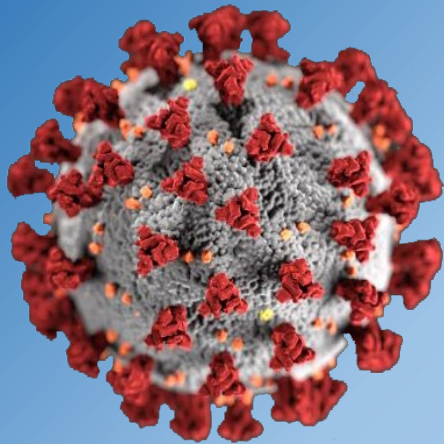


COVID-19 Pandemic

-- Children & Schools



Kevin T. Kavanagh, MD, MS
Health Watch USAsm



COVID-19: Schools – Opening





The Narrative: Children do not get sick, they do not get the virus, lets open schools !!

▼ naturemedicine

Letter | Published: 16 June 2020

Age-dependent effects in the transmission and control of COVID-19 epidemics

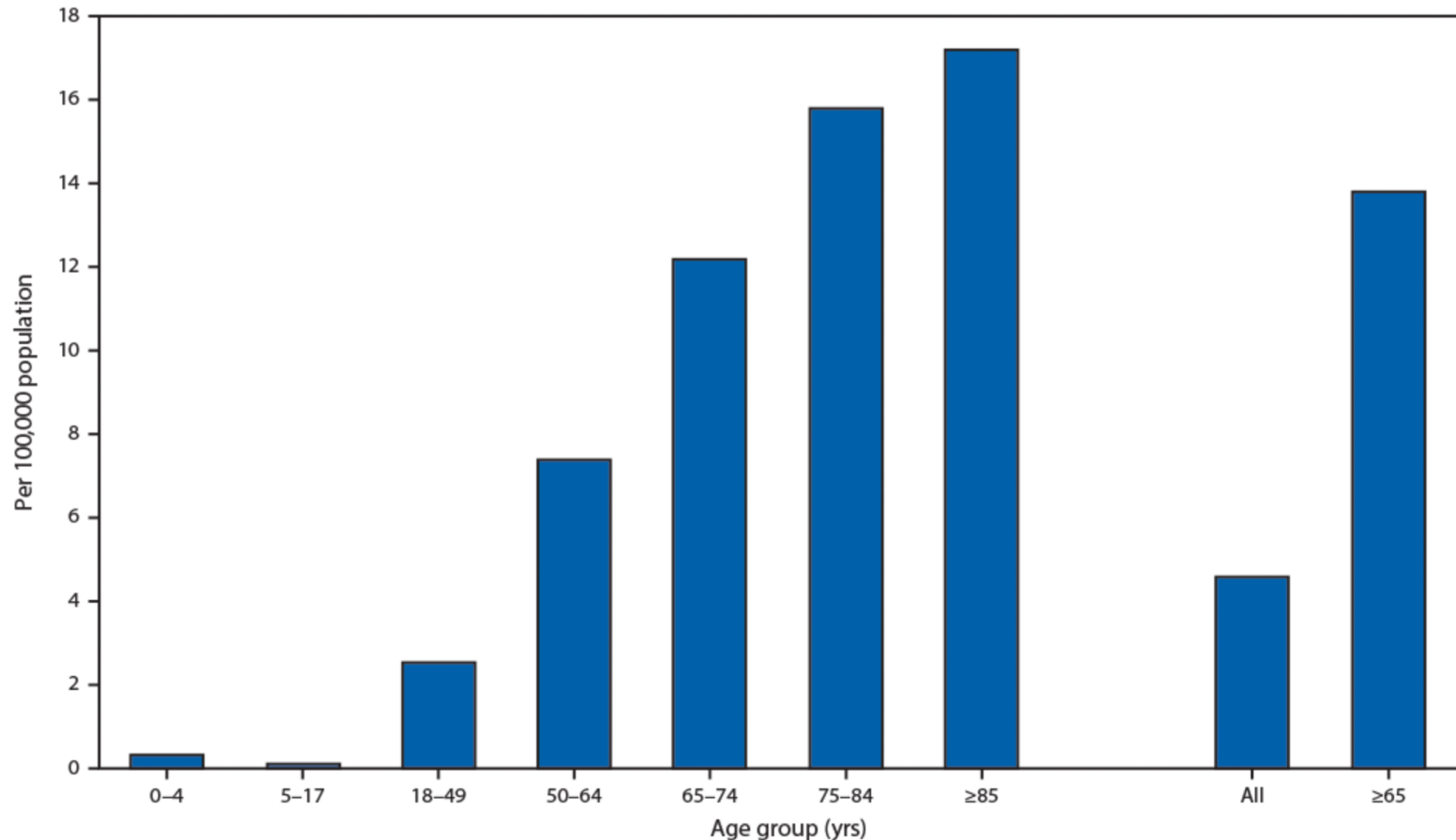
Nicholas G. Davies , Petra Klepac, Yang Liu, Kiesha Prem, Mark Jit, CMMID COVID-19 working group & Rosalind M. Eggo 

