by the local governments and monitored everyday by the health service personnel, consequently, this data is difficult to apply to understanding whether there are differences or not in transmission by age groups. (Published April 2020)

<https://t.co/AdZvxiZUJv?amp=1>

Switzerland. Data from Switzerland showing no difference in the proportion of children and adults infected with the novel coronavirus. (Preprint, May 2020)

<https://t.co/xm4t1ayVrL?amp=1>

Switzerland. Study of 23 children with COVID-19. Infectious virus was successfully isolated from 12 (52%); though reduced quality of the samples were analyzed. The youngest child with shed virus was 7 days old. Viral load was similar to adults. This provides yet more evidence that an infected child is relevant for transmission. (June 2020)

https://wwwnc.cdc.gov/eid/article/26/10/20-2403_article?deliveryName=USCDC_333-DM32083

Germany. This study by one of the most experienced coronavirus virology groups in the world found that shed SARS-CoV-2 viral loads were similar among children and adults with COVID-19. Age categories ranged from

kindergarten through adult. Furthermore, when an estimate of threshold of transmissibility was applied, shed virus from nearly 1 in 3 children who were 6 years or less of age with COVID-19 surpassed it, and the fraction increased with older ages. (Preprint, June 2020)

<https://www.medrxiv.org/content/10.1101/2020.06.08.20125484v1>

UK. Data from 27,000 cases shows no difference in the proportion of children and adults infected with the novel coronavirus. Authors note “It is also not possible to say with confidence that there are any differences in infection rates across age groups” (July 2020)

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19infectionsinthecommunityinengland/july2020>

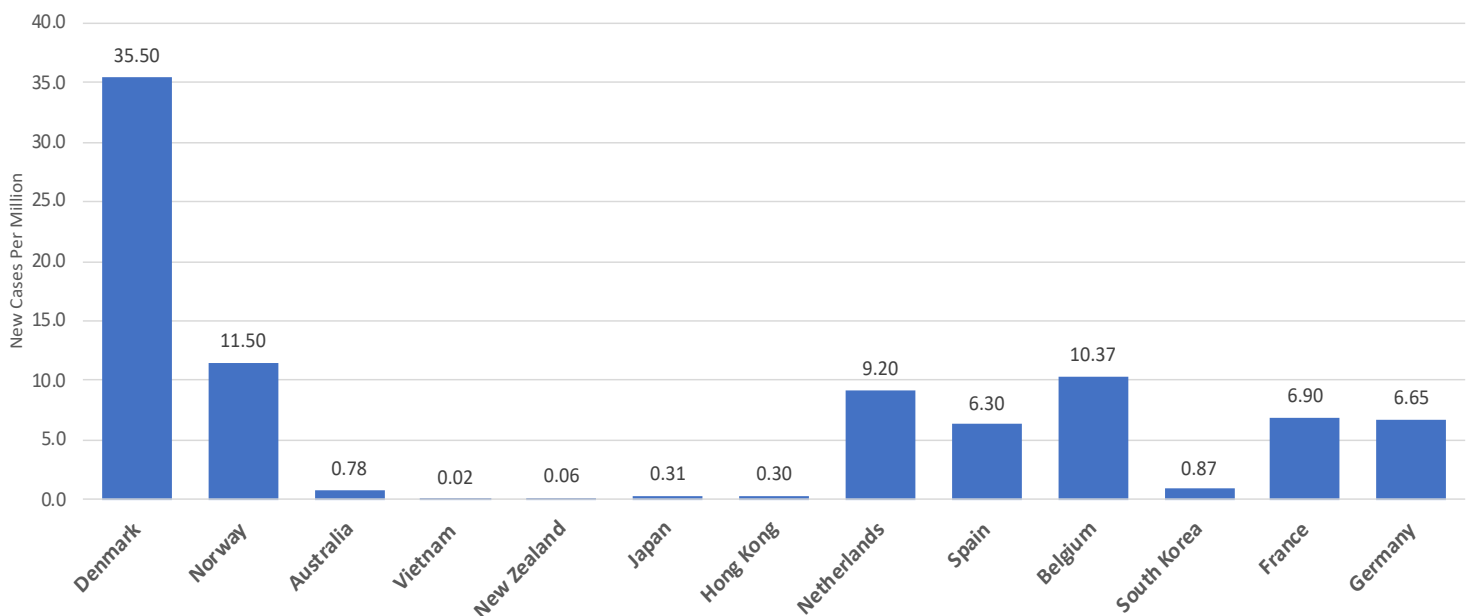
Georgia. Case report from an overnight camp in Georgia reported 290 cases of COVID-19 among 597 residents. The overall attack rate was 44% (260 of 597): 51% among those aged 6–10 years, 44% among those aged 11–17 years, and 33% among those aged 18–21 years. The study adds to the body of evidence that children of all ages are susceptible to SARS-CoV-2 and could play an important role in transmission. The camp reported having adopted most components of CDC recommendations for Youth and Summer Camps but did not implement mask requirements for campers or enhanced ventilation measures. (Published July 2020).

