



# Rapid Review Update 9: What is the specific role of daycares and schools in COVID-19 transmission?

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# Executive Summary

## Background

As jurisdictions continue to lift restrictions implemented to slow the spread of coronavirus disease 2019 (COVID-19), they face major decisions about how to re-open and operate schools and daycares. While children are known to be effective vectors for other viruses, such as influenza, their role in the transmission of COVID-19 is much less clear.

This rapid review was produced to support public health decision makers' response to the COVID-19 pandemic. This review seeks to identify, appraise and summarize emerging research evidence to support evidence-informed decision making.

This rapid review is based on the most recent research evidence available at the time of release. A previous version was completed on October 5, 2020. This updated version includes evidence available up to October 13, 2020.

In this rapid evidence review, we answer the question: **What is the specific role of daycares and schools in COVID-19 transmission?**

## What Has Changed in This Version?

- A large cross-sectional study from the United States in which childcare providers were surveyed, found that there was no association between attendance at a childcare facility and COVID-19 as an outcome.
- Two new single studies and a synthesis provide evidence that adults are more commonly responsible for transmission in households and childcare settings:
  - A synthesis of 43 household studies determined that adult close contacts were more likely than children to be infected with COVID-19. Adults were also found to have higher secondary attack rates than children (33.3% and 16.9% respectively).
  - A prevalence study from Greece analyzing reported child cases (0-19 years), reported transmission occurred more frequently from an adult to child, with limited or no evidence of adolescent to parent or child to child transmission among families. The school setting was indicated as the source of infection in a very small number of child cases (2%).
  - A case report identified that a staff index case in one childcare facility in Poland resulted in multiple secondary cases (n=27), primarily among children attending the facility and parents; overall positivity rate was 27%. Infection control measures included mask wearing by staff while in contact with children and parents, and cohorting of classes.
- Two additional new studies describe household transmission primarily from child/adolescent to adults outside of school/daycare settings:
  - A household based case report described an adolescent index case with prolonged exposure to contacts during a 3-week family gathering resulting in 11 secondary cases (6=positive, 4=probable, or 1=suspected); more cases were among adults. Among these cases, mask wearing or physical distancing was not practiced.
  - In a cohort study from the United States, 224 primary cases of children and adolescents linked to an overnight camp outbreak resulted in 48 secondary household cases; 7 cases were in contacts <18 years old, with the majority (n=41)

over the age of 18. Of note, some of the primary cases wore masks or went into isolation upon returning home.

## Key Points

- Based on the published reports to date from both prior to COVID-19 lockdown and following re-opening, the risk of transmission from children to children and children to adults in primary school and daycare settings appears low, particularly when infection control measures are in place. The certainty of the evidence is low (GRADE), and findings may change as new data become available.
- Within clusters and outbreaks, adult to adult transmission seems to be more common than child to adult or adult to child. Certainty of the evidence is very low (GRADE), and findings are very likely to change as new data become available.
- Implementation of infection control measures appear to be important to limiting spread as evidenced by several outbreaks where limited or no measures were in place. Across jurisdictions reviewed, there is wide variability in policies in place limiting the ability to evaluate the impact of specific infection prevention and control measures or make best practice recommendations for daycare or school settings due to variability in measures implemented.

## Overview of Evidence and Knowledge Gaps

- Building upon earlier case reports, contact tracing and prevalence studies, there is a growing body of reports using national or regional surveillance data and comprehensive contact tracing and testing strategies to minimize the likelihood of underestimation of cases.
- Surveillance data of outbreaks in school and daycare settings in the United States is inconsistent with data reported from other jurisdictions. Interpretation of this data is limited as key details such as index case and information about secondary transmission and infection control measures in place is not provided. Variation across the United States suggesting levels of community transmission is important is consistent with recent analyses from the United Kingdom and Canada.
- Contact tracing studies have identified much lower transmission by children to children, and children to adults than from adults to adults and adults to children in school and household settings. Limited evidence suggests the likelihood of infected adults transmitting to students is possible, but less likely than adult to adult transmission.
- Limited evidence suggests adult to child transmission in household and daycare settings, as well as child/adolescent to adult transmission in households is also possible.
- Infection control measures were highly variable across jurisdictions scanned. It is important to note that there may be regional variations in policies in place above what are reported in national guidelines.
- While surveillance reports are identifying cases among staff and students in schools, these commonly include single cases or a small number of cases typically less than 5.
- Within daycares most jurisdictions described enhanced hand hygiene (67%, 33% did not describe), cleaning protocols (67%, 33% did not describe), and pre-attendance screening (67%, 33% did not describe). Most jurisdictions (67%) recommended some degree of cohorting (33% did not describe). Minimizing contact (i.e. physical distancing) between groups of children was described in only one jurisdiction (11%), was not required in 3 jurisdictions (33%) and was not described in 4 (56%). One jurisdiction (11.1%) required masks for all children, one (11.1%) in common areas only, and 3 (33.3%) did not require

students to wear masks (44.4% not described). Masks were required for staff in 55.6% of settings (not required in 22.2% and not described in 22.2%).

- Within primary schools, most jurisdictions described enhanced hand hygiene (92.3%, 7.7% not described), cleaning protocols (69.2%, 30.8% not described) and pre-attendance screening (76.9%, 23.1% not reported). Cohorting was reported in 69% of jurisdictions (31% not described). Over half of the jurisdictions require students to physically distance (61.5%) while 30.8% do not require distancing between students, and such was not described in one jurisdiction. Requirements on wearing masks among students was described to varying degrees among 62% of the jurisdictions and was not required in 38% of them. Physical distancing and mask wearing were also commonly required amongst staff (76.9%, 54% respectively).
- Within high schools, almost all jurisdictions described enhanced hand hygiene (100%), enhanced cleaning procedures (69.2%, 30.8% not described), cohorting of students (85%, 15% not described), and physical distancing amongst staff (92%); mandatory face mask wear was reported amongst staff (69%, 15% not described) and students (69.2%, 8% not described).

# Methods

## Research Questions

What is the specific role of daycares and schools in COVID-19 transmission?

1. What is known about the likelihood of transmission of COVID-19 among children and adults in daycare and schools and among children to their household members?
2. What is known about the likelihood of transmission of COVID-19 by toddlers and school-aged children to others in other settings?
3. What infection prevention and control policies have been put in place in daycares and schools that have published data on COVID-19 cases amongst students and teachers following re-opening?

## Search

The following databases and sources were searched for evidence pertaining to the role of daycares and schools in the transmission of COVID-19 up to October 13, 2020:

- Pubmed's curated COVID-19 literature hub: [LitCovid](#)
- [Trip Medical Database](#)
- World Health Organization's [Global literature on coronavirus disease](#)
- Joanna Briggs Institute [COVID-19 Special Collection](#)
- [COVID-19 Evidence Alerts](#) from McMaster PLUS™
- [Public Health +](#)
- [COVID-19 Living Overview of the Evidence \(L·OVE\)](#)
- Cochrane [Coronavirus \(COVID-19\) Special Collections](#)
- Oxford [COVID-19 Evidence Service](#)
- [Guidelines International Network \(GIN\)](#)
- Cochrane Rapid Reviews [Question Bank](#)
- [Prospero Registry of Systematic Reviews](#)
- NCCMT [COVID-19 Rapid Evidence Reviews](#)
- [MedRxiv preprint server](#)
- NCCDH [Equity-informed Responses to COVID-19](#)
- NCCEH [Environmental Health Resources for the COVID-19 Pandemic](#)
- NCCHPP [Public Health Ethics and COVID-19](#)
- NCCID [Public Health Quick Links](#)
- NCCID [Disease Debrief](#)
- NCCIH [Updates on COVID-19](#)
- [Public Health Ontario](#)
- [Institute national d'excellence en santé et en services sociaux \(INESSS\)](#)
- [Uncover \(USHER Network for COVID-19 Evidence Reviews\)](#)
- Centers for Disease Control and Prevention's [Morbidity and Mortality Weekly Report](#)
- Robert Koch Institute [Situation report of the RKI on COVID-19](#)
- Ontario [COVID-19 cases in schools and child care centres database](#)
- Alberta [COVID-19 school status map](#).

A copy of the search strategy is available at this [link](#).

Information on policies for childcare and educational settings were retrieved from the scientific publications and governmental public health webpages for the jurisdictions included in research articles in this review.

## Study Selection Criteria

The search first included recent, high-quality syntheses. If no syntheses were found, single studies were included. English-language, peer-reviewed sources and sources published ahead of print before peer review were included. Grey literature were excluded.

	Inclusion Criteria	Exclusion Criteria
Population	Children and adolescents aged 1–18	Infants
Intervention	Exposure to or diagnosis of COVID-19	
Comparisons	-	
Outcomes	Transmission of COVID-19	
Setting	Schools, daycares, playgrounds, parks, homes	

## Data Extraction and Synthesis

Data on study design, setting, location, population characteristics, interventions or exposure and outcomes were extracted when reported. We synthesized the results narratively due to the variation in methodology and outcomes for the included studies.

The identified syntheses relevant to this report had considerable overlap in the primary literature but varied in the data reported across reviews for the same primary studies. We chose to conduct a new synthesis rather than reporting the overlapping results of the identified syntheses in order to present the data most succinctly and clearly. The primary studies were used to extract study characteristics and key findings, and to appraise study quality.

## Appraisal of Evidence Quality

We evaluated the quality of included evidence using critical appraisal tools as indicated by the study design below. Quality assessment was completed by one reviewer and verified by a second reviewer. Conflicts were resolved through discussion.

Study Design	Critical Appraisal Tool
Synthesis	Assessing the Methodological Quality of Systematic Reviews (AMSTAR) <a href="#">AMSTAR 1 Tool</a>
Cohort	Joanna Briggs Institute (JBI) <a href="#">Checklist for Cohort Studies</a>
Case Series	Joanna Briggs Institute (JBI) <a href="#">Checklist for Case Series</a>
Case Report	Joanna Briggs Institute (JBI) <a href="#">Checklist for Case Reports</a>
Prevalence	Joanna Briggs Institute (JBI) <a href="#">Checklist for Prevalence Studies</a>
Cross sectional	Joanna Briggs Institute (JBI) <a href="#">Checklist for Analytical Cross Sectional Studies</a>

Completed quality assessments for each included study are available on request.

The Grading of Recommendations, Assessment, Development and Evaluations ([GRADE](#)) approach was used to assess the certainty in the findings based on eight key domains.

In the GRADE approach to quality of evidence, **observational studies**, as included in this review, provide **low quality** evidence, and this assessment can be further reduced based on other domains:

- High risk of bias
- Inconsistency in effects
- Indirectness of interventions/outcomes
- Imprecision in effect estimate
- Publication bias

and can be upgraded based on:

- Large effect
- Dose-response relationship
- Accounting for confounding.

The overall certainty of the evidence for each outcome was determined taking in to account the characteristics of the available evidence (observational studies, some not peer-reviewed, unaccounted-for potential confounding factors, different tests and testing protocols, lack of valid comparison groups). A judgement of 'overall certainty is very low', means that the findings are very likely to change as more evidence accumulates.

## Findings

### Summary of Evidence Quality

In this update, five new single studies, three in-progress single studies, one new synthesis, and six updates to previously included studies were identified for a total of 74 publications addressing two distinct questions.

In this version a search was undertaken for infection control policies in place in jurisdictions with published data included in this review.