“The COVID-19 pandemic has shown a markedly low proportion of cases among children^{[1](#),[2](#),[3](#),[4](#)}. Age disparities in observed cases could be **explained by children having lower susceptibility to infection, lower propensity to show clinical symptoms or both.**”

COVID-19: Schools – Children Symptoms & Death



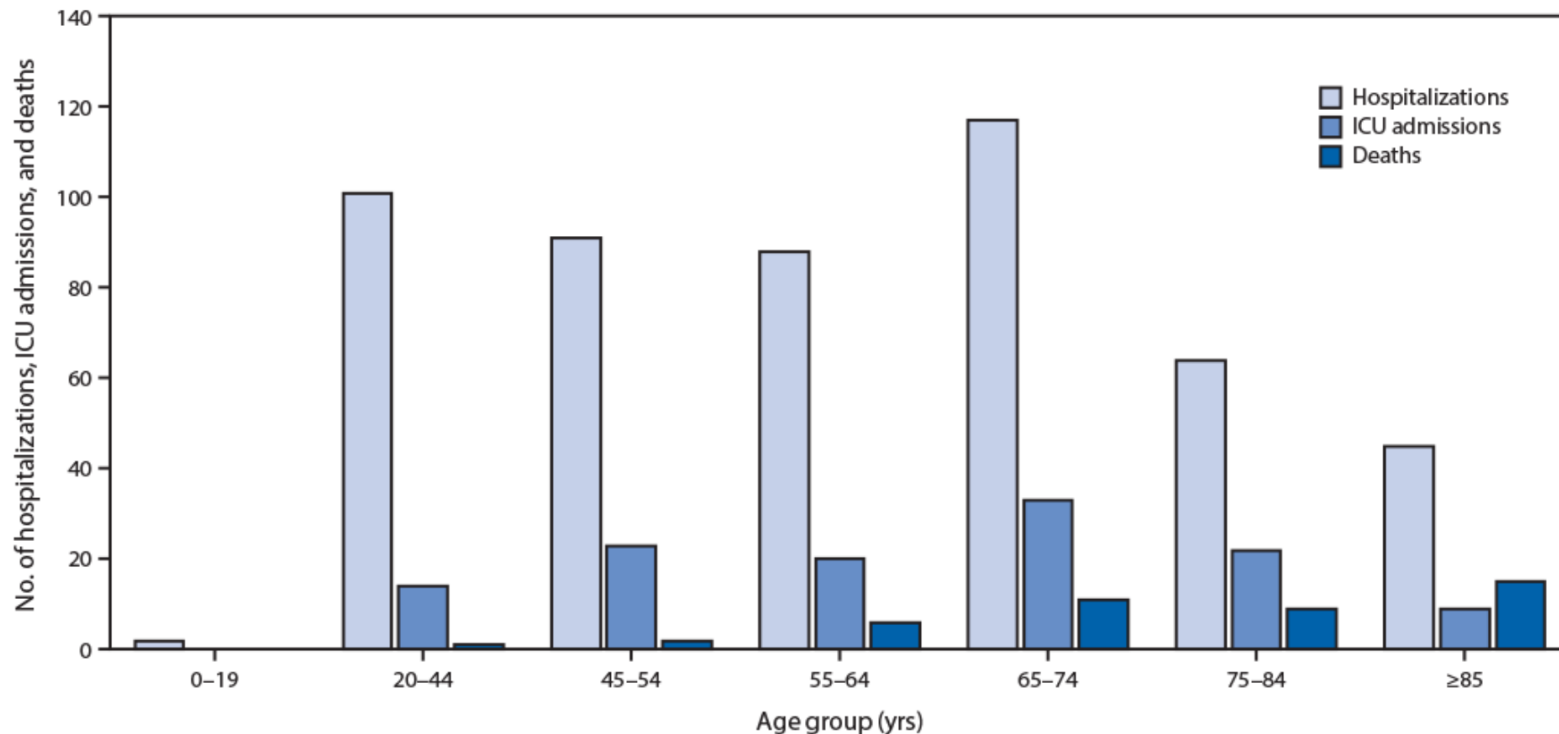
FIGURE 1. Laboratory-confirmed coronavirus disease 2019 (COVID-19)–associated hospitalization rates,* by age group — COVID-NET, 14 states,† March 1–28, 2020



