

What we know about **COVID-19 transmission in schools**

THE LATEST ON THE COVID-19 GLOBAL SITUATION
& THE SPREAD OF COVID-19 IN SCHOOLS

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Current global situation

As of 18 October 2020; (10H CEST)

- **> 39 million cases**

- 5 countries with highest cumulative number of cases



United States of America



India



Brazil



Russian Federation



Argentina

- **> 1.1 million deaths**

- 5 countries with highest cumulative number of deaths



United States of America



Brazil



India



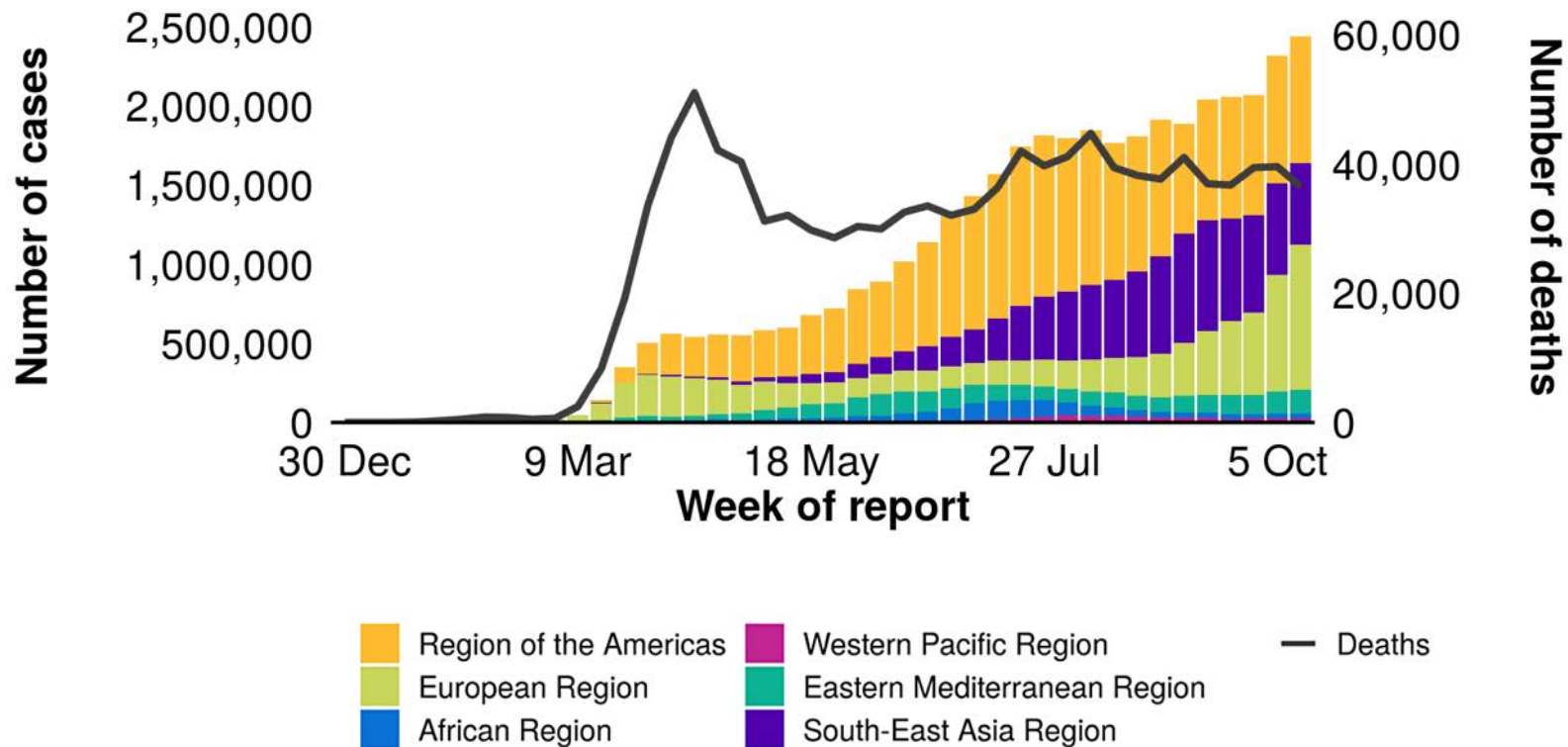
Mexico



The United Kingdom

Current global situation

(Cases reported to WHO as of 18 October 2020, 10:00 CEST)