Question	Evidence included		Overall certainty in evidence
What is known about the likelihood of transmission of COVID-19 among children and adults in daycare and schools and among children to their household members?	Syntheses In progress syntheses Single studies In progress single studies	10 4 33 3	Low
What is known about the likelihood of transmission of COVID-19 by toddlers and school-aged children to others in other settings?	Syntheses In progress syntheses Single studies In progress single studies	14 4 14 1	Very low
What infection prevention and control policies or procedures have been implemented in daycares and schools?	Policy documents	17	Not applicable

### Warning

Given the need to make emerging COVID-19 evidence quickly available, many emerging studies have not been peer reviewed. As such, we advise caution when using and interpreting the evidence included in this rapid review. We have provided a summary of overall certainty of the evidence to support the process of decision making. Where possible, make decisions using the highest quality evidence available.



## Question 1: What is known about the likelihood of transmission of COVID-19 among children and adults in daycare and primary schools and children to their household members?

**Table 1: Single Studies**

Reference	Date Released	Study Design	Location	Setting	Summary of Findings	Quality Rating:
<b>Data collected following school re-opening</b>						
<b>New evidence reported October 22, 2020</b>						
Government of Ontario. (2020, October 14). <a href="#">COVID-19 cases in schools and child care centres.</a>	Oct 14, 2020	Prevalence	Ontario	Primary, secondary schools, and childcare	<p>As of Oct 14, 2020, 1,040 school-related cases had occurred in those connected to publicly funded schools in Ontario:</p> <ul style="list-style-type: none"> <li>• 580 student cases (376 in last 14 days)</li> <li>• 168 staff cases (95 in last 14 days)</li> <li>• 292 other cases (not identified) (174 in last 14 days)</li> </ul> <p>421 (8.72%) schools currently reported cases and 5 schools (0.10%) were currently closed.</p> <p>261 cases occurred in those connected to childcare settings in Ontario:</p> <ul style="list-style-type: none"> <li>• 149 child cases (93 in last 14 days)</li> <li>• 112 staff/provider cases (61 in last 14 days)</li> </ul> <p>119 centres (2.28%) had a reported case and 29 centres (0.56%) were closed.</p>	Moderate
Government of Alberta. (2020, October 14). <a href="#">COVID-19 school status map.</a>	Oct 14, 2020	Prevalence	Alberta	Primary and secondary schools	<p>As of Oct 14, 2020:</p> <ul style="list-style-type: none"> <li>• 21 schools (% unknown) on watch status (a school outbreak declared, <math>\geq 5</math> cases COVID-19 may have been acquired/transmitted at school).</li> <li>• 68 schools (% unknown) reported an outbreak of 2-4 cases in a 14-day period, COVID-19 may have been acquired/transmitted at school.</li> </ul>	Moderate

National Institute for Public Health and the Environment (RIVM). (2020, October 14). <a href="#">Children and COVID-19.</a>	Oct 14, 2020	Prevalence	Netherlands	Primary schools, childcare facilities	<p>Prior to school closures on March 16<sup>th</sup>, there were no reports of COVID-19 clusters linked to school or childcare facilities.</p> <p>Partial school re-opening began on May 11 and schools were fully reopened on June 8<sup>th</sup>.</p> <p>There are a few reports of school employees becoming infected with COVID-19 (0.7%); there are no reports of employees being infected by children.</p>	Low
Robert Koch Institute. (2020, October 12). <a href="#">Coronavirus Disease 2019 (COVID-19) Daily Situation Report of the Robert Koch Institute.</a>	Oct 12, 2020	Prevalence	Germany	Childcare, schools, after school care, other educational facilities, children's homes, camps	<p>Of 325,331 cases in Germany until Oct 12, 10,844 (3.3%) were in those cared for or attending childcare/school/camp settings and 5,216 (1.6%) were in staff employed in these settings.</p> <p>No information available on source of exposure or the total number of staff and students who attended during the time period.</p> <p>Prevalence was lower than other settings such as hospitals and clinical settings (6.6% of total), congregate living settings (10% of total) and similar to prevalence of cases in the food sector (2.1% of total). No data is given on the number of people employed in these settings.</p>	Moderate
Okarska-Napierala, M., Mańdziuk, J., & Kuchar, E. (2020). <a href="#">SARS-CoV-2 Cluster in Nursery, Poland. Emerging Infectious Disease.</a> Epub ahead of print.	Oct 9, 2020	Case Report	Poland	Childcare	<p>Following a nationwide lockdown, a childcare facility reopened on May 18. Infection control procedures (e.g., cohorting, workers wore facemasks) were implemented until the facility was closed on May 31 following a staff worker's contact with a symptomatic COVID-19 case (family member). The staff member tested positive on June 4. Subsequent testing of 2 initial case patients and 104 contacts found positive cases for:</p> <ul style="list-style-type: none"> <li>• 4 nursery workers (1 who was also a parent of a child at the facility)</li> <li>• 3 children of staff</li> <li>• 8 children attending the facility</li> <li>• 3 siblings of those children</li> <li>• 8 parents</li> <li>• 1 grandparent</li> </ul> <p>Overall positivity rate was 27%.</p>	Low

<p>COVID-Explained. (2020, October 4). <a href="#">Data Overview: Child Care Centers, Camps, and Outbreaks</a></p>	<p>Oct 4, 2020</p>	<p>Surveillance (crowd-sourced)</p>	<p>United States</p>	<p>Daycares, camps  Infection control measures and community transmission vary within and across state.</p>	<p>State-level data as of Oct 4 (unless noted):</p> <ul style="list-style-type: none"> <li>• Arizona: As of Oct 2, 26 child/daycare facilities with positive cases</li> <li>• California: As of Oct 1, across 9644 open childcare facilities, 1616 cases have been reported (46% staff, 25% children, 27% parents, 2% other)</li> <li>• Colorado: As of Sept 30, 11 childcare facilities have reported outbreaks (active and resolved) with a total of 56 confirmed or probable cases (46% staff, 54% children)</li> <li>• Georgia: As of Oct 2, 2314 childcare facilities were opened (75%).</li> <li>• Kansas: As of Oct 2, 14 outbreaks in daycares with 52 cases and 27 outbreaks in schools with 197 cases (4 hospitalizations)</li> <li>• Minnesota: Of 505 childcare programs with confirmed cases, 347 have had 1 case, 126 have had 2-4 cases, and 32 have had 5 or more cases. There have been 557 cases amongst child care staff and 266 amongst children</li> <li>• Nevada: As of Oct 2, there have been 48 confirmed cases (35% child, 65% staff) in 30 out of 443 total childcare facilities</li> <li>• North Carolina: As of Oct 2, 12 schools (total 112 cases, 35% staff, 65% children) and 10 daycares (total 72 cases, 54% staff [1 death], 46% children) had ongoing clusters</li> <li>• Ohio: 442 reported cases linked to childcare, 75% determined to be acquired through community spread as of July 28</li> <li>• Oregon: 7 current outbreaks with 42 reported cases as of Sept 30</li> <li>• Pennsylvania: 143 child or parent and 211 staff cases reported in licensed childcare facilities as of Oct 1</li> <li>• Rhode Island: 666 childcare centres (29 cases; 17 children and 16 staff) between June 1-July 31.</li> <li>• Texas: 1419 child and 2675 employee reported cases among 2229 facilities from March to Oct 1</li> <li>• Tennessee: 47 facilities with positive cases as of July 14</li> <li>• Utah: As of Oct 2, 33 outbreaks with 159 cases in childcare settings (median age 23), 2501 school associated cases (353 cases in teachers, 1797 in students and 351 in other/unknown).</li> <li>• Virginia: As of Oct 2, 44 outbreaks with 230 cases in childcare settings, 27 outbreaks with 134 cases in schools.</li> </ul>	<p>Not rated</p>
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<p>Gilliam, W.S., Malik, A.A., Shafiq M., Klotz, M., Reyes, C., Humphries, J.E., ... Omer, S.B. (2020). <a href="#">COVID-19 Transmission in US Child Care Programs</a>. <i>Pediatrics</i>. Epub ahead of print.</p>	<p>Oct 1, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>Childcare</p>	<p>Among 57,335 childcare providers who participated in the study:</p> <ul style="list-style-type: none"> <li>• 51.4% reported their childcare facility closed near the start of the pandemic and remained closed.</li> <li>• 48.6% reported their childcare facility did not close, closed but had reopened, or closed at a later date due to a confirmed or suspected case of COVID-19.</li> </ul> <p>No association was found between exposure to child care and COVID-19 in both unmatched (OR=1.06; 95% CI 0.82 to 1.38, p=0.66) and matched (OR=0.94; 95% CI 0.73 to 1.21, p=0.64) analyses.</p> <p>Childcare centres that were open reported high implementation rates of infection mitigation strategies such as increased cleaning, cohorting and smaller group sizes. Findings must also be interpreted in the context of community transmission rates.</p>	<p>Moderate</p>
<b>Previously Reported Evidence</b>						
<p>Otte im Kampe, E., Lehfeld, A. S., Buda, S., Buchholz, U., &amp; Haas, W. (2020). <a href="#">Surveillance of COVID-19 school outbreaks. Germany, March to August 2020</a>. <i>Eurosurveillance</i> 25(38).</p>	<p>Sep 24, 2020</p>	<p>Prevalence</p>	<p>Germany</p>	<p>Schools</p>	<p>From Jan 28 and Aug 31 2020, 48 outbreaks (0.5% of all in Germany) occurred in schools.</p> <p>Of the 216 cases:</p> <ul style="list-style-type: none"> <li>• 102 (47.2%) were in adults age &gt;21</li> <li>• 39 (18.1%) in students aged 15-20</li> <li>• 45 (21.8%) in students aged 11-14</li> <li>• 30 (13.9%) in students aged 6-10</li> </ul> <p>5 school outbreaks were linked to outbreaks in other settings.</p> <p>In 10 outbreaks (21%), only adult cases occurred. In 29 outbreaks (60%), only one grade was affected.</p> <p>Most outbreaks had a small number of cases; only 2 outbreaks (both prior to school lockdown) had &gt;10 cases. Thus, while there is some indication of transmission in schools, relative to the number of staff and students, data suggests this transmission is limited.</p>	<p>High</p>

<p>Ulyte, A., Radtke, T., Abela, I.R., Haile, S.R., Blankenberger, J., Jung, R., ... Kriemler, S. (2020). <a href="#">Variation in SARS-CoV-2 seroprevalence in school-children across districts, schools and classes</a>. <i>Preprint</i>.</p>	<p>Sep 18, 2020</p>	<p>Prevalence</p>	<p>Zurich, Switzerland</p>	<p>Schools</p>	<p>From June 16 – July 9, 2020, testing of 2585 children in 55 randomly selected schools found a seroprevalence rate of 2.8% (95% CI 1.6-4.1%). Participation rate was 45% (5% to 94% across classes).</p> <p>Seroprevalence rates were higher in younger children:</p> <ul style="list-style-type: none"> <li>• Grades 1-2 = 3.8% (95% CI 1.9-6.1%)</li> <li>• Grades 4-5 = 2.5% (95% CI 1.1-4.2%)</li> <li>• Grades 7-8 = 1.5% (95% CI 0.5-3.0%)</li> </ul> <p>Seroprevalence rates were similar in adults, however PCR confirmed cases were much higher for adults (0.24% vs 0.03%).</p> <p>The number of classes with seropositive children was very small suggesting little evidence of major school transmission.</p> <p>Schools were closed between March 16 and May 10, 2020.</p>	<p>Moderate</p>
<p>Fong, M.W., Cowling, B.J., Leung, G.M., &amp; Wu, P. (2020). <a href="#">Letter to the editor: COVID-19 cases among school-aged children and school-based measures in Hong Kong, July 2020</a>. <i>Eurosurveillance</i> 25(37).</p>	<p>Sep 17, 2020</p>	<p>Case Report</p>	<p>Hong Kong</p>	<p>Schools</p>	<p>Secondary schools returned late May and primary schools in early June. Schools closed again July 12 (summer break). By July 18 there were 20 cases in children aged 5-17 years.</p> <p>15 cases were linked to household or community clusters, or unknown source. 5 cases linked to a secondary school cluster and tutorial center cluster.</p> <p>School wide testing occurred for 7/15 cases, and the two school/tutorial center clusters. No other cases in this age range have been linked to the 20 cases.</p>	<p>Moderate</p>