COVID-19: Schools – Children Symptoms & Death



FIGURE 2. Coronavirus disease 2019 (COVID-19) hospitalizations,* intensive care unit (ICU) admissions,[†] and deaths,[§] by age group — United States, February 12– March 16, 2020



* Hospitalization status missing or unknown for 1,514 cases.

[†] ICU status missing or unknown for 2,253 cases.

[§] Illness outcome or death missing or unknown for 2,001 cases.

COVID-19: Schools – Children Symptoms & Death



CDC Centers for Disease Control and Prevention
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Morbidity and Mortality Weekly Report (*MMWR*)

Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020

Weekly / March 27, 2020 / 69(12);343-346

<https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm>

TABLE. Hospitalization, intensive care unit (ICU) admission, and case-fatality percentages for reported COVID-19 cases, by age group — United States, February 12–March 16, 2020

Age group (yrs) (no. of cases)	%*		
	Hospitalization	ICU admission	Case-fatality
0–19 (123)	1.6–2.5	0	0
20–44 (705)	14.3–20.8	2.0–4.2	0.1–0.2
45–54 (429)	21.2–28.3	5.4–10.4	0.5–0.8
55–64 (429)	20.5–30.1	4.7–11.2	1.4–2.6
65–74 (409)	28.6–43.5	8.1–18.8	2.7–4.9
75–84 (210)	30.5–58.7	10.5–31.0	4.3–10.5
≥85 (144)	31.3–70.3	6.3–29.0	10.4–27.3
Total (2,449)	20.7–31.4	4.9–11.5	1.8–3.4

* Lower bound of range = number of persons hospitalized, admitted to ICU, or who died among total in age group; upper bound of range = number of persons hospitalized, admitted to ICU, or who died among total in age group with known hospitalization status, ICU admission status, or death.

The cases described in this report include both COVID-19 cases confirmed by state or local public health laboratories as well as those with a positive test at the state or local public health laboratories and confirmation at CDC.

**CDC COVID-19
Response Team**

COVID-19: Schools – Children Symptoms & Death



LEXINGTON
HERALD LEADER

Kentucky infant with COVID-19 dies. 265 new coronavirus cases and 8 new deaths.