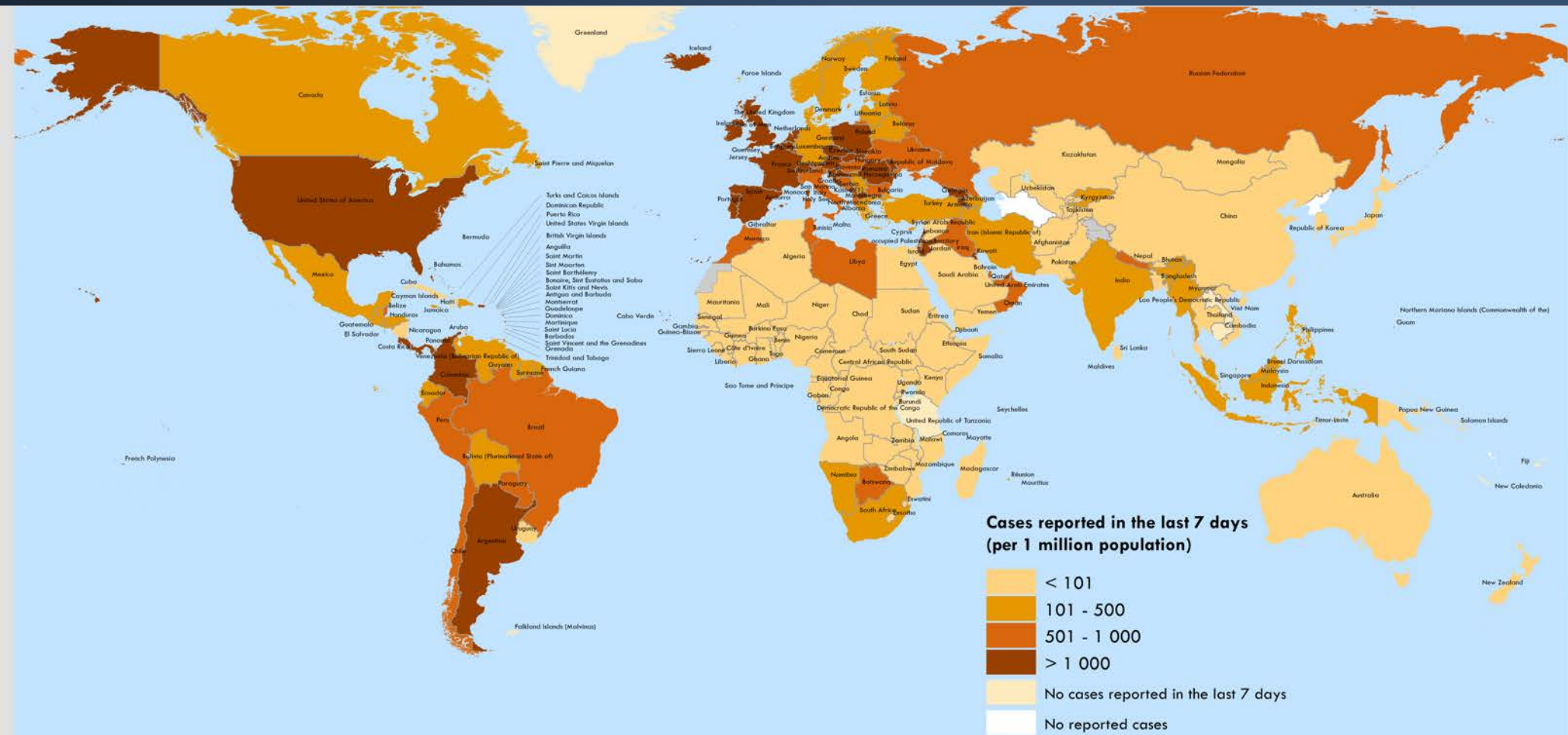


* Cases depicted by bars; deaths depicted by line

COVID-19 cases reported in the last 7 days