<p>Lopez, A.S., Hill, M., Antezano, J., Vilven, D., Rutner, T., Bogdanow, L., ... Tran, C.H. (2020). <a href="#">Transmission dynamic of COVID-19 outbreaks associated with child care facilities – Salt Lake City, Utah, April-July 2020</a>. <i>Morbidity and Mortality Weekly Report</i> 69(37): 1319–1323.</p>	<p>Sep 11, 2020</p>	<p>Case Series</p>	<p>Utah, United States</p>	<p>Childcare facilities and day camps for school-aged children</p>	<p>From April 1 – July 10 Salt Lake County, Utah identified 17 childcare facilities with at least two confirmed COVID-19 cases; this report describes 3.</p> <p>Amongst 101 staff and children, 22 confirmed cases identified (10 staff, 12 children). Amongst 83 close contacts, 9 confirmed (2 adult, 7 pediatric) and 7 probable (2 adult, 5 pediatric) cases were identified.</p> <p>Facility attack rates ranged from 17%-100%. Overall attack rates ranged from 7%-36%.</p> <p><u>Facility A:</u> (temperature checks, frequent cleaning, staff masks); 12 staff and children, 15 close contacts, 2 confirmed adult cases, no transmission to/from children; index case staff</p> <p><u>Facility B:</u> (temperature checks, frequent cleaning, staff masks); 5 staff and children in setting all tested positive, of 28 close contacts 2 confirmed and 3 probable cases; likely transmission from children to household; index case staff</p> <p><u>Facility C:</u> (home temperature and symptom screening requested, no masks); 84 staff and children, 15 confirmed cases ; 40 close contacts had 5 confirmed and 2 probable cases; likely transmission from children; index case unknown</p>	<p>High</p>
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<p>Ehrhardt, J., Ekinci, A., Krehl, H., Meincke, M., Finci, I., Klein, J., ... Brockmann, S.O. (2020). <a href="#">Transmission of SARS-CoV-2 in children aged 0 to 19 years in childcare facilities and schools after their reopening in May 2020, Baden-Württemberg, Germany.</a> <i>Eurosurveillance</i> 25(36): pii=2001587.</p>	<p>Sep 10, 2020</p>	<p>Prevalence</p>	<p>Germany</p>	<p>Children's homes, childcare, schools</p>	<p>557 confirmed cases in children 0-19 in Baden-Württemberg, Germany May 25 - Aug 5, 1 week after opening to 1 week after summer closure. School data available for 453 cases; 137 attended school or childcare for at least 1 day during infectious period.</p> <p>Source of transmission was primarily household (41.9%), followed by event (8.4%), school or childcare (3.3%), church (3.1%), travel (1.1%). 41.3% had unknown source, but unlikely to be school or childcare due to close examination of close contacts.</p> <p>In a school or childcare setting, 11 cases were infected by another pupil and 4 cases infected by a teacher.</p> <p>Across settings, group sizes reduced by 50%, enhanced cleaning, ventilation, exclusion of sick children and hand hygiene. Masks not required for students in the class but were required outside for some primary and secondary schools. Physical distancing only required for secondary school.</p>	<p>Moderate</p>
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<p>Link-Gelles, R., DellaGrotta, A.L., Molina, C., Clyne, A., Campagna, K., Lanzieri, T.M., ... Bandy, U. (2020). <a href="#">Limited Secondary Transmission of SARS-CoV-2 in Child Care Programs -Rhode Island, June 1- July 31, 2020.</a> <i>Morbidity and Mortality Weekly Report</i> 69(34): 1170-1172.</p>	<p>Aug 28, 2020</p>	<p>Case Series</p>	<p>Rhode Island, United States</p>	<p>Childcare</p>	<p>Childcare programs re-opened on June 1, 2020; data presented on all possible childcare-associated COVID-19 cases to July 31, 2020.</p> <p>52 positive/probable cases of 101 possible cases reported:</p> <ul style="list-style-type: none"> <li>• 30 (58%) children (median age = 5 years)</li> <li>• 22 (42%) adults (20 teachers, 2 parents)</li> </ul> <p>Cases occurred in 29 (4.4%) of 666 re-opened childcare programs:</p> <ul style="list-style-type: none"> <li>• 20 programs (69%) had a single case with no secondary transmission</li> <li>• 5 programs (15%) had 2-5 cases with no secondary transmission</li> <li>• 4 programs (0.6%) had possible secondary transmission</li> </ul> <p>Among 4 programs with possible secondary transmission:</p> <ul style="list-style-type: none"> <li>• Program #1: 5 children, 4 staff, 1 parent; 60 children and 21 staff quarantined</li> <li>• Program #2: 3 confirmed cases; 26 students and 17 staff quarantined</li> <li>• Program #3: 2 cases; appear un-linked but cannot confirm</li> <li>• Program #4: 1 staff, 1 child; 37 students and 16 staff quarantined</li> </ul> <p>In programs where secondary transmission likely took place, epidemiologic investigations identified lack of adherence to Department of Health guidelines (e.g., movement between groups/classrooms).</p>	<p>Moderate</p>
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<p>Blaisdell, L.L., Cohn, W., Pavell, J.R., Rubin, D.S. &amp; Vergales, J.E. (2020). <a href="#">Preventing and Mitigating SARS-CoV-2 Transmission – Four Overnight Camps, Maine, June-August 2020</a>. <i>Morbidity and Mortality Weekly Report</i> 69(35): 1216-1220.</p>	<p>Aug 26, 2020</p>	<p>Case Report</p>	<p>Maine, United States</p>	<p>Overnight camps</p>	<p>642 children and 380 staff members (aged 7-70 years) attended 4 overnight camps from June to August 2020.</p> <p>12 attendees (11 children and 1 staff) were identified as having COVID-19 related signs or symptoms during daily screening checks. All tested negative.</p> <p>Three asymptomatic attendees tested positive for SARS-CoV-2 after camp arrival (1 child, 2 staff). They were immediately isolated, and respective cohorts quarantined. No secondary transmission was identified.</p> <p>Preventative measures included prearrival quarantine, pre- and post-arrival testing and symptom screening, cohorting, face coverings, physical distancing, enhanced hygiene, cleaning and disinfecting and maximal outdoor programming.</p>	<p>Moderate</p>
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<p>Ismail, S.A., Saliba, V., Lopez Bernal, J., Ramsay, M.E., &amp; Ladhani, S.N. (2020). SARS-CoV-2 infection and transmission in educational settings: cross-sectional analysis of clusters and outbreaks in England. <i>Preprint</i>.</p>	<p>Aug 24, 2020</p>	<p>Cross-sectional</p>	<p>England</p>	<p>Preschools, primary, secondary, schools</p>	<p>From June 1-30, 2020, Public Health England conducted enhanced surveillance including daily monitoring of school. Staggered reentry ranged from 475 000 to 1 646 000 children attended 20 500 to 23 400 settings.</p> <p>101 reports of confirmed 70 cases in children and 128 cases in staff:</p> <ul style="list-style-type: none"> <li>• 67 reports involved a single case with no secondary transmission</li> <li>• 4 reports described co-primary cases (cases coming from the same household, all asymptomatic but identified through contact with a known household case)</li> <li>• 30 reports confirmed outbreaks of <math>\geq 2</math> cases</li> </ul> <p>Outbreaks:</p> <ul style="list-style-type: none"> <li>• 53% of confirmed outbreaks involved only one secondary case linked to the index case</li> <li>• Probably transmission was staff-to-staff (n = 15), staff-to-student (n = 7), student-to-staff (n = 6) and student-to-student (n = 2)</li> </ul> <p>Number of outbreaks was correlated with community infection rates.</p> <p>Rates of infection were highest in youngest children:</p> <ul style="list-style-type: none"> <li>• Early years: 9.9 per 100,000 students/day (CI=6.2-15.0)</li> <li>• Primary: 8.3 per 100,000 students/day (CI=6.0-11.0)</li> <li>• Secondary: 2.0 per 100,000 students/day (CI=0.24-7.1)</li> <li>• Staff: 20.6 per 100,000 staff/day (CI=16.9-24.9)</li> </ul> <p>Rates of outbreaks highest in primary schools:</p> <ul style="list-style-type: none"> <li>• Early years: 0.51 outbreaks per 1,000 settings/month (CI=0.05-0.80)</li> <li>• Primary: 4.8 outbreaks per 1,000 settings/month (CI=0.20-1.04)</li> <li>• Secondary: 1.6 outbreaks per 1,000 settings/month (CI=0.58-3.4)</li> </ul>	<p>Moderate</p>
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<p>European Centre for Disease Prevention and Control (2020, August 6). <a href="#">COVID-19 in children and the role of school settings in COVID-19 transmission.</a></p>	<p>Aug 6, 2020</p>	<p>Cross-sectional</p>	<p>Europe and UK</p>	<p>Preschools, schools</p>	<p>15 of 31 European and UK countries responded to a telephone survey about cases or outbreaks in schools:</p> <ul style="list-style-type: none"> <li>• 4 countries reported no cases in schools</li> <li>• 5 reported individual cases in students or staff with no secondary transmission</li> <li>• 5 countries reported limited clusters of &lt;10 cases in school settings involving few secondary cases</li> <li>• 1 country reported a cluster of ≥10 cases in a school setting (4 students, 9 staff)</li> </ul> <p>Countries which had reopened schools did not see an increase in cases.</p>	<p>Low</p>
<p>Yoon, Y., Kim, K.R., Park, H., Kim, S.Y., &amp; Kim, Y.J. (2020). <a href="#">Stepwise School Opening Online and Offline and an Impact on the Epidemiology of COVID-19 in the Pediatric Population.</a> Preprint.</p>	<p>Aug 4, 2020</p>	<p>Prevalence</p>	<p>Korea</p>	<p>Schools</p>	<p>Report of phased school opening for all grades from May 20 to June 8, data collected to July 11. Proportion of pediatric cases nationally remained constant (~7.0%).</p> <p>A total of 45 children had confirmed COVID-19 cases in 40 schools. Additional testing of more than 11,000 students found only one additional case.</p> <p>71.1% of cases had known source of infection; 78% of known sources were family. Older children were more likely to have unknown source. Younger children were more likely to be infected by a family member.</p>	<p>Moderate</p>

<p>Macartney, K., Quinn, H.E., Pillsbury, A.J., Koirala, A., Deng, L., Winkler, N., ... Chant, K. (2020). <a href="#">Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study</a>. <i>The Lancet Child &amp; Adolescent Health</i>. Epub ahead of print.</p>	<p>Aug 3, 2020</p>	<p>Cohort</p>	<p>New South Wales, Australia</p>	<p>Daycare, primary and secondary school</p>	<p>From Jan 25 to April 10, all lab-confirmed COVID-19 cases in children or staff who attended school or daycare within 24h of symptom onset.</p> <p>15 adults, 12 children (8 secondary school, 1 primary school, 3 daycare) attended while infectious.</p> <p>Of 1448 close contacts identified, 43.7% had RT-PCR testing. Secondary transmission occurred in 4 of 25 settings.</p> <p>In schools, 5 secondary cases (3 children, 2 adults) were identified in 3 schools.</p> <p>No secondary transmission occurred in 9 of 10 daycares, however one outbreak was identified where 6 adults and 7 children were infected.</p> <p>Secondary attack rate of staff to staff was 4.4%, staff to child 1.5%, child to staff 1.0% and child to child 0.3%.</p>	<p>Moderate</p>
<p>National Centre for Immunisation Research and Surveillance. (2020, July 31). <a href="#">COVID-19 in schools and early childhood education and care services – the Term 2 experience in NSW</a>.</p>	<p>Jul 31, 2020</p>	<p>Cohort</p>	<p>Australia</p>	<p>Daycare, primary school, secondary school</p>	<p>Surveillance data from April 10 to July 3 while all daycares were open, and schools were undergoing gradual reopening. Schools were fully reopened with face to face learning by May 25.</p> <p>Daycare:</p> <ul style="list-style-type: none"> <li>• 1 child with confirmed COVID-19 had contact with 84 students and 18 staff in school</li> <li>• 82% of contacts were tested; none tested positive</li> </ul> <p>Primary school:</p> <ul style="list-style-type: none"> <li>• 1 child with confirmed COVID-19 had contact with 15 students and 4 adults in school</li> <li>• 57% of contacts were tested; none tested positive</li> </ul> <p>Secondary school:</p> <ul style="list-style-type: none"> <li>• 2 adolescents with confirmed COVID-19 had contact with a total of 165 students and 23 adults in school</li> <li>• 55% of contacts were tested; none tested positive</li> </ul>	<p>Moderate</p>