BY ALEX ACQUISTO

JUNE 03, 2020 04:33 PM , UPDATED JUNE 03, 2020 06:21 PM



Gov. Andy Beshear announced 265 new cases of COVID-19 in Kentucky on Wednesday, bringing the state's total number of cases to at least 10,410. Eight more people with the coronavirus have died, including a nine-month-old girl.



How are babies affected by COVID-19?

Although rare, children under age 1 (infants) are at higher risk of severe illness with COVID-19. This is likely due to their immature immune systems and smaller airways, which make them more likely to develop breathing issues with respiratory virus infections.

<https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-in-babies-and-children/art-20484405>

COVID-19: Schools – Children Symptoms & Death



In Kentucky as of Aug. 1, 2020

Age Yrs.	Deaths
0-9	1
10-29	0
30-39	6
40-49	16
50-59	46
60-69	122
70-79	180
80+	369
Total	740

The one death was in a 9 month old.

COVID-19: Multisystem Inflammatory Syndrome in Children (MIS-C)



Infectious Disease > COVID-19

Kids' Brains Affected by COVID-Linked Inflammatory Syndrome

— Central and peripheral nervous system symptoms also reported

by Crystal Phend, Senior Editor, MedPage Today July 1, 2020

<https://www.medpagetoday.com/infectiousdisease/covid19/87378>

Infectious Disease > COVID-19

MIS-C: Tip of the Iceberg for Kids' COVID Inflammation?

— Surveillance data affirm profile of the syndrome, but there may be more to it

by Crystal Phend, Senior Editor, MedPage Today June 30, 2020

<https://www.medpagetoday.com/infectiousdisease/covid19/87341>

Paediatric multisystem inflammatory syndrome temporally associated with COVID-19 (PIMS)

“A child presenting with persistent fever, inflammation (neutrophilia, elevated CRP and lymphopaenia) and evidence of single or multi-organ dysfunction (shock, cardiac, respiratory, renal, gastrointestinal or neurological disorder) with additional features (see listed in Appendix 1). This may include children fulfilling full or partial criteria for Kawasaki disease.” <https://www.rcpch.ac.uk/resources/guidance-paediatric-multisystem-inflammatory-syndrome-temporally-associated-covid-19-pims>

COVID-19: Multisystem Inflammatory Syndrome in Children (MIS-C)



Delayed Presentation

- MIS-C develops 2 to 4 weeks after infection with SARS-CoV-2.
- The Syndrome is Rare. Affects less than 1% of SARS-CoV-2 infections which occur in patients less than 21 years of age (of cases reported by the NYSDOH).

<https://www.nejm.org/doi/full/10.1056/NEJMe2023158>

<https://www.statnews.com/2020/06/29/nejm-inflammation-children-covid19-misc/>

COVID-19: Multisystem Inflammatory Syndrome in Children (MIS-C)



The NEW ENGLAND
JOURNAL of MEDICINE

July 23, 2020

N Engl J Med 2020; 383:334-346

DOI: 10.1056/NEJMoa2021680

Multisystem Inflammatory Syndrome in Children in New York State

“As of May 10, 2020, a total of 191 potential cases were reported to the NYSDOH.”

- All presented with subjective fever or chills;
- 97% had tachycardia,
- 80% had gastrointestinal symptoms,
- 60% had rash,
- 56% had conjunctival injection,
- 27% had mucosal changes,
- 62% received vasopressor support,
- 53% had evidence of myocarditis,

“80% were admitted to an intensive care unit, and 2 died. The median length of hospital stay was 6 days.”

COVID-19: Multisystem Inflammatory Syndrome in Children (MIS-C)



The NEW ENGLAND
JOURNAL of MEDICINE

July 23, 2020

N Engl J Med 2020; 383:334-346

DOI: 10.1056/NEJMoa2021680

Multisystem Inflammatory Syndrome in U.S. Children and Adolescents

“We report on 186 patients with MIS-C in 26 states. 164 (88%) were hospitalized after April 16, 2020. Organ-system involvement included”:

- Gastrointestinal system in 171 patients (92%),
- Cardiovascular in 149 (80%),
Coronary-artery aneurysms were documented in 15 patients (8%),
- Hematologic in 142 (76%),
- Mucocutaneous in 137 (74%),
- Respiratory in 131 (70%),
- Kawasaki’s disease–like features were documented in 74 (40%).”