<https://www.cdc.gov/mmwr/volumes/69/wr/mm6931e1.htm>

Appendix B: Reopening Thresholds and Best Practices for Schools That Have Reopened Successfully

Strategies Successful Countries Have Implemented in Reopening: Countries that have successfully reopened schools have, with few exceptions, done so when community transmission rates were below 10 cases/million/day and well past the highest number of daily recorded cases (see Figures 1 and 2). Most countries have emphasized physical distancing of students greater than 3-6 feet; restricted building access to essential personnel only; enhanced cleaning/disinfection procedures; increased frequency of handwashing; and required teachers and/or students to use face coverings. Many countries have also reduced class sizes, adopted a hybrid approach to reduce the density of students in school buildings at one time, and implemented cohorting of students in small, consistent groups to reduce the number of interactions and contacts of each individual. Best practices, epidemic curves, and community transmission rates at the time of school reopening of countries that have successfully reopened schools with minimal school-related cases are detailed below.

Figure 1. Reopening Thresholds for Schools by Selected Countries. Average = 6.83 cases/M/D



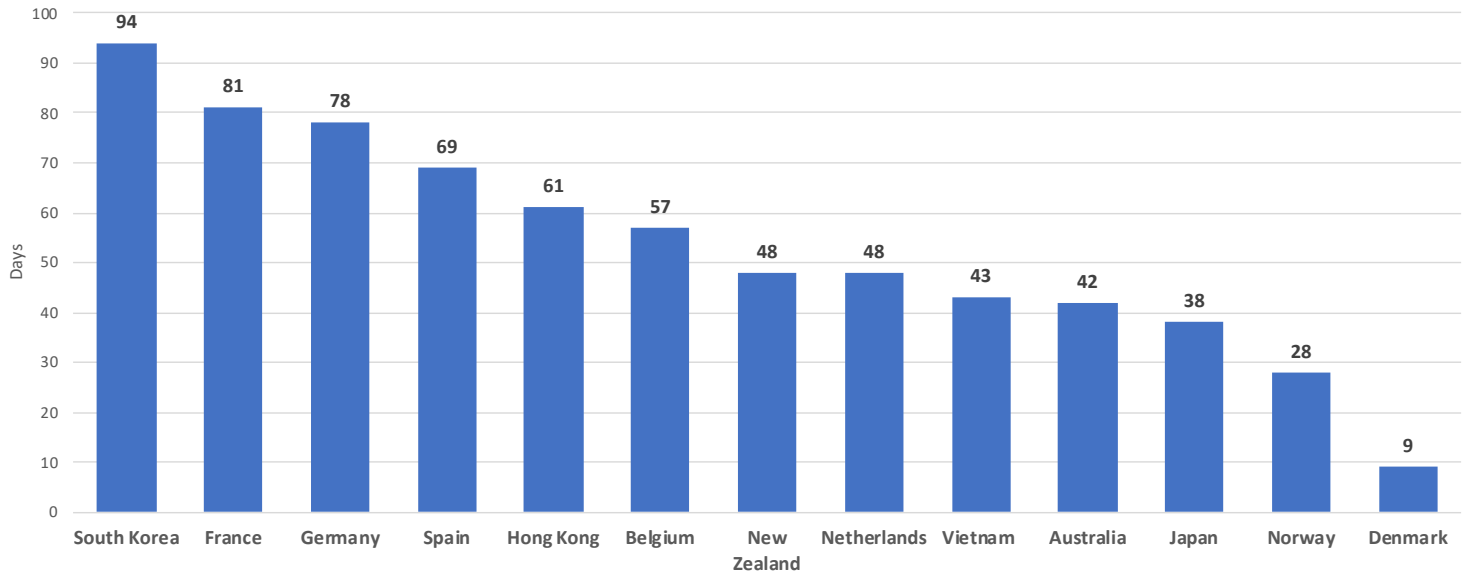
*Included countries: Australia, New Zealand, Denmark, Norway, France, Germany, Belgium, Spain, Netherlands, Hong Kong, Vietnam, Japan, Singapore and South Korea.

*Singapore, which re-opened school at 81.3/million cases, excluded because cases confined to migrant camps.

*Denmark gradually re-opened schools at 35.5 cases/m/7-day average (started K-5 with a dozen pupils per pod)

*Data source: <https://ourworldindata.org/coronavirus>

Figure 2. Number of days from peak onset of COVID-19 to schools re-opening by selected countries. Average = 53.5 days.



*Included countries: Australia, New Zealand, Denmark, Norway, France, Germany, Belgium, Spain, Netherlands, Hong Kong, Vietnam, Japan, Singapore and South Korea.

*Singapore which re-opened school at 81.3/million cases excluded because cases confined to migrant camps.