<p>Szablewski, C.M., Chang, K.T., Brown, M.M., Chu, V.T., Yousaf, A.R., Anyalechi, N., ... Stewart, R.J. (2020). <a href="#">SARS-CoV-2 transmission and infection among attendees of an overnight camp</a>. <i>Morbidity and Mortality Weekly Report</i> 69(31): 1023-1025.</p>	<p>Jul 31, 2020</p>	<p>Prevalence</p>	<p>Georgia, USA</p>	<p>Overnight summer camp</p> <p>All attendees tested negative within 12 days of attending.</p> <p>Masks for staff but not campers, doors and windows were not opened for ventilation.</p>	<p>158 staff and counsellors took part in training June 17-20. 363 campers and 3 staff joined on June 21.</p> <p>On June 22 a staff member developed symptoms, on June 23 left the camp and on June 24 tested positive. The camp was closed that day.</p> <p>Test results were available for 344 of 597 attendees.</p> <p>Attack rate was highest amongst staff (56%) compared to youth (49%), and those in larger cabins (53%).</p> <p>The authors note they cannot rule out multiple index cases due to high incidence of COVID-19 in Georgia.</p>	<p>Low</p>
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<p>Stein-Zamir, C., Abramson, N., Shoob, H., Libal, E., Bitan, M., Cardash, T., ... Miskin, I. (2020). <a href="#">A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020.</a> <i>Eurosurveillance</i> 25(29): pii=2001352.</p>	<p>Jul 23, 2020</p>	<p>Prevalence</p>	<p>Israel</p>	<p>Regional public school with 1,190 students age 12-18 years and 162 staff.</p> <p>No physical distancing or masks. Children took school buses together and participated in extra-curricular activities (e.g., sports and dance classes).</p>	<p>Within 10 days of schools reopening an outbreak among high school students was observed linked back to 2 independent index cases. The prevalence of confirmed cases was 13.1% among students and 16.4% among teachers.</p> <p>Cases were highest in grade 7 and grade 9. There was no report of the grade of index cases, or prevalence among close contacts.</p> <p>Prior to school reopening regional prevalence rate among those age 10-19 years was 19.8%. Following opening of schools, the prevalence increased to 40.9%.</p>	<p>Low</p>
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<p>Public Health Agency of Sweden. (2020, July 7). <a href="#">Covid-19 in schoolchildren A comparison between Finland and Sweden.</a></p>	<p>Jul 7, 2020</p>	<p>Prevalence</p>	<p>Sweden Finland</p>	<p>Preschool, primary school, secondary school</p> <p>In Finland, all schools were closed in March 2020.</p> <p>In Sweden only secondary and post-secondary schools were closed.</p>	<p>As of June 14, 2020: In Finland, 584 out of 7,110 (8.2%) reported cases of COVID-19 were among children ages 1-19 years. Age-specific rates were:</p> <ul style="list-style-type: none"> <li>• 1-5 years: 36 per 100 000</li> <li>• 6-15 years: 42 per 100 000</li> <li>• 16-19 years: 98 per 100 000</li> </ul> <p>Primary school closures and reopening in Finland did not impact weekly number of reported COVID-19 cases.</p> <p>In Sweden, 1,124 out of 52,424 (2.1%) reported cases of COVID-19 were among children ages 1-19 years. Age-specific rates were:</p> <ul style="list-style-type: none"> <li>• 1-5 years: 16 per 100 000</li> <li>• 6-15 years: 30 per 100 000</li> <li>• 16-19 years: 150 per 100 000</li> </ul> <p>No increased risk of infection was found amongst Swedish school or daycare staff:</p> <ul style="list-style-type: none"> <li>• Daycare, Relative Risk (RR) = 0.9 (95% Confidence Interval (CI), 0.7-1.1)</li> <li>• Primary school, RR = 1.1 (95% CI: 0.9-1.3)</li> <li>• Secondary school, RR = 0.7 (95% CI: 0.5-1.0)</li> </ul>	<p>Low</p>
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Stage, H.B., Shingleton, J., Ghosh, S., Scarabel, F., Pellis, L., & Finnie, T. (2020). <a href="#">Shut and re-open: the role of schools in the spread of COVID-19 in Europe</a> . <i>Preprint</i> .	Jun 26, 2020	Cohort	Germany Denmark Norway Sweden	Community  Preschool, primary school, secondary school infection control measures vary by country.	<p>Timing of school closures coincided with a reduction in the growth rate of COVID-19 cases and hospitalizations compared to data models with no intervention. However, implementation of concurrent community interventions (e.g., travel restrictions, social distancing, banned gatherings) mean is it difficult to determine which interventions were most effective.</p> <p>Reopening of schools among younger student groups and those participating in exams did not result in a significant increase in rates of COVID-19.</p> <p>In countries with low community transmission of COVID-19, return of all students did not appear to increase transmission.</p> <p>The return of older students in a country of high community transmission levels appeared to increase transmission among students but not staff.</p>	Moderate
Yung, C.H., Kam, K., Nadua, K.D., Chong, C.Y., Tan, N.W.H., Li, J., ... Ng, K.C. (2020). <a href="#">Novel coronavirus 2019 transmission risk in educational settings</a> . <i>Clinical Infectious Diseases</i> . Epub ahead of print.	Jun 25, 2020	Case report	Singapore	Preschool, secondary school	<p>1 child with COVID-19 attended a preschool for ages 3–6 (number of contacts not reported):</p> <ul style="list-style-type: none"> <li>• 34 contacts developed symptoms and were tested; none tested positive</li> </ul> <p>1 adolescent with COVID-19 attended a secondary school for ages 12–15 (total number of contacts not reported):</p> <ul style="list-style-type: none"> <li>• 8 contacts developed symptoms and were tested; none tested positive</li> </ul>	High
Folkhälsomyndigh etc. (2020, May 27). <a href="#">Förekomst av covid-19 i olika yrkesgrupper</a> .	May 27, 2020	Prevalence	Sweden	Preschool, primary school, secondary school	<p>National public health data and census data were used to determine the relative risk of COVID-19 infection for various occupations. For occupations working with children, such as primary and secondary school teachers, preschool teachers and nannies, the relative risk of COVID-19 infection was no different than other occupations.</p> <p>Notably, Sweden has not implemented nationwide lockdown measures.</p>	Moderate



Data collected prior to school lockdown measures						
Dub, T., Erra, E., Hagberg, L., Sarvikivi, E., Virta, C., Jarvinen, A., ... Nohynek, H. (2020). <a href="#">Transmission of SARS-CoV-2 following exposure in school settings: experience from two Helsinki area exposure incidents.</a> <i>Preprint.</i>	Jul 30, 2020	Case report	Finland	Primary school, other school not noted.  Infection control procedures not reported.	Case A (age 12) tested positive for COVID-19 in early March after attending school and team sports with minor symptoms since late February. 89 of 121 close school and sport contacts tested; no secondary cases identified.  Case B (school staff) attended work for 2 days while symptomatic. 51 of 63 close contacts tested for antibodies >28 days post-exposure. 6 of 42 students, 1 of 9 teachers were positive for IgG antibodies. 2 students had confirmed case 7- and 6-days post-exposure, 1 student had confirmed COVID-19 >26 days post-exposure, thus source was unconfirmed.  Secondary attack rate for household and extended contacts for students was 17%.  Secondary attack rate for staff was 100% (spouse and two children contacts).	High
Torres, J.P., Piñera, C., De La Maza, V., Lagomarcino, A.J., Simian, D., Torres, B., ... O’Ryan, M. (2020). <a href="#">SARS-CoV-2 antibody prevalence in blood in a large school community subject to a Covid-19 outbreak: a cross-sectional study.</a> <i>Clinical Infectious Diseases.</i> Epub ahead of print.	Jul 10, 2020	Prevalence	Chile	Private school with 14 grade levels experiencing an outbreak following a week of parent-teacher nights. Index case was a staff member.  No infection control measures were reported.	There were 52 confirmed cases in students (15%), staff (35%) and parents (52%).  Positive antibody tests were higher amongst teachers (20.6%) compared to support staff (7.1%) and students (9.9%) two months later.  1,009 of 2,616 students (aged 4 – 18) participated: <ul style="list-style-type: none"> <li>• 100 students (9.9%; CI: 8.6 – 11.5) tested positive for antibodies</li> <li>• The highest positive rate was among preschool students (12.3%; CI: 7.8-18.6) and lowest was among high school students (5.7%; CI: 3.6-8.9)</li> </ul> Students were more likely to have contracted COVID-19 from home caregivers and household relatives than classmates or teachers.	Moderate

<p>Brown, N.E., Bryant-Genevier, J., Bandy, U., Browning, C.A., Berns, A.L., ... Watson, J. (2020). <a href="#">Antibody Responses after Classroom Exposure to Teacher with Coronavirus Disease, March 2020</a>. <i>Emerging Infectious Diseases</i> 26(9).</p>	<p>Jun 29, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>Secondary school</p>	<p>A symptomatic teacher, who had taught 16 different classes during February 24-27, tested positive for COVID-19 on March 1.</p> <p>Among 21 students who had contact with the teacher, and who volunteered to participate in a serologic survey, results for only two students suggested previous SARS-CoV-2 infection (both positive and indeterminate results).</p>	<p>Low</p>
<p>Fontanet, A., Grant, R., Tondeur, L., Madec, Y., Grzelak, L., Cailleau, I., ... Hoen, B. (2020a). <a href="#">SARS-CoV-2 infection in primary schools in northern France: A retrospective cohort study in an area of high transmission</a>. <i>Preprint</i>.</p>	<p>Jun 29, 2020</p>	<p>Retrospective cohort</p>	<p>France</p>	<p>Primary school</p> <p>No infection control measures were reported.</p> <p>Schools had been shut down for 4 weeks prior to antibody testing.</p>	<p>510 of 1047 students (aged 6–11 years) at a primary school consented to testing for antibodies to the virus that causes COVID-19:</p> <ul style="list-style-type: none"> <li>• 45 of 510 (8.8%) tested positive for antibodies</li> <li>• 11.9% parents tested positive for antibodies</li> </ul> <p>No information was reported on index cases.</p>	<p>Moderate</p>