“The median duration of hospitalization was 7 days (interquartile range, 4 to 10); 148 patients (80%) received intensive care, 37 (20%) received mechanical ventilation, 90 (48%) received vasoactive support, and 4 (2%) died.

COVID-19: Schools



Most Children Are Asymptomatic



▼ naturemedicine

Letter | Published: 16 June 2020

Age-dependent effects in the transmission and control of COVID-19 epidemics

Nicholas G. Davies , Petra Klepac, Yang Liu, Kiesha Prem, Mark Jit, CMMID COVID-19 working group & Rosalind M. Eggo 

Possibly Half as Likely to Be Infected; But 21% of those infected are symptomatic.

- First, age-varying susceptibility to infection by SARS-CoV-2, where children are less susceptible than adults to becoming infected on contact with an infectious person, would reduce cases among children.
- Second, children could experience mild or no symptoms with infections more frequently than adults.

COVID-19: Schools



Most Children Are Asymptomatic



▼ naturemedicine

Letter | Published: 16 June 2020

Age-dependent effects in the transmission and control of COVID-19 epidemics

Nicholas G. Davies , Petra Klepac, Yang Liu, Kiesha Prem, Mark Jit, CMMID COVID-19 working group & Rosalind M. Eggo 

Possibly Half as Likely to Be Infected; But 21% of those infected are symptomatic.

Nature Medicine: “We estimate that susceptibility to infection in individuals under 20 years of age is approximately half that of adults aged over 20 years”

And Clinical Symptoms Manifests In:

- 10- to 19-year-olds - 21% (95% CI: 12–31%) of infections.
- over 70 years - 69% (57–82%) of infections.

COVID-19: Schools

Most Children Are Asymptomatic



However, what is the transmissibility of subclinical infection?

COVID-19: Schools – Children Transmission to Others



 Centers for Disease Control and Prevention

EMERGING INFECTIOUS DISEASES® ISSN: 1550-8688

Disclaimer: Early release articles are not considered as final versions. Any changes will be reflected in the online version in the month the article is official.

Volume 26, Number 10—October 2020

Research Letter

Culture-Competent SARS-CoV-2 in Nasopharynx of Symptomatic Neonates, Children, and Adolescents

Arnaud G. L'Huillier¹, Giulia Torriani¹, Fiona Pigny, Laurent Kaiser, and Isabella Eckerle[✉]

Author affiliations: Geneva University Hospitals and Faculty of Medicine, University of Geneva, Geneva, Switzerland

[Suggested citation for this article](#)

On This Page

[Research Letter](#)

[Suggested Citation](#)

Infected Children Shed The Virus Similar to Adults.

“SARS-CoV-2 shedding patterns of culture competent virus in symptomatic children resemble those observed in adults. Therefore, transmission of SARS-CoV-2 from children is plausible.” Median Age of Child Studied was 12 years, Range 7 days to 16 years.

https://wwwnc.cdc.gov/eid/article/26/10/20-2403_article

COVID-19: Schools – Children Transmission to Others



[Comment on this paper](#)

An analysis of SARS-CoV-2 viral load by patient age

Terry C Jones, Barbara Mühlemann, Talitha Veith, Guido Biele, Marta Zuchowski, Jörg Hoffmann, Angela Stein, Anke Edelmann, Victor Max Corman, Christian Drosten

doi: <https://doi.org/10.1101/2020.06.08.20125484>

- “... a threshold we previously established for the isolation of infectious virus in cell culture at more than 5% probability, were present across the study period in 29.0% of kindergarten-aged patients 0-6 years old (n=38), 37.3% of those aged 0-19 (n=150), and in 51.4% of those aged 20 and above (n=3153).”
- **“We conclude that a considerable percentage of infected people in all age groups, including those who are pre- or mild-symptomatic, carry viral loads likely to represent infectivity.”**
- **“In particular, there is little evidence from the present study to support suggestions that children may not be as infectious as adults.”**