*Denmark gradually re-opened schools at 35.5 cases/m/7-day average (started K-5 with a dozen pupils per pod)

*Data source: <https://ourworldindata.org/coronavirus>

Table 1. Country Comparisons of Reopening Thresholds and Strategies for Reopening

	Daily Cases Per Million at Reopening	Strategies to Reopening*
Austria	9	Prioritized graduating classes before bringing back other students. <ul style="list-style-type: none"> • Staggered schedules (one group Mon-Wed, another group Thur-Fri) • In some schools, gymnasiums used instead of classrooms for distancing • Masks initially required but no longer required for students • Signage on hygiene policies and one-way movement posted
Belgium	10.4	Prioritized nursery and primary school students returning first. <ul style="list-style-type: none"> • Some classes have met in other buildings (e.g., churches) to spread out • Students remain in small, consistent cohorts • One cohort per time at recess • Hybrid approach for larger classes (each cohort attend two days per week) • Students bring their own lunch and eat in classrooms • Separate entrances for each class • Masks required for students, teachers, and staff

Denmark	35	<p>Brought back primary grades first, with older students about one month later.</p> <ul style="list-style-type: none"> • Hybrid approach to reduce density • Class sizes reduced to enable 6-feet of distancing (~ 10/class) • Consistent, self-contained small cohorts • Outside play limited to small groups with homeroom • To reduce density, Denmark asked families to keep their children at home if at least one parent does not work • Use alternative spaces, including gyms and outdoor spaces • Reserved public parks and buildings (e.g., museums, libraries) • Teachers (rather than students) rotate classrooms in secondary schools • Specialists (e.g., art) done via video chat • Lunch at desks in classrooms • Buses: half capacity, one student per row • Temperature checks on arrival • Students handwash every 2 hours
Finland	9	<p>Prioritized return of students from daycares and Grades 1-9 first</p> <ul style="list-style-type: none"> • Normal class sizes but classes cohorted and do not mix • Staggered start times (15 minutes between grades) • Staggered break times • Some classes moved to larger rooms (e.g., gyms), others split into two classrooms • Teacher assigned to classes • Handwashing required on entrance to school
France	6.9	<p>Prioritized bringing back preschool, primary school and junior high students. After first week of in-person learning, approximately 70 COVID-19 cases had been linked to schools.</p> <ul style="list-style-type: none"> • Physical distancing initially required, but now considered only highly recommended for preschool and primary school students • Masks required when physical distancing cannot be achieved
Germany	6.65	<p>Prioritized graduating seniors to prepare for college entrance exams. Two-week trial with open high schools did not increase cases, prompting further reopening.</p> <ul style="list-style-type: none"> • Hybrid approach to increase onsite spacing • Focus on math and grammar for in-person instruction • Reduced class sizes by half (~15 students) • One-way hallways to limit crossover • Opened windows and doors for circulation • Masks required for teachers; student requirements vary by state • High-risk older teachers out of school
Japan	0.31	<ul style="list-style-type: none"> • Parents are expected to take and log child's temperature each morning • Students attend on alternate days • All students, teachers, and staff are required to wear masks • Visual cues indicate appropriate distancing in areas where lines are formed • Students are required to wash hands upon entering the building • Lunch is eaten at desks in classrooms
Netherlands	9.20	<p>Prioritized bringing primary school students back.</p> <ul style="list-style-type: none"> ▪ Reduced class sizes by half (~15 students) ▪ Hybrid approach (half in school, half do remote learning and switch days) ▪ Physical distancing between students and teachers and between adults, but no physical distancing required between younger students

New Zealand	0.06	All grades returned at the same time. <ul style="list-style-type: none"> • Designated drop-off zones and parents not allowed to enter school grounds • Parents provided continued at-home learning option
Norway	11.5	Prioritized bringing back preschool and primary school students. <ul style="list-style-type: none"> • Small cohorts (primary classes capped at 15 students, 20 for middle schools) • Use outdoor spaces as much as possible • Outdoor space is divided, and use staggered between groups • Play limited to homeroom small groups • Lunch at desks in classrooms • If cafeterias used, homeroom groups enter in shifts and eat together • Buses: one student per row • Temperature checks on arrival • Students clean/disinfect materials daily
Singapore	81.3* *High community transmission rates were primarily a result of outbreaks among migrant workers.	Began by bringing back graduating cohorts of primary and secondary schools. All other students alternated between online and in-person classes on a weekly basis. <ul style="list-style-type: none"> • Hybrid approach for most students • No maximum class size when classroom space large enough to accommodate 6-foot physical distancing • Staggered arrival/dismissal times • Assigned seating in cafeteria with physical distancing • Masks required for students & teachers • Interschool sports suspended
South Korea	0.87	Brought back high school seniors first to prepare for college entrance exams. Delayed reopening several times due to spikes in community cases. <ul style="list-style-type: none"> • Many schools have implemented hybrid schedule with alternating in-person and distance learning every other day • Staggered start times • Reduced class sizes • Online training on hygiene and health policies one week before school began • Masks required for students & teachers • Temperature checks 2X day
Spain	6.3	Different age groups have returned at different times, varying by region <ul style="list-style-type: none"> • Prioritize outdoor spaces for classes • Small cohorts for children in primary schools (up to 20) • Physical distancing for older students • Masks required for older students when not in classrooms
Vietnam	0.02	Older students returned first, followed by primary school students one week later <ul style="list-style-type: none"> • Mandatory temperature checks upon entering school building • Students, staff, and teachers required to wear masks • Strict physical distancing is enforced in school buildings

*Strategies do not necessarily apply to all schools, but are examples of widely adopted country strategies

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