Per million population

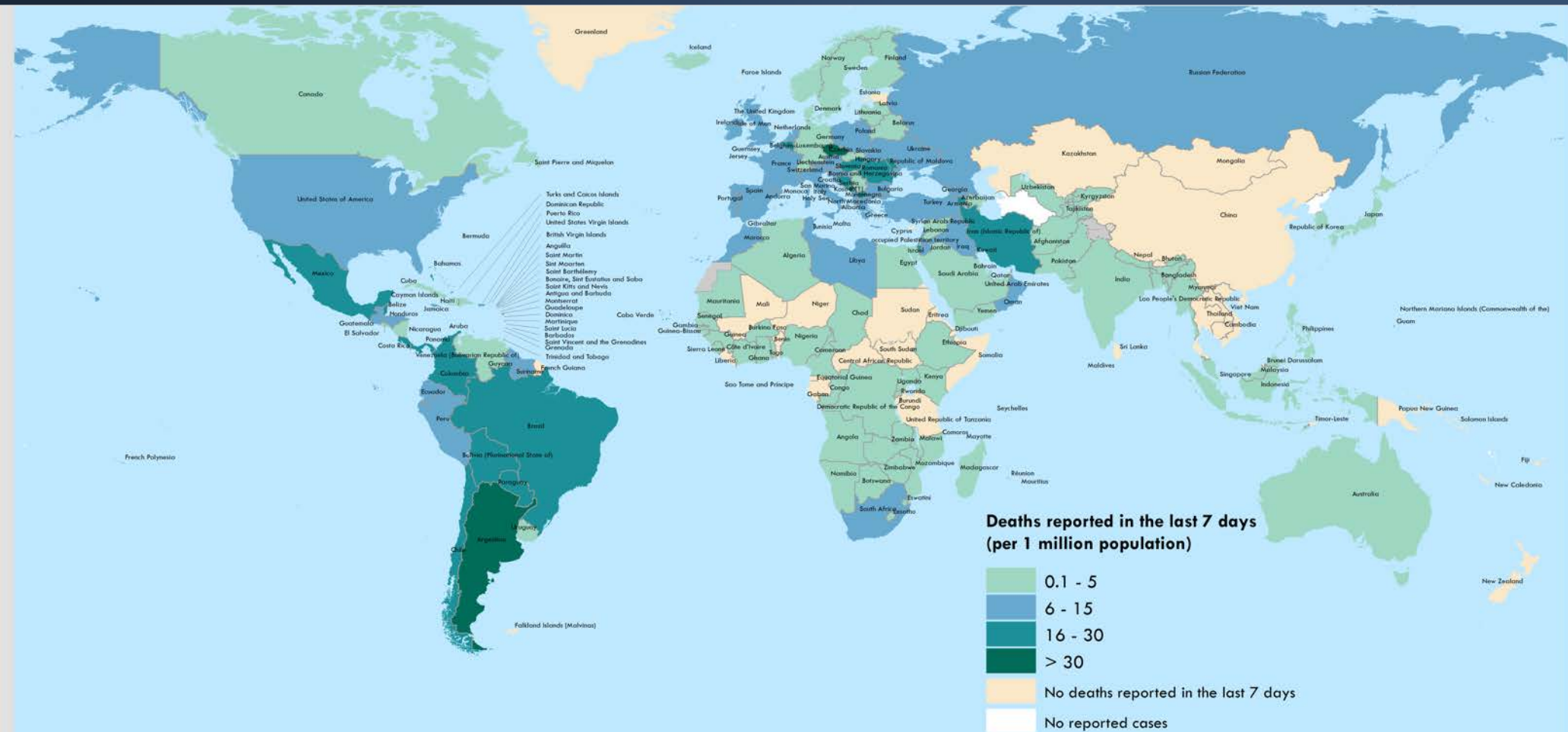
FROM 12 OCTOBER 2020, 10:00AM CEST to 18 OCTOBER 2020, 10:00 AM CEST