Work at Charité virology is funded by European Commission via project ReCoVer, the German Ministry of Research and Education via Deutsches Zentrum für Infektionsforschung, and the German Ministry of Health via the Konsiliarlabor für Coronaviren. <https://www.medrxiv.org/content/10.1101/2020.06.08.20125484v1>

COVID-19: Schools – Children Transmission to Others



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Volume 26, Number 10—October 2020

Dispatch

Contact Tracing during Coronavirus Disease Outbreak, South Korea, 2020

SARS-CoV-2 positive patients tracing number of positive cases in household contacts. (Table 2)

This Research included both symptomatic and asymptomatic patients. South Korea does extensive testing and case tracking but the authors stated “all asymptomatic patients might not have been identified”

https://wwwnc.cdc.gov/eid/article/26/10/20-1315_article

Age 1 to 9 spread the virus half as frequently as adults as those 10 to 19 spread it more than adults.

Index patient age, y	No. Household contacts positive/no. contacts traced	% Positive (95% CI)
0–9	3/57	5.3 (1.3–13.7)
10–19	43/231	18.6 (14.0–24.0)
20–29	240/3,417	7.0 (6.2–7.9)
30–39	143/1,229	11.6 (9.9–13.5)
40–49	206/1,749	11.8 (10.3–13.4)
50–59	300/2,045	14.7 (13.2–16.3)
60–69	177/1,039	17.0 (14.8–19.4)
70–79	86/477	18.0 (14.8–21.7)
≥80	50/348	14.4 (11.0–18.4)

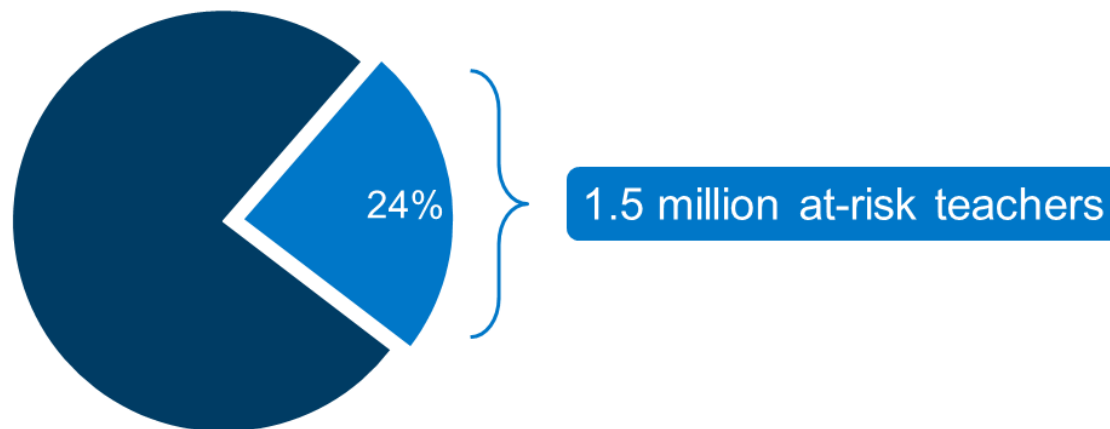
COVID-19: Schools – Risk to Teachers



KFF

Nearly 1.5 Million Teachers (One in Four) are at Greater Risk of Serious Illness if Infected with Coronavirus

Share of teachers at greater risk of serious illness if infected with coronavirus



Source: KFF analysis of 2018 National Health Interview Survey.