Heavey, L., Casey, G., Kelly, C., Kelly, D., & McDarby, G. (2020). <a href="#">No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020.</a> <i>Eurosurveillance</i> 25(21):pii=2000903.	May 28, 2020	Case report	Ireland	Primary school, secondary school  No infection control measures in place. Sports, music and choir practice continued.	3 children aged 10–15 with COVID-19 attended one primary and two secondary schools: <ul style="list-style-type: none"> <li>• The children had contact with 822 students and 83 adults in schools</li> <li>• Contacts who developed symptoms were tested; the number was not reported</li> </ul> No contacts tested positive.	Moderate
Desmet, S., Skinci, E., Wouters, I., Decru, B., Beuselinck, K., Malhotra-Kumar, S., & Theeten, H. (2020). <a href="#">No SARS-CoV-2 carriage observed in children attending daycare centers during the first weeks of the epidemic in Belgium.</a> <i>Preprint.</i>	May 18, 2020	Prevalence	Belgium	Daycare centers  No infection prevention and control were reported.	84 children aged 0–2.5 years attending 8 different daycare centers were randomly sampled and tested for COVID-19. No children tested positive.	High
Fontanet, A., Tondeur, L., Madec, Y., Grant, R., Besombes, C., Jolly, N., ... Hoen, B. (2020b). <a href="#">Cluster of COVID-19 in northern France: A retrospective closed cohort study.</a> <i>Preprint.</i>	Apr 23, 2020	Prevalence	France	Secondary school  No infection control measures reported. Schools had been shut down for 4 weeks prior to antibody testing.	326 of 1262 students (aged 14–17), teachers and staff at a secondary school consented to testing for antibodies to the virus that causes COVID-19: <ul style="list-style-type: none"> <li>• 92 of 240 (38.3%) of students tested positive for antibodies</li> <li>• 11.4% of parents tested positive for antibodies</li> <li>• 10.2% of siblings tested positive for antibodies</li> </ul>	Moderate

<p>Danis, K., Epaulard, O., Bénet, T., Gaymard, A., Campoy, S., Bothelo-Nevers, E., ... Saura, C. (2020). <a href="#">Cluster of Coronavirus Disease 2019 (COVID-19) in the French Alps, February 2020</a>. <i>Clinical Infectious Diseases</i> 71(15): 825-832.</p>	<p>Apr 11, 2020</p>	<p>Case report</p>	<p>France</p>	<p>Primary schools</p> <p>No infection control measures at the schools were reported. Schools were closed upon identification of the case.</p>	<p>1 child aged 9 years with COVID-19 attended 3 primary schools:</p> <ul style="list-style-type: none"> <li>• The child had 86 contacts</li> <li>• 55 contacts developed symptoms and were tested; none tested positive</li> </ul>	<p>High</p>
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**Table 2: In-progress Single Studies**

Title	Anticipated Release Date	Setting	Description of Document
<b>New evidence reported October 22, 2020</b>			
Assistance Publique - Hôpitaux de Paris. (2020). <a href="#">COVID-19 Infection and Transmission in Exposed, Confined and Community-based Infants (COVIDOCRECHE)</a> .	Estimated study completion date: Jun 2, 2021	Hospitals, Childcare centres for healthcare workers' children	This study will measure rates of COVID-19 cases and presence of anti-SARS-CoV2 antibodies in children of healthcare workers attending childcare, childcare staff, and hospital laboratory and administrative workers.
German Clinical Trials Register. (2020). <a href="#">Prospective Study initiated by University Hospital Rostock concerning COVID-19 in mothers, nursery and school teachers of children in Rostock</a> .	N/A	Childcare, schools	This study will measure prevalence of COVID-19 and associated antibodies in mothers, childcare nurses and teachers, and school teachers over the period of 12 months.
<b>Previously reported evidence</b>			
Charité. (2020). <a href="#">Berlin's testing strategy – Charité starts screening program for staff from childcare centers and school-based study</a> .	N/A	School	Through this study, primary and secondary school children and staff will undergo testing at regular intervals over 12 months.

**Table 3: Syntheses**

Reference	Date Released	Included Studies Relevant to Transmission by Children in Daycares and Schools	Review Conclusions	Quality Rating
<b>Previously reported evidence</b>				
Health Information and Quality Authority. (2020, August 21). <a href="#">Evidence summary for potential for children to contribute to transmission of SARS-CoV-2.</a>	Aug 21, 2020 (Search completed Aug 10, 2020)	Desmet, 2020 Dub, 2020 Fontanet, 2020a Heavey, 2020 Macartney, 2020 Stein-Zamir, 2020	Based on low certainty evidence, transmission from child-to-adult or child-to child does occur in household and education settings, but transmission rates for children are low.  Three studies with nine cases and 1036 close contacts confirmed to secondary transmission. Three studies with 74 confirmed cases across 66 facilitates to over 13 000 close contacts identified 198 confirmed cases.	Low
Alberta Health Services. (2020, August 7). <a href="#">COVID-19 Scientific Advisory Group Rapid Evidence Report.</a>	Aug 7, 2020 (Search completed Jun 10, 2020)	Number of studies not reported, included scientific evidence and news media reports	Exposed children in schools and daycares appear to be less infected than exposed adults in other settings.  There is no evidence to suggest that transmission to teachers and staff is higher than community-based transmission.  Transmission appears to be lower for younger children and may be higher for older children and teens in school settings; transmission can be limited if public health precautions are in place.	Moderate
Public Health England. (2020, July 28). <a href="#">Transmission of COVID-19 in school settings and interventions to reduce the transmission: a rapid review.</a>	Jul 28, 2020 (Search completed Jun 18, 2020)	Danis, 2020 Fontanet, 2020a NCIRS, 2020	Transmission of COVID-19 within school settings is low, however additional research is needed to understand the role of schools in transmission of COVID-19.	Moderate
Li, X., Xu, W., Dozier, M., He, Y., Kirolos, A., & Theodoratou, E. (2020). <a href="#">The role of children in transmission of SARS-CoV-2: A rapid review.</a> <i>Journal of Global Health, 10</i> (1), 011101.	Jul 3, 2020 (Search completed Apr 30, 2020)	Danis, 2020 Fontanet, 2020a NCIRS, 2020 RIVM, 2020	Children are infected less frequently and infect others less frequently than adults. Prolonged fecal shedding may increase the risk of fecal-oral transmission in children.	Low

Usher Institute. (2020, July 2). <a href="#">Summary: What is the evidence for transmission of SARS-COV-2 by children [or in schools]?</a>	Jul 2, 2020 (Search completed Jun 21, 2020)	Fontanet, 2020a Heavey, 2020 National Institute for Public Health and the Environment, 2020 NCIRS, 2020 Desmet, 2020	Children, especially young children, are less likely to be infected and to infect others than adults. Children appear to have lower viral loads than adults. Fecal shedding of the virus that causes COVID-19 has been shown and fecal-oral transmission is possible.	Low
Rajmil, L. (2020). <a href="#">Role of children in the transmission of the COVID-19 pandemic: a rapid scoping review</a> . <i>BMJ Paediatrics Open</i> , 4(1), e000722.	Jun 30, 2020 (Search completed May 28, 2020)	Heavey, 2020 NCIRS, 2020 RIVM, 2020	Children do not transmit the virus that causes COVID-19 more than adults. Many reported cases of transmission in children were traced to transmission within families.	Low
Institut national de sante publique Québec. (2020, May 21). <a href="#">Revue rapide de la littérature scientifique - COVID-19 chez les enfants: facteurs de risque d'infections sévères et potentiel de transmission</a> .	May 21, 2020 (Search completed May 15, 2020)	Danis, 2020 Fontanet, 2020a NCIRS, 2020	Children are susceptible to COVID-19 infection, but upon exposure to the COVID-19, they are less likely to be infected than adults. Transmission of COVID-19 by children is limited.	Low
Ludvigsson, J.F. (2020). <a href="#">Children are unlikely to be the main drivers of the COVID-19 pandemic – A systematic review</a> . <i>Acta Paediatrica</i> 109(8), 1525-1530.	May 19, 2020 (Search completed May 11, 2020)	Danis, 2020 NCIRS, 2020	Children are unlikely to be key drivers of transmission. Opening daycares and schools is unlikely to affect mortality in adults.	Low
Brurberg, K.G. (2020). <a href="#">The role of children in the transmission of SARS-CoV-2-19 – 1<sup>st</sup> update - a rapid review</a> Oslo: Folkehelseinstituttet/ Norwegian Institute of Public Health.	Apr 30, 2020 (Search completed Apr 22, 2020)	Fontanet, 2020a NCIRS, 2020 Viner, 2020a	Children can transmit the virus that causes COVID-19 but are unlikely to be the main drivers of transmission. It is too early to make firm conclusions about the role of children in transmission.	Low
Viner, R.M., Russell, S.J., Croker, H., Packer, J., Ward, J., Stansfield, C., ... Booy, R. (2020a). <a href="#">School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review</a> . <i>The Lancet Child &amp; Adolescent Health</i> , 4(5), 397–404.	Apr 6, 2020 (Search completed Mar 19, 2020)	None included in Table 1. This review included studies from pandemics prior to COVID-19.	It is not possible to specifically evaluate the impact of school closures on infection prevention and control, as they were part of a broad range of quarantine and social distancing measures.	Low

**Table 4: In-progress Syntheses**

Title	Anticipated Release Date	Setting	Description of Document
<b>Previously reported evidence</b>			
Minozzi, S., Amato, L., Mitrova, Z., & Davoli, M. (2020). <a href="#">COVID-19 among children and adolescents and impact of school closure on outbreaks control: an overview of systematic reviews</a> . PROSPERO, CRD42020186291.	Jul 31, 2020	Home, school	This review will summarize available evidence for the prevalence of infection and disease as well as the risk of transmission by children and adolescents. The review also seeks to assess the effect of school closures on controlling the spread of COVID-19.
Chatterji, M., Kitamura, K., Muenig, P., Willson, G.E., De Leon Jr., R., & Allegrante, J.P. (2020). <a href="#">The relative effectiveness of multilevel interventions in reducing risks of transmission of lethal viruses in Grade K-12 school communities and school linked populations: a systematic review and best-evidence synthesis</a> . PROSPERO, CRD42020201930.	Aug 29, 2020	School and school-linked populations	This review will report on the relative efficacy of multilevel intervention in reducing risks of COVID-19 and other lethal viruses among kindergarten to grade 12 school communities and in school linked populations.
Siegfried, N., Theodoratou, E., Mathews, C., Li, X., Xu, W., He, Y., ... Dozier, M. (2020). <a href="#">What is the evidence for transmission of COVID-19 by children in schools?</a> PROSPERO, CRD42020192839.	Aug 31, 2020	School and school-linked populations	This review will summarize the available evidence on virus transmission by children in schools, including the rate of transmission of infection in the school environment from children to other children and from children to adults.
Bhamani, S., Tabani, A., Ahmed, D., & Saleem, A. (2020). <a href="#">A rapid systematic review on COVID transmission trends in children on schools reopening in lower middle income countries</a> . PROSPERO, CRD42020204925.	Feb 28, 2021	Schools	This review will summarize virus transmission among children and outbreaks occurring after schools re-open in lower middle-income countries.



## Question 2: What is known about the likelihood of transmission of COVID-19 by toddlers and school-aged children to others?