COVID-19 deaths reported in the last 7 days

Per million population

FROM 12 OCTOBER 2020, 10:00AM CEST to 18 OCTOBER 2020, 10:00 AM CEST



Transmission of SARS-COV-2 in schools

One of the most concerning questions has been the extent to which COVID-19 spreads in schools

- **There were few outbreaks reported in schools since early 2020¹**
 - Studies were limited during school closures and other stay at home measures. We are learning more as schools re-open
 - In most infections or COVID-19 cases reported in children, infection was acquired at home
- **More outbreaks were reported in secondary/high schools than in primary/elementary schools**
 - Studies suggest that children < 10 years are less susceptible and less infectious than older ones
- **In school outbreaks, it was more likely that virus was introduced by adult personnel**
 - Transmission staff-to-staff was most common; among staff and students was less common; and student-to-student spread more rare
- Early modelling studies suggested that closing schools reduced community transmission less than other social distancing interventions²



¹ [COVID-19 in children and the role of school settings in COVID-19 transmission](#)

² [School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review.](#)

What we know about children and COVID-19

- **COVID-19 is reported much less frequently in children than in adults**
 - Children and adolescents represent about 8% of reported cases (and 29% of the global population)
 - Mild and asymptomatic infections are more common and may be under-reported
- **Children have much milder disease than adults¹**
 - All the same, children with underlying conditions are at higher risk of serious illness
 - Rarely, a few may develop severe disease like multisystem inflammatory syndrome² (MIS-C)
 - MIS-C is a rare inflammatory condition with persistent fever
 - Occurs 2-4 weeks after onset of COVID-19; most recover with treatment but rarely death may occur
- **The role of children in transmission is not yet fully understood**
 - Children of all ages can be infected and spread the virus to others
 - Studies to date show less spread among children under ten years than in older children
 - Infection occurs more often in teenagers than in younger children
 - Older children appear to be more susceptible to infection and to transmit more often than younger children

¹ [Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults](#)

² [Multisystem inflammatory syndrome in children and adolescents with COVID-19](#)

Young children are less susceptible to SARS-CoV-2 than older children¹

Susceptibility refers to how easily a child can become infected by SARS-CoV-2 ► [SEE THE DATA](#)

Data is still limited. Current information from most studies suggests that SARS-CoV-2 susceptibility rises with age. A range of studies show this in different ways:^{1,2}

- **Contact tracing studies:**
 - Given the same exposure to infected household members, children under the age of 10 become infected less frequently than adults and adolescents. Studies limited as often rely on persons with symptoms.
- **Studies of household and community transmission:**
 - Children 9 years or younger are less susceptible than children aged 10-14 years
- **Serological studies:**
 - Seroprevalence (% of study participants with COVID-19 antibodies) is lower in younger children than in older children and adults. However the assay used had not been validated in children. ► [SEE THE DATA](#)
- **Modelling studies:**
 - Susceptibility to infection of persons under 20 years is about half that of adults aged 20 or older and rises steadily with age. Modelling studies rely on data from other studies so will also share the same limitations.

¹ [On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community](#)

² [Susceptibility to and transmission of COVID-19 amongst children and adolescents compared with adults: a systematic review and meta-analysis](#)

Adolescents transmit virus as often as adults and more readily than young children¹

Infectivity refers to how easily SARS-CoV-2 can be transmitted to others

SARS-CoV-2 infectivity rises with age. A range of studies show this in different ways^{1,2,3}:

- **Contact tracing studies^{1,2}:**
 - Infected children under 10 years may be less contagious than teenagers and adults ► [SEE THE DATA](#)
- **Serological studies²:**
 - Older children may play a more active role in transmission than younger children
- **Viral load studies³:**
 - Children with symptoms carry as much virus in the nose, mouth and throat as adults, but for shorter periods
 - Children show peak respiratory viral load early after symptom onset, followed by a rapid decline.
 - Prolonged fecal shedding is more common in children than adults; but infectivity of virus in stool is uncertain
- **Information on age-related infectivity continues to evolve and may change**