KFF

<https://www.kff.org/coronavirus-covid-19/issue-brief/how-many-teachers-are-at-risk-of-serious-illness-if-infected-with-coronavirus/>

COVID-19: Schools – Experience In Other Countries



Over 191 countries closed schools. <https://news.un.org/en/story/2020/04/1062232>
EUROPE OPENED SCHOOLS AT AN INFECTION NADIR

MIT Technology Review: “But in many countries, schools are now cautiously reopening: in Germany, Denmark, Vietnam, New Zealand, and China, children are mostly back behind their desks. These countries all have two things in common: **low levels of infection and a reasonably firm ability to trace outbreaks.**”

<https://www.technologyreview.com/2020/06/30/1004625/is-it-safe-to-send-kids-back-to-school/>

In Germany: “.. in most of Germany, students have been back in school since May, albeit on a part-time basis. And this is to allow for reduced class sizes and social distancing, meaning that students still study from home for some of the week.”

<https://www.npr.org/2020/07/10/889842725/lessons-on-reopening-schools-the-u-s-could-learn-from-germany-israel-and-thailand>

But on July 20, 2020. German Schools in one district closed again: “All schools and day-care centers in the district were also closed and will remain so until mid-August.”

<https://www.cnn.com/2020/06/23/germany-is-struggling-with-more-coronavirus-outbreaks.html>

In Thailand: There has been no domestic infection for more than five weeks.

<https://www.npr.org/2020/07/10/889842725/lessons-on-reopening-schools-the-u-s-could-learn-from-germany-israel-and-thailand>

COVID-19: Schools – Experience In Other Countries



June 3, 2020, Israel: After reopening for two weeks Israel reclosed 130 schools.

THE CORONAVIRUS CRISIS

After Reopening Schools, Israel Orders Them To Shut If COVID-19 Cases Are Discovered

June 3, 2020 · 11:32 AM ET



DANIEL ESTRIN



<https://www.npr.org/sections/coronavirus-live-updates/2020/06/03/868507524/israel-orders-schools-to-close-when-covid-19-cases-are-discovered>



Lessons On Reopening Schools The U.S. Could Learn From Germany, Israel And Thailand

July 10, 2020 · 3:45 PM ET

ESME NICHOLSON

“But instead of just letting the younger kids go back to school, there were these last-minute negotiations. Ultra-Orthodox Jewish schools wanted the older kids to go back to religious studies, and so they did. And then 11th- and 12th-graders also went back to school. And so very, very quickly, everyone was back. And then very quickly after that, there was a heat wave, so the government said, well, kids don't need to wear masks anymore during this heat wave. And then we just saw big outbreaks in schools, and a lot of schools shut down for several weeks.”

<https://www.npr.org/2020/07/10/889842725/lessons-on-reopening-schools-the-u-s-could-learn-from-germany-israel-and-thailand>

COVID-19: Schools – Experience In Other Countries



In France on May 18, 2020: Coronavirus flare-ups force France to re-close some schools. Reclosed 7 schools in Northern France due to a flare up.

<https://www.cbsnews.com/news/coronavirus-france-close-some-reopened-schools-covid-cases-flare-up-today-2020-05-18/>

In South Korea on May 30, 2020: Hundreds (838) of schools closed after a spike infection rates. <https://www.washingtonpost.com/education/2020/05/30/south-korea-closes-schools-again-amid-covid-19-spike-days-after-reopening/>

All of these countries opened Schools when community spread of the virus was controlled and there was abundant case tracking.

COVID-19: Schools – Experience In Other Countries



In France on Aug 1, 2020: CNN reported that France is planning to use different strategies in opening schools in the fall, depending upon the level of spread of the virus in the community. Strategies range from: In school learning, blended programs and online only options.

COVID-19: Overnight Camp



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

SARS-CoV-2 Transmission and Infection Among Attendees of an Overnight Camp — Georgia, June 2020 *Early Release* / July 31, 2020 / 69

- On June 23, a teenage staff member left camp A after developing chills the previous evening. The staff member was tested and reported a positive test result for SARS-CoV-2 the following day (June 24).
- Officials began sending campers home on June 24 and closed the camp on June 27.