**Table 5: Syntheses**

Reference	Date Released	Description of Included Studies	Summary of Findings	Quality Rating: Synthesis	Quality Rating: Included Studies
<b>New evidence reported October 22, 2020</b>					
Koh, W.C., Naing, L., Chaw, L., Rosledzana, M.A., Alikhan, M.F., Jamaludin, S.A., ... Wong, J. (2020). <a href="#">What do we know about SARS-CoV-2 transmission? A systematic review and meta-analysis of the secondary attack rate and associated risk factors.</a> <i>PLoS ONE</i> , 15(10), e0240205.	Oct 8, 2020 (Search completed Jul 25, 2020)	57 studies across multiple settings: <ul style="list-style-type: none"> <li>• 43 studies in households</li> <li>• 18 studies in healthcare settings</li> <li>• 17 studies in other settings</li> </ul>	In households, adult close contacts were more likely to be infected than children (RR =1.71; 95% CI: 1.35 - 2.17).  The secondary attack rate (SAR) was significantly higher in adults (33.3%; 95% CI: 24.4% - 42.1%) than in children (16.9%; 95% CI: 10.9% - 22.9%).	Moderate	High
<b>Previously reported evidence</b>					
Viner, R.M., Mytton, O.T., Bonell, C., Melendez-Torres, G.J., Ward, J.L., Hudson, L., ... Eggo, R. (2020b). <a href="#">Susceptibility to SARS-CoV-2 Infection Among Children and Adolescents Compared With Adults A Systematic Review and Meta-analysis.</a> <i>JAMA Pediatrics</i> . Epub ahead of print.	Sep 25, 2020 (Search completed Jul 28, 2020)	32 studies <ul style="list-style-type: none"> <li>• 18 contact tracing</li> <li>• 14 population-screening</li> </ul>	Lower secondary attack rates in children and adolescents compared to adults in 11 studies, however some confidence intervals were wide. No differences were found in 3 studies. One study found a higher secondary attack rate in those < 19 than adults.  Lower seroprevalence was found in children compared to adults but was similar between adolescents and adults.	Low	Moderate

Health Information and Quality Authority. (2020, August 21). <a href="#">Evidence summary for potential for children to contribute to transmission of SARS-CoV-2.</a>	Aug 21, 2020 (Search completed Aug 10, 2020)	19 studies of household and close contact transmission involving children.	10 of 19 studies reported child to adult or child to child transmission, although at very low rates.  Accuracy of reporting is of concern and it is possible recording of cases may be incomplete and errors in ascertaining direction of transmission.	Low	Low-moderate
Alberta Health Services. (2020, August 7). <a href="#">COVID-19 Scientific Advisory Group Rapid Evidence Report</a>	Aug 7, 2020 (Search completed Jun 10, 2020)	Number of included studies not reported; data presented comes from case reports, case series, cross-sectional, cohort studies and media reports.	Transmission is most from symptomatic adults to other adults or children.  Child to adult transmission appears to be lower based on epidemiologic studies from multiple countries, particularly for children <10 years old.  An estimated 1.33 cases per exposure to a pediatric case and 5.79 cases per exposure to an adult case.	Moderate	Not reported
Madewell, Z.J., Yang, Y., Longini, I. M., Halloran, M. E., & Dean, N. E. (2020). <a href="#">Household transmission of SARS-CoV-2: A systematic review and meta-analysis of secondary attack rate.</a> Preprint.	Aug 1, 2020 (Search completed Jul 29, 2020)	40 published studies reporting household secondary transmission, including 10 that compared children to adults.	A meta-analysis found that secondary attack rates were higher from adults to adult contacts (31%, 95% Confidence Interval (CI): 19.4, 42.7%) than from adults to child (<18 years old) contacts (15.7, 95% CI: 9.9, 21.5%).  An analysis of attack rates from child index cases was not conducted due to the limited available data.	Low	Not reported

<p>Merckx, J., Labrecque, J.A. &amp; Kaufman, J.S. (2020). <a href="#">Transmission of SARS-CoV-2 by children</a>. <i>Deutsches Ärzteblatt International</i> 2020(117), 553-60.</p>	<p>Jul 5, 2020 (Search completed Jun 25, 2020)</p>	<p>Total number of studies not reported, but studies of:</p> <ul style="list-style-type: none"> <li>• Household clusters (n = 4)</li> <li>• School outbreaks (n = 3)</li> <li>• Sero-prevalence (n = 4)</li> <li>• Viral load (n = 2)</li> <li>• Time-series (n = 1)</li> <li>• Modelling (n = 3)</li> </ul>	<p>The authors conclude that whether or not children transmit the virus causing COVID-19 effectively is inconclusive.</p> <p>Viral load estimates are only reported from select samples, which introduces selection bias.</p> <p>Secondary attack rate appears lower for younger children, but the age effect is not well understood.</p> <p>The authors call for studies in representative populations using rigorous epidemiological methods across different settings.</p>	<p>Low</p>	<p>Not reported</p>
<p>Li, X., Xu, W., Dozier, M., He, Y., Kirolos, A., &amp; Theodoratou, E. (2020). <a href="#">The role of children in transmission of SARS-CoV-2: A rapid review</a>. <i>Journal of Global Health</i>, 10(1), 011101.</p>	<p>Jul 3, 2020 (Search completed Apr 30, 2020)</p>	<p>16 primary studies:</p> <ul style="list-style-type: none"> <li>• 1 household contact tracing</li> <li>• 4 school contact tracing</li> <li>• 5 studies providing indirect evidence for potential transmission by children</li> <li>• 6 studies reporting the prevalence of COVID-19 in children</li> </ul>	<p>One case report describes presumed transmission from an infant to its parents.</p> <p>One case report describes environmental contamination by an infant with COVID-19 in a hospital setting. Three studies found that fecal shedding in children lasts longer than in adults. Another study of 3712 COVID-19 patients found similar viral loads between age groups.</p>	<p>Low</p>	<p>Not reported</p>
<p>Usher Institute. (2020, Jul 2). <a href="#">Summary: What is the evidence for transmission of SARS-COV-2 by children [or in schools]?</a></p>	<p>Jul 2, 2020, (Search completed Jun 21, 2020)</p>	<p>83 primary studies:</p> <ul style="list-style-type: none"> <li>• 2 case reports of transmission by children</li> <li>• 14 studies on the potential for infection by children, such as through fecal shedding</li> <li>• 8 studies related to schools or daycares</li> </ul>	<p>Overall, there is limited evidence of transmission of COVID-19 from children to others.</p> <p>Children can become infected through exposure to confirmed cases, most often through household contacts or those with recent travel history.</p> <p>There appears to be a linear relationship between age and likelihood of transmitting COVID-19 in those age 1-19.</p>	<p>Low</p>	<p>Not reported</p>

Rajmil, L. (2020). <a href="#">Role of children in the transmission of the COVID-19 pandemic: a rapid scoping review</a> . <i>BMJ Paediatrics Open</i> , 4(1), e000722.	Jun 21, 2020 (Search completed May 28, 2020)	14 primary studies: <ul style="list-style-type: none"> <li>• 11 contact tracing in households</li> <li>• 2 contact tracing studies in schools</li> <li>• 1 study reported prevalence of COVID-19 in children</li> </ul>	Studies of family clusters demonstrate transmission of COVID-19 to children by family members. Studies did not confirm transmission to family members by children. One study noted that 8% (3 of 40 cases) of children developed symptoms prior to the adults in their households.	Low	Not reported
Institut national de sante publié Québec. (2020, May 21). <a href="#">Revue rapide de la littérature scientifique - COVID-19 chez les enfants: facteurs de risque d'infections sévères et potentiel de transmission</a> .	May 21, 2020 (Search completed May 15, 2020)	9 studies relevant to transmission by children: <ul style="list-style-type: none"> <li>• 1 rapid review of</li> <li>• 1 contact tracing study in a household</li> <li>• 2 contact tracing studies in schools</li> </ul> 5 studies providing indirect evidence for potential transmission by children.	Analysis of likelihood of transmission within family clusters was described as challenging since many children remain asymptomatic.  Another study of COVID-19 patients found similar viral loads between age groups.	Low	Not reported
Ludvigsson, J.F. (2020). <a href="#">Children are unlikely to be the main drivers of the COVID-19 pandemic – A systematic review</a> . <i>Acta Paediatrica</i> 109(8), 1525-1530.	May 19, 2020 (Search completed May 11, 2020)	47 articles were reviewed; a full list of included studies was not provided.	This review described a systematic search and screen for included studies, however the author did not provide a list of studies reviewed and it is unclear how evidence was synthesized across studies.  Cross-sectional studies found that viral loads or viral shedding are similar in different age groups. Most of these studies assessed symptomatic cases.  Two case reports and 2 syntheses analyzed transmission of COVID-19 within households. Most reported no evidence of child-to-child or child-to-adult transmission.  One included synthesis found that in 3 of 31 (9.7%) household clusters analyzed, the index case was a child (Viner, 2020a).	Low	Not reported

Mehta, N.S., Mytton, O.T., Mullins, E.W.S., Fowler, T.A., Falconer, C.L., Murphy, O.B., ... Nguyen-Van-Tam, J.S. (2020). <a href="#">SARS-CoV-2 (COVID-19): What do we know about children? A systematic review</a> . <i>Clinical Infectious Diseases</i> . Epub ahead of print.	May 11, 2020 (Search completed Mar 9, 2020)	24 primary studies: <ul style="list-style-type: none"> <li>• 20 studies assessing prevalence, symptoms and outcomes in children</li> <li>• 4 case reports of transmission involving children</li> </ul>	Evidence related to transmission by children was limited. Cases in children tended to be identified through contact tracing of adult cases. One case report described probable transmission from an infant to her parents.	Moderate	Not reported
Brurberg, K.G. (2020). <a href="#">The role of children in the transmission of SARS-CoV-2-19 – 1<sup>st</sup> update - a rapid review</a> . Oslo: Folkehelseinstituttet/ Norwegian Institute of Public Health.	Apr 30, 2020 (Search completed Apr 22, 2020)	9 case series or case reports and one narrative review related to the likelihood of children transmitting COVID-19 to others.	Case reports indicate that children are susceptible to COVID-19 infection, although less so than adults. The overall prevalence of COVID-19 among children is unknown due to lack of comprehensive testing.  According to tracing of infection routes in case studies, infected children are less likely to transmit the disease than adults, but this data is very limited.	Low	Not reported
Zhen-Dong, Y., Gao-Jun, Z., Run-Ming, J., Zhi-Sheng, L., Zong-Qi, D., Xiong, X., & Guo-Wei, S. (2020). <a href="#">Clinical and transmission dynamics characteristics of 406 children with coronavirus disease 2019 in China: A review</a> . <i>Journal of Infection</i> 81(2), e11–e15.	Apr 28, 2020 (Search completed Apr 3, 2020)	406 case reports of children up to 16 years of age diagnosed with COVID-19.	Among the included case reports, nearly half of cases were asymptomatic or had only mild symptoms.  Evidence from stool samples indicated that children had higher rates of fecal virus RNA (81.8%) than adults (53.4%), suggesting that further investigation of fecal-oral transmission by children may be warranted.	Low	Low

**Table 6: In-progress Syntheses**

Title	Anticipated Release Date	Setting	Description of Document
<b>Previously reported evidence</b>			
Chan, M., Bhuiyan, M., Islam, S., Hassan, Z., Satter, S., Haider, N., & Homaira, N. (2020). <a href="#"><i>Epidemiology of COVID-19 in children aged &lt;5 years: a systematic review and metanalysis.</i></a> PROSPERO, CRD42020181936.	Jul 31, 2020	Home	This review will summarize COVID-19 epidemiology in children younger than 5 years of age, including answering the question, "Is there any secondary/household transmission from pediatric COVID-19 cases?"
Du, P., & Luo, X. (2020). <a href="#"><i>Are children more unsusceptible to COVID-19? A rapid review and meta-analysis.</i></a> PROSPERO, CRD42020190740.	Sep 7, 2020	Home, community	This review will compare the likelihood of infection in children and adults who have been exposed to COVID-19.
Bockey, A., Torres, J., Hausner, E., Waffenschmidt, S., Beckmann, L., Chuermann, C., & Lange, B. (2020). <a href="#"><i>The direct and indirect effects of COVID-19 and COVID-19 control measures on children: a systematic review.</i></a> PROSPERO, CRD42020209327.	Oct 31, 2020	Home, community	This review will explore the direct and indirect effects of COVID-19 on children, specifically: the effect of non-pharmaceutical interventions on COVID-19 incidence (including source of transmission) and indirect impact on health and wellbeing, and effect of measures to decrease the indirect burden of disease associated with COVID-19.
Medeiros, G., Azevedo, K., Hugo, V., Segundo, O., Santos, G., Mata, A.N., ... Piuvezam, G. (2020). <a href="#"><i>The control and prevention of COVID-19 transmission in children: a protocol for systematic review and meta-analysis.</i></a> PROSPERO, CRD42020179263.	Nov 1, 2020	Home	This review will summarize the role of children in COVID-19 Community transmission.