¹ [Tracing during Coronavirus Disease Outbreak](#), South Korea; 20 January - 27 March 2020

² [On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community](#)

³ [An analysis of SARS-CoV-2 viral load by patient age](#)

The risk of outbreaks rises when community transmission is high

Evidence from schools and camps

- There is a strong link between number of outbreaks and local transmission^{1,2}
- Schools being open did not lead to rise in community spread where infection was low^{1,3}
 - Preventive measures, prompt case detection and contact-tracing averted larger outbreaks ➤ [SEE THE DATA](#)
- Large outbreaks can occur in specific circumstances
 - Israel⁴: 178 cases (153 students 12-18 years and 25 staff) in a **high school** 10 days after reopening; affected classes were crowded with few measures in place ➤ [SEE THE DATA](#)
 - Georgia⁵, USA: 260 cases among staff and campers (6-19 years) in an overnight camp
 - In both these instances, prevention measures were weak
- When there is widespread community transmission of SARS-CoV-2 or the number of cases is rising, **preventive and protective measures in schools** are even more important

¹ [How schools can reopen safely during the pandemic](#)

² [SARS-CoV-2 infection and transmission in educational settings: cross-sectional analysis of clusters and outbreaks in England](#)

³ [Reopening Primary schools during the Pandemic](#)

⁴ [A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020](#)

⁵ [SARS-CoV-2 Transmission and Infection Among Attendees of an Overnight Camp, Georgia, June 2020](#)

School closures can affect children in many ways

School absence affects equity, education, child health and development

- Disruption to instructional time can affect a child's **ability to learn**. The longer marginalized children are out of school, the less likely they are to return
- Closures disrupt **school-based services** such as immunization, school meals, mental health and psychosocial support, and can cause anxiety due to loss of peer interaction and disrupted routines
- Being out of school **increases the risk** of teenage pregnancy, sexual exploitation, child marriage, violence and other threats
- Harms are greater for children of migrants, refugees, minorities; children living with disabilities; and children in institutions or in countries affected by conflict

More than 1.5 billion students were affected by school closures worldwide¹

- Many schools are **unable to offer remote education** or alternate strategies
- Keeping children home **affects the ability of parents to work**, introducing other risks

USEFUL RESOURCES

UNITED NATIONS

[Policy Brief: The Impact of COVID-19 on children](#)

PUBLIC HEALTH ONTARIO /
SANTÉ PUBLIQUE ONTARIO

[Negative impacts of community-based public health measures during a pandemic on children and families](#)

[Mesures communautaires de santé publique en situation de pandémie \(dont la COVID-19\) : répercussions négatives sur les enfants et les familles](#)

¹ ['What will a return to school during the COVID-19 pandemic look like?' What parents need to know about school reopening in the age of coronavirus](#)

Implications for school public health policy

- **COVID-19 appears to have less effect on children's health than for adults**
 - In contrast, school closures can adversely affect children's health, education and development
- **Children and schools are unlikely to be the main drivers of COVID-19 transmission, when community transmission is low and when appropriate mitigation measures are applied**
 - However, information is limited and gathered early in the epidemic — to be interpreted with caution
 - Reported outbreaks underscore the importance of rigorous preventive measures in schools when COVID-19 is circulating in the community
 - Schools should have outbreak prevention and management plans ready before resuming classes
- **Closure of schools should be considered only if there is no other alternative**
 - More caution is necessary regarding secondary/high schools and older students compared to primary/elementary schools
- **Adult personnel may be at risk of acquiring and transmitting the infection**
 - Control measures to protect staff must be reinforced
 - School policy should support personnel to enable isolation or quarantine when necessary
 - Adult staff need to be stay vigilant for exposure outside the school
- **Community transmission is reflected in the school setting**
 - Public health measures in the community are essential to protect schools from amplifying transmission