TABLE. SARS-CoV-2 attack rates^{*,†} among attendees of an overnight camp, by selected characteristics — Georgia, June 2020

Characteristic	No. [§]	No. positive	Attack rate, %
Total	597	260	44
Sex			
Male	267	123	46
Female	330	137	42
Age group, yrs			
6–10	100	51	51
11–17	409	180	44
18–21	81	27	33
22–59	7	2	29

136 cases had available symptom data,

- 36 (26%) patients reported no symptoms;
- 100 (74%) reported symptoms, subjective or documented fever (65%), headache (61%), and sore throat (46%).

COVID-19: When To Open - WHO



Decision makers should consider the following when deciding on whether to open or close schools:

- Current understanding about COVID-19 transmission and severity in children
- Local situation and epidemiology of COVID-19 where the school(s) are located
- School setting and ability to maintain COVID-19 prevention and control measures

**MIT
Technology
Review**

These countries all have two things in common: low levels of infection and a reasonably firm ability to trace outbreaks.

COVID-19: When To Open - Criteria



Criteria for Opening Schools (University of Minnesota Center for Infectious Disease Research and Policy):

- Less than 5 cases per 100,000 per day (In Kentucky that would be about 200 cases per day).
- Rates falling for 2 weeks.
- 25% of hospital beds available.

Robert Redfield, Director of the CDC.

- Counties with test positivity rates greater than 5% should consider closing.

COVID-19: When To Open - Criteria



The New York Times

“To create safe schools is much more complex than just having students wear face masks and sit physically distanced from one another in class. We must ensure that all five of the core school-based activities — transportation, time in the classroom, mealtimes, gym and extracurricular activities — are safe.”

<https://www.nytimes.com/2020/07/29/opinion/coronavirus-schools-reopen.html>

COVID-19: When To Open - Criteria



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COMMUNITY, WORK & SCHOOL

School Decision-Making Tool for Parents, Caregivers, and Guardians

Decision-Making Tool for Parents and Guardians

Choosing whether or not to send your child back to school can be difficult. When weighing decisions about your child returning to school, it is important to consider your family's unique needs and situation and your comfort level with the steps your school is taking to reduce the spread of COVID-19. Some considerations may include the specific risks to members of your household if a child were to become infected in school, as well as access to school meal programs, social services, extended day childcare services and extra-curricular activities, social-emotional support from peers and educators, and school transportation.

Back to School Decision Making Tool

Back to School Decision Making Tool

Note: These questions address your view about how your school is preparing for school year 2020-2021. If you answer "no" to any item regarding your school's plan, consider reaching out to your school administrator for more information.

	Does Not Apply	Disagree	Strongly Disagree	Agree
That conforms with my school's existing plans for reducing risk of spreading COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
That my school has the resources needed to effectively implement their existing plan (e.g., staffing, supplies, training).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
That conforms with my school's plan for a summer or fall semester that is possible for COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
That my school has a plan to provide an effective program of instruction every day of the	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/decision-tool.html>

COVID-19: When To Open – School Modifications Needed



Once Community Spread is Under control & There is Adequate Case Tracking:

- Social Distance of 6 feet between Desks.
- Wearing of Masks.
- Hand sanitizers.
- Smaller Class Size with Maintaining Activities Within The “Bubble” or Cohort. Some are using 10 or fewer so if a student tests positive the whole facility does not have to shut down.
- Pool Testing of Family.
- Outdoor Class.
- Infrastructure Investments
 - 1) Larger Class Room Sizes.
 - 2) Different Patient Flow and Protection in Halls, Restrooms & Cafeterias.
 - 3) Ventilation:
 - High Volume to Dilute The Virus.
 - Sterilization of Virus In A/C System – UV Light

**IF WE DO NOT
CHANGE OUR
DIRECTION,**

**we are likely
to end up where
we are headed.**

Ancient Chinese Proverb