## Table 7: Single Studies

Reference	Date Released	Study Design	Location	Setting	Summary of Findings	Quality Rating:
<b>New evidence reported October 22, 2020</b>						
National Institute for Public Health and the Environment (RIVM). (2020, October 14). <a href="#">Children and COVID-19.</a>	Oct 14, 2020	Prevalence	Netherlands	Community  Preschool, primary school	<p>Between Jun 29 and Sep 6, over 62 000 contacts were traced for COVID-19 patients. Of the COVID-19 cases,</p> <ul style="list-style-type: none"> <li>• 14 (0.3%) had an index case under age 4</li> <li>• 36 (0.7%) had an index case aged 4-11</li> <li>• 4.6% had an index case aged 12-17</li> </ul> <p>Low rates of COVID-19 cases have been reported among children ages 0-18 years (7.3%).</p> <p>Data on 732 paired patients (source patient and patient they infected) showed that transmission mainly occurs between people in the same age group, with minimal transmission between parents and children.</p>	Low
Chu, V.T., Yousef, A.R., Chang, K., Schwartz N.G., McDaniel, C.J., Szablewski, C.M., ... Stewart, R.J. (2020). <a href="#">Transmission of SARS-CoV-2 from Children and Adolescents.</a> <i>Preprint.</i>	Oct 12, 2020	Cohort	United States	Household	<p>Across 194 households, 526 household contacts were identified from 224 primary cases of children and adolescents who attended a camp in June 2020 and self-reported COVID-19 (based on molecular or antigen testing). The mean age of primary cases was 14 years.</p> <p>48 household contacts were classified as secondary cases (either confirmed or probable COVID-19). 7 cases were in contacts aged under 18 (none hospitalized), 41 secondary cases were over the age of 18 (4 were hospitalized). The secondary attack rate (SAR) was 9% (95% CI: 7-12%), but among contacts who reported COVID-19 testing, SAR was 12% (46/377; 95% CI: 9-16%).</p> <p>This study provides evidence of transmission from children/adolescents to both adults and other children who are household contacts.</p>	Low

<p>Schwartz, N.G., Moorman, A.C., Makaretz, A., Chang, K.T., Chu, V.T., Szablewski, C.M., ... Stewart, R.J. (2020). <a href="#">Adolescent with COVID-19 as the Source of an Outbreak at a 3-Week Family Gathering – Four States, June-July 2020</a>. <i>Morbidity and Mortality Weekly Report</i> 69(40): 1457-1459.</p>	<p>Oct 9, 2020</p>	<p>Case Report</p>	<p>United States</p>	<p>Household</p>	<p>An adolescent (index case) exposed to a large COVID-19 outbreak in June 2020 subsequently attended a 3 week family gathering. Members of 5 households attended the family gathering at various times during the 3 weeks. 13 family members shared a house with the index case for between 8-25 days. An additional 6 family members visited on 2 separate days, but remained outdoors.</p> <p>Of the 14 family members (including the index case) who stayed in the same house, 12 experienced symptoms. Of these:</p> <ul style="list-style-type: none"> <li>• 6 returned a positive COVID-19 PCR test (2 grandparents, 2 parents, 1 aunt, 1 uncle)</li> <li>• 4 were classified as probable COVID-19 cases based on positive antigen testing or clinical criteria and epidemiologic criteria (1 sibling, 1 cousin, 1 aunt, 1 uncle)</li> <li>• 2 were classified as suspected COVID-19 cases based on positive antibody testing (the index case and a sibling).</li> </ul> <p>None of the 6 family members who visited but remained outside developed symptoms and 4 that were tested all returned negative tests.</p>	<p>Moderate</p>
<p>Maltezou, H.C., Magaziotou, I., Dedoukou, X., Eleftheriou, E., Raftopoulos, V., Michos, A., ... Tsolia, M. (2020). <a href="#">Children and Adolescents With SARS-CoV-2 Infection Epidemiology, Clinical Course and Viral Loads</a>. (2020). <i>The Pediatric Infectious Disease Journal</i>. Epub ahead of print.</p>	<p>Oct 6, 2020</p>	<p>Prevalence</p>	<p>Greece</p>	<p>Community</p>	<p>National registry information on national COVID-19 infections in Greece from February 26 (first case diagnosed) to June 30, 2020 revealed 203 cases in children aged 0-19 years old. Sources of infection included:</p> <ul style="list-style-type: none"> <li>• Family (n = 132; 65%)</li> <li>• Community (n=29; 14.3%)</li> <li>• Travel (n=9; 4.4%)</li> <li>• School (n=4; 2%)</li> <li>• Other (n=4; 2%)</li> <li>• Unknown (n=25; 12.3%)</li> </ul> <p>Transmission occurred from an adult to a child in 133 families. There was only 1 documented case of transmission from an adolescent to a parent, and no reported child-to-child transmission.</p>	<p>High</p>



Laxminarayan, R., Wahl, B., Dudala, S.R., Gopal, K., Mohan, C., Neelima, S., ... Lewnard, J.A. (2020). <a href="#">Epidemiology and transmission dynamics of COVID-19 in two Indian states.</a> <i>Science</i> . Epub ahead of print.	Sep 30, 2020	Prevalence	Tamil Nadu and Andhra Pradesh, India	Community	<p>From 435,539 positive cases from March 5 to June 4, 2020, contact tracing reached 3,084,885 known contacts. Epidemiological and testing data was available for 575,071 contacts of 84,965 cases.</p> <p>Secondary attack rate was highest in household settings (9%) compared to community (2.6%) or healthcare (1.2%) settings. The highest probability of transmission was in case-contact pairs of similar age. This was strongest for children aged 0-14, and for adults aged 65+.</p> <p>The authors note that in many cases, classification of the index case in order to determine secondary attack rate may be imprecise.</p>	Low
<b>Previously reported evidence</b>						
Wood, R., Thomson, E.C., Galbraith, R., Gribben, C., Caldwell, D., Bishop, J., ... McAllister, D.A. (2020). <a href="#">Sharing a household with children and risk of COVID-19: a study of over 300,000 adults living in healthcare worker households in Scotland.</a> <i>Preprint</i> .	Sep 22, 2020	Prevalence	Scotland	Household	<p>Through record-linkage of 158,445 Scottish NHS workers and their households, COVID-19 cases, cases requiring hospitalization, and severe cases (ICU admission or death) from Mar 1 to Jul 7 2020.</p> <p>There was an inverse association between number of children age 0-11 in the household and risk of an adult COVID-19 case (HR = 0.89, 95% CI 0.84-0.95).</p> <p>Stronger associations found in pre-school (0.82; 95% CI 0.74-0.91) vs. primary school (0.94; 95% CI 0.88-1.00).</p> <p>Similar patterns for cases requiring hospitalization, although was not statistically significant (HR = 0.89, 95% CI 0.74-1.06).</p> <p>There was no association between number of young children in the household and risk of severe cases (HR = 0.99, 95% CI 0.69-1.40), however frequency of this outcome was low (n = 97).</p>	High

<p>Lyngse, F.P., Kirkeby, C.T., Halasa, T., Andreasen, V., Skov, R.L., Møller, F.T., ... Mølbak, K. (2020). <a href="#">COVID-19 transmission within Danish households: A nationwide study from lockdown to reopening</a>. <i>Preprint</i>.</p>	<p>Sep 9, 2020</p>	<p>Prevalence</p>	<p>Denmark</p>	<p>Household</p>	<p>Administrative registry data from all COVID-19 tests in Denmark from Feb 27 (first positive) to July 24 including 6782 primary cases and 14232 contacts.</p> <p>There is a linear relationship between age and attack rate and transmission risk. Although youngest children had higher transmission risk due to close contact with parents.</p> <p>Susceptibility to infection increases with the age of the susceptible person.</p> <p>Where primary case is an adult, transmission risk increases linearly with age of contacts/potential secondary cases.</p>	<p>Moderate</p>
<p>Hu, S., Wang, W., Wang, Y., Litvinova, M., Luo, K., Ren, L., ... Yu, H. (2020). <a href="#">Infectivity, susceptibility, and risk factors associated with SARS-CoV-2 transmission under intensive contact tracing in Hunan, China</a>. <i>Preprint</i>.</p>	<p>Aug 7, 2020</p>	<p>Case Series</p>	<p>China</p>	<p>Community</p>	<p>Comprehensive contact tracing was carried out amongst 1,178 confirmed cases and 15,648 contacts. 471 contacts (3.0%) tested positive.</p> <p>Transmission was not significantly different in those 0-14 year compared to 15 to 59 years (odds ratio (OR) = 0.25, 95% CI (CI) = 0.04, 1.75).</p> <p>No significant relationship between age and risk of transmission (OR = 1.62, 95% CI: 0.91, 2.90).</p>	<p>Moderate</p>

<p>Kim, J., Choe, Y.J., Lee, J., Park, Y.J., Park, O., Han, M.S., ... Choi, E.H. (2020). <a href="#">Role of children in household transmission of COVID-19</a>. <i>Archives of Disease in Childhood</i>. Epub ahead of print.</p>	<p>Aug 7, 2020</p>	<p>Case Series</p>	<p>South Korea</p>	<p>Household</p>	<p>All confirmed pediatric cases of COVID-19 from January 20 to April 6, 2020 were included.</p> <ul style="list-style-type: none"> <li>• 107 index cases and 248 household members identified; median age 15 years, interquartile range 10-17 years</li> <li>• 41 of 248 contacts (16.5%) developed COVID-19 <ul style="list-style-type: none"> <li>○ one episode of secondary transmission identified as a younger sibling</li> <li>○ exposure time was 2 days during the pre-symptomatic period and 1 day during the symptomatic period of the index case</li> </ul> </li> <li>• Overall, household secondary attack rate was 0.5% (95% CI 0.0% to 2.6%)</li> </ul> <p>The authors note potential underestimation of results due to testing inaccuracies and exclusion of household cases with the same initial exposure.</p>	<p>Moderate</p>
<p>Maltezou, H.C., Vorou, R., Papadima, K., Kossyvakis, A., Spanakis, N., Gioula, G., ... Papa, A. (2020). <a href="#">Transmission dynamics of SARS-CoV-2 within families with children in Greece: A study of 23 clusters</a>. <i>Journal of Medical Virology</i>. Epub ahead of print.</p>	<p>Aug 7, 2020</p>	<p>Case series</p>	<p>Greece</p>	<p>Household</p>	<p>From February 26 to May 3, 2020 (period of lockdown) all family clusters with at least one child were identified from a national registry:</p> <ul style="list-style-type: none"> <li>• 23 clusters with 109 household members (66 adults, 43 children) were identified</li> <li>• Median attack rate was 60% (range 33.4 to 100%)</li> <li>• Despite close contact between infected children and non-infected adults in 14 clusters, no child to adult or child to child transmission was confirmed</li> <li>• An adult was the first identified case in 21 clusters, and a child in 2</li> </ul>	<p>Low</p>