A risk-based approach to minimizing risk to students and staff

Factors to consider for deciding how to manage risk in schools in your community

- **Understand the local context** such as intensity of community spread and local epidemic trends
- **Gauge public health capacity** to quickly detect and manage new cases / outbreaks
- **Evaluate school readiness and resources** to maintain COVID-19 prevention and control measures and / or to deploy remote learning methods
- **Be aware of potential harm that may occur with school closures** such as disruption in health and social services (meals, vaccinations, etc.) and school dropout which may be particularly detrimental for girls
- **Consider benefits vs. risks** across health, education, and socioeconomic factors when considering whether to reduce in-person education

USEFUL RESOURCES

WHO GUIDANCE

[Considerations for school-related public health measures in the context of COVID-19](#)

UNICEF

[Framework for reopening schools](#)

[What will a return to school during COVID-19 look like?](#)
[What parents need to know about school reopening in the age of coronavirus](#)

How to support schools to stay safe

Multi-layered approach to help prevent introduction & spread of SARS-CoV-2 in schools

Communications with parents, students, teachers & staff

- ✓ **Intense collaboration** between the school and the community is key
- ✓ **Post signs in visible locations** that promote everyday protective measures
- ✓ **Ask for cooperation of parents** to report any cases of COVID-19 in the household
- ✓ **Ensure frequent communications** and messaging to reassure parents, students and teachers
- ✓ **Address and counter rumours**, misleading information and stigma
- ✓ **If someone in the household is suspected of having COVID-19**, all members of the household should stay home and the school should be informed

Community

- Early detection and isolation of cases; contact tracing and quarantine
- Swift public health response to halt spread: Cluster investigation and local public health and social measures
- Physical distancing, hand-washing and age-appropriate wearing of masks
- Safe public transportation, protection of vulnerable groups and other measures as appropriate

School & classrooms

- All community measures, plus:
- Symptom screening by parents and teachers
- Maintaining a clean and healthy environment
- Ensuring adequate and appropriate ventilation

Individuals at high risk

- Enhanced protection of students and teachers with underlying health conditions
- Coordinated approach to address vulnerable children's needs (mental health and psychosocial support, rehabilitation, nutrition, etc.)

Hygiene and daily practices at school

- ✓ **Educate students, staff and school employees** in frequent hand hygiene, respiratory etiquette, appropriate mask use, recognizing COVID-19 symptoms and knowing what to do when sick
- ✓ **Provide hand hygiene stations** at entrances and exits
 - Create a schedule for frequent hand hygiene: at school arrival, before snack and lunch, before departure, etc.
- ✓ **Implement respiratory, hand hygiene and physical distancing in school buses**



- ✓ **Clean and disinfect the school environment daily, including school buses and transport vehicles**
 - Clean and disinfect frequently touched surfaces (door handles, sink handles, equipment, etc.)
 - Prepare checklists for school cleaners
 - Discourage sharing of items that are difficult to clean

Physical distancing

Maintain at least 1m distance between individuals where feasible

✓ Limit number of students per class

- Increase number of teachers or volunteers to allow for fewer students per classroom
- Alternate shifts (morning, afternoon) to accommodate fewer students at a time
- Alternate distance learning with physical presence in schools

✓ Limit mixing of classes and age groups¹

- Staggering: classes start, break and stop at different times
- Cohorting or bubbling: small student groups with minimal contact
- Limit contact in gym classes, sports; music and other activities; playgrounds and changing rooms

✓ Encourage use of physical barriers to support physical distancing

- Arrange desk spacing and orientation: desks face in the same direction
- Provide physical guides, such as tape on floors and signs on walls

✓ Ensure crowd control during drop off & pick up

- Clearly identify entry and exits, mark direction of walking, restrict access (suppliers, parents)
- Display clear information on number of people allowed into each school facility



¹ [Summary of School Re-Opening Models and Implementation Approaches During the COVID-19 Pandemic](#), 6 July 2020.

Use of masks in schools

WHO & UNICEF advice on masks & children in the context of COVID-19¹

Where there is intense community transmission of COVID-19 and in settings where physical distancing is not possible:

- ✓ **Children under five years should not be required to wear masks**
- ✓ **6 to 11 years old, the use of mask should be based on:**
 - Whether there is widespread transmission in the area
 - Ability of the child to safely and appropriately use a mask
 - Access to clean and replacement masks
 - Adequate adult supervision
 - Potential impact on learning and psychosocial development
 - Specific settings and interactions with persons at higher risk
- ✓ **12 years and older should wear a mask under the same conditions as adults**
- ✓ **Teacher and support staff should wear masks when they cannot guarantee at least a 1-metre distance from others or if there is widespread transmission in the area**



¹ [Advice on the use of masks for children in the community in the context of COVID-19](#)

Ventilation

- ✓ **Ventilate indoor spaces** to increase airflow and dilute any contaminants
 - Open windows and doors for natural ventilation
- ✓ **Ensure heating, ventilation and air conditioning (HVAC) systems and filters are regularly cleaned**, maintained, inspected and operating properly
 - Increase the total air supply up to 100 % of outdoor air where possible
 - Set central air filtration to the highest level possible
 - Disable controls that reduce air supply automatically
 - Consider running outside airflow for two hours before and after the building is occupied

USEFUL RESOURCES

[Q&A on ventilation and air conditioning in the context of COVID-19](#)

[Operational considerations for COVID-19 management in the accommodation sector](#)

Caring for students and staff who feel unwell

- ✓ **Staff and students should stay home when they feel unwell**
- ✓ Consider daily screening for fever in the previous 24 hours
- ✓ Waive the requirement for a doctor's note to excuse absences
- ✓ Implement a plan when a staff/student develops symptoms at school
 - Isolate the sick person in a designated room until transportation can be arranged
 - Connect with local health providers to arrange for testing and care
 - Ensure appropriate PPE for all those in contact with the sick person

Case investigation & contact tracing at school

What to do if a student or staff tests positive for COVID-19

- ✓ **Notify health officials, staff and families immediately**, maintaining confidentiality
- ✓ **Work with local health officials to assess spread in school**, support contact tracing¹ efforts
 - Create a list of close contacts of the sick student. A close contact is someone within 1 meter of a COVID-19 case, from 2 days before to 14 days after the onset of illness
 - Ensure close contacts are notified and advised to stay home for 14 days, self-monitor for symptoms and consult with health care providers to arrange for testing if necessary
- ✓ **Persons infected may return to school after meeting criteria for ending home isolation²**
- ✓ **School areas used by the ill person(s) should be cleaned and disinfected** by staff with PPE
 - Until disinfected, areas should be closed to the public
- ✓ **Consider closure of groups, classrooms or schools**, depending on virus spread
 - Decision on short-term closures should be taken together with local health authorities

¹ [Contact tracing in the context of COVID-19](#)

² [Criteria for releasing COVID-19 patients from isolation](#)

Additional measures for schools

Ensure school-based health services, immunization, meals and support services are maintained

- ✓ **Assess the impact of differential access to health and education** during school closures. Once school reopens, design tailored catch-up strategies; especially for students with vulnerabilities
- ✓ **Institute support mechanisms** to address gender-based implications of school closures such as early marriage and girls school drop out
- ✓ **Enhance opportunities for psychosocial and mental health support**

Remote learning

Where children cannot attend classes in person, ensure students have continued access to educational materials and technologies - internet, text messaging, written assignments, radio, television or any innovative means of offering physically distanced learning support.

Monitoring of school operations

As protective school measures are applied, **conduct monitoring in close collaboration with schools and communities** and establish surveillance programmes to monitor the impact of school measures and re-openings

Resources on school readiness

- [*IASC Interim Guidance for COVID-19 Prevention and Control in Schools*](#)
- [*Framework for Reopening Schools*](#)

Resources on re-opening & operations of schools

- [Q&A: Schools and COVID-19](#)

WHO

- [Considerations for school-related public health measures in the context of COVID-19](#)

WHO

- [Key messages and actions for COVID-19 prevention