<p>Park, Y.J., Choe, Y.J., Park, O., Park, S.Y., Kim, Y.M., Kim, J., ... Jeong, E.K. (2020). <a href="#">Contact tracing during Coronavirus disease outbreak, South Korea, 2020</a>. <i>Emerging Infectious Diseases</i> 26(10), 2465-2468.</p>	<p>Jul 16, 2020</p>	<p>Case series</p>	<p>South Korea</p>	<p>Community</p>	<p>Of 5,705 COVID-19 positive cases analyzed between January 20 and March 27, 2020:</p> <ul style="list-style-type: none"> <li>• 29 (0.5%) were children ages 0-9</li> <li>• 124 (2.2%) were children ages 10-19</li> </ul> <p>Young children are less likely to transmit COVID-19 than adults:</p> <ul style="list-style-type: none"> <li>• Amongst children ages 0-9, 5.3% (95% CI: 1.3-13.7) of household contacts, 1.1% (95% CI: 0.2-3.6) of non-household contacts tested positive</li> </ul> <p>Among children ages 10-19, 18.6% (95% CI: 14.0-24.0) of household contacts, 0.9% (95% CI: 0.1-2.9) of non-household contacts tested positive.</p>	<p>Low</p>
<p>Wongsawat, J., Moolasart, V., Srikin, P., Srijareonvijit, C., Vaivong, N., Uttayamakul, S., &amp; Disthakumpa, A. (2020). <a href="#">Risk of novel coronavirus 2019 transmission from children to caregivers: A case series</a>. <i>Journal of Paediatrics and Child Health</i>, 56(6), 984–985.</p>	<p>Jun 22, 2020</p>	<p>Case series</p>	<p>Thailand</p>	<p>Home</p>	<p>3 cases of confirmed COVID-19 in children are reported. In each case, source of infection was determined to be a close family contact. Following national policies, children were isolated in a health facility.</p> <p>During isolation, caregivers were encouraged to follow strict hand hygiene protocols and not share personal items. Surgical masks were provided but compliance was poor.</p> <p>Caregivers of 2 of 3 children tested negative for COVID-19; the third caregiver did not undergo testing.</p>	<p>Moderate</p>
<p>van der Hoek, W., Backer, J.A., Bodewes, R., Friesema, I., Meijer, A., Pijnacker, R., ... van den Hof, S. (2020). <a href="#">The role of children in the transmission of SARS-CoV-2</a>. <i>Nederlands Tijdschrift Voor Geneeskunde</i>, 164: D5140.</p>	<p>Jun 3, 2020</p>	<p>Cohort</p>	<p>Netherlands</p>	<p>Household</p>	<p>All laboratory confirmed cases of COVID-19 from March 23 to April 16, 2020 in families were identified:</p> <ul style="list-style-type: none"> <li>• Within 54 clusters (227 participants, 185 were immediate family) no children under 12 were the source of transmission</li> <li>• Children 1-11 were less often positive compared to older children or adults</li> <li>• 368 children (0-18 years) have been positive for COVID-19 accounting for 0.9% of the total number of cases</li> </ul>	<p>Low</p>

<p>Somekh, E., Gleyzer, A., Heller, E., Popian, M., Kashani-Ligumski, L., Czeiger, S... Stein, M. (2020). <a href="#">The role of children in the dynamics of intra family coronavirus 2019 spread in densely populated area</a>. <i>The Pediatric Infectious Diseases Journal</i> 39(8), e202-e204.</p>	<p>Jun 1, 2020</p>	<p>Case series</p>	<p>Israel</p>	<p>Households</p>	<p>Members of 13 households of COVID-19 cases were tested for COVID-19. Test results were presented by age group:</p> <ul style="list-style-type: none"> <li>• 21 of 36 (58.3%) adults tested positive</li> <li>• 13 of 40 (32.5%) children aged 5–17 tested positive</li> <li>• 2 of 18 (11.1%) children younger than 5 years tested positive</li> </ul> <p>In 1 household, the index case was an adolescent aged 14.5 years who was exposed in the community. The index case for the other 12 households were adults.</p>	<p>Low</p>
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**Table 8: In-Progress Single Studies**

Title	Anticipated Release Date	Setting	Description of Document
<b>New evidence reported October 22, 2020</b>			
Xu, S.F., Lu, Y.H., Zhang, T., Xiong, H.Y., & Wang, W.B. (2020). <a href="#">Cross-Sectional Seroepidemiologic Study of Coronavirus Disease 2019 (COVID-19) among Close Contacts, Children, and Migrant Workers in Shanghai</a> . <i>Int. J. Environ. Res. Public Health</i> , 17(19), 7223.	N/A	Community School	This study will measure serum antibody levels against SARS-CoV-2 among migrant workers, children, and close contacts, and explore potential asymptomatic infection and risk factors of COVID-19.

**Table 9: Regional COVID-19 prevention and control policies, daycares**

Location	Date	Screen	Temp. Check	Reduced Class Size	Cohort	Distance: Children	Distance: Staff	Masks: Children	Masks: Staff	Hand Hygiene	Enhanced Cleaning	Ventilation	Other
<a href="#">Australia (New South Wales)</a>	Mar 16, 2020	Yes	NR	NR	Yes	NR	NR	No	No	Yes	Yes	NR	
<a href="#">Canada (Ontario)</a>	Oct 5, 2020	Yes	NR	No	Yes	NR	NR	NR	Yes + eye protection	NR	Yes	NR	Log daily attendance Must have a COVID-19 response plan No non-essential visitors Drop-off/pick-up protocols in place
<a href="#">Finland</a>	Aug 6, 2020	Yes	NR	"Limited"	Where possible	Avoid or reduce contact	Avoid or reduce contact	NR	NR	Yes	Yes	NR	No one other than children and staff
<a href="#">Germany (Baden-Wuerttemberg)</a>	Sep 10, 2020	NR	NR	Yes	NR	No	No	No	Yes	Yes	Yes	Yes	
<a href="#">Netherlands</a>	n.d.	Yes	NR	NR	NR	No	1.5m	NR	NR	Yes	NR	NR	
<a href="#">Poland</a>	Oct 9, 2020	NR	NR	NR	Yes	NR	NR	NR	When in contact with children	NR	NR	NR	
<a href="#">Singapore</a>	May 28, 2020	Yes	Yes	NR	Yes	NR	NR	Yes (age 2+)	Yes	Yes	Yes	NR	
<a href="#">Sweden</a>	Oct 6, 2020	NR	NR	NR	NR	NR	NR	No	No	NR	NR	NR	If child becomes unwell, must stay home for 48 hours after recovery (unless only mild symptoms)
<a href="#">United States (Rhode Island)</a>	Aug 21, 2020	Yes	NR	Yes	Yes	No	NR	Common areas only	Yes	Yes	Yes	NR	

NR: Not Reported

**Table 10: Regional COVID-19 prevention and control policies, primary schools**

Location	Date	Screen	Temp. Check	Reduced Class Size	Cohort	Distance: Students	Distance: Staff	Masks: Students	Masks: Staff	Hand Hygiene	Enhanced Cleaning	Ventilation	Other
<a href="#">Australia (New South Wales)</a>	Oct 8, 2020	Negative test required to return after symptoms	No	NR	Yes	No	1.5m	No	No	Yes	Yes	NR	No parents in schools unless volunteering for educational purposes
<a href="#">Canada (Alberta)</a>	n.d.	Yes	NR	NR	Yes	Yes	Yes	Grades 4 and higher when physical distancing not possible	Yes when physical distancing not possible	Yes	Yes	NR	
<a href="#">Canada (Ontario)</a>	Aug 28, 2020	Yes	NR	NR	Yes	Yes	Yes	Grades 4 and higher	Yes	Yes	Yes	NR	
<a href="#">Denmark</a>	May 15, 2020	Yes	Yes	Yes	Yes	2m	2m	No	NR	Yes	NR	NR	Staggered reopening; no family members allowed
<a href="#">England</a>	Sep 22, 2020	Yes	No	No	Yes	Encouraged for "older children" where possible	2m	Decision left to schools	Yes	Yes	Yes	NR	
<a href="#">Finland</a>	Aug 6, 2020	Yes	NR	NR	Yes	No	No	No	No	Yes	Yes	NR	Only children and staff allowed in
<a href="#">Germany</a>	Sept 24, 2020	NR	NR	Yes	Yes	Yes	Yes	All over the age of 6	Yes	Yes	NR	Yes	Staggered timetables, opening school for select grades
<a href="#">Hong Kong</a>	Oct 9, 2020	Yes	Yes	NR	Yes	1.5m	NR	Yes	Yes	Yes	Yes	Yes	Shortened school days
<a href="#">Korea</a>	Aug 4, 2020	Yes	Yes	Yes	NR	Yes (not specified)	Yes (not specified)	Yes, indoors	Yes	Yes	Yes	NR	Plastic barriers at lunch
<a href="#">Netherlands</a>	Oct 14, 2020	Yes	NR	NR	NR	No	1.5m	No	No	Yes	Yes	Yes	



<a href="#">Norway</a>	Sep 28, 2020	Yes	NR	NR	Yes	No	1m	If symptoms develop and cannot physically distance	No	Yes	Yes	NR	
<a href="#">Sweden</a>	Oct 6, 2020	NR	NR	NR	NR	NR	NR	No	No	NR	NR	NR	
<a href="#">Switzerland</a>	Sep 30, 2020	NR	NR	NR	NR	1.5m	1.5m	Yes when physical distancing not possible	Yes when physical distancing not possible	Yes	NR	NR	

NR: Not Reported

**Table 11: Regional COVID-19 prevention and control policies, secondary schools**

Location	Date	Screen	Temp. Check	Class Size	Cohort	Distance: Students	Distance: Staff	Masks: Students	Masks: Staff	Hand Hygiene	Enhanced Cleaning	Ventilation	Other
<a href="#">Australia (New South Wales)</a>	Oct 8, 2020	Negative test required to return after symptoms	No	NR	Yes	No	1.5m	No	No	Yes	Yes	NR	No parents in schools unless volunteering for educational purposes
<a href="#">Canada (Alberta)</a>	n.d.	Yes	NR	NR	Yes	Yes	Yes	Yes, when physical distancing cannot be maintained	Yes, when physical distancing cannot be maintained	Yes	Yes	NR	
<a href="#">Canada (Ontario)</a>	Aug 28, 2020	Yes	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	Hybrid in-person and remote learning in higher-risk areas
<a href="#">Denmark</a>	May 15, 2020	Yes	Yes	Yes	Yes	2m	2m	No	NR	Yes	NR	NR	Staggered reopening; no family members allowed
<a href="#">England</a>	Sep 22, 2020	Yes	No	No	Yes	Encouraged for "older children" where possible	2m	Decision left to schools	Yes	Yes	Yes	NR	
<a href="#">Finland</a>	Aug 6, 2020	Yes	NR	NR	Yes	1-2m	1-2m	NR	NR	Yes	Yes	NR	
<a href="#">Germany</a>	Sept 24, 2020	NR	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	
<a href="#">Hong Kong</a>	Oct 9, 2020	Yes	Yes	NR	Yes	1.5m	NR	Yes	Yes	Yes	Yes	Yes	Shortened school days
<a href="#">Israel</a>	n.d.	Yes (home)	Yes (home)	NR	Yes	Yes (not specified)	Yes (not specified)	Yes	Yes	Yes	NR	NR	
<a href="#">Korea</a>	Aug 4, 2020	Yes	Yes	Yes	NR	Yes (not specified)	Yes (not specified)	Yes, indoors	Yes	Yes	Yes	NR	Plastic barriers at lunch
<a href="#">Norway</a>	Sep 28, 2020	Yes	NR	NR	Yes	Yes (not specified)	1m	In transit or with symptoms	No	Yes	Yes	NR	
<a href="#">Singapore</a>	Oct 8, 2020	Yes	Yes	No	Yes	No	Yes (not specified)	Yes	Yes	Yes	Yes	NR	

<a href="#">Switzerland</a>	Sep 30, 2020	NR	NR	NR	NR	1.5m	1.5m	Yes when physical distancing not possible	Yes when physical distancing not possible	Yes	NR	NR	
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NR: Not Reported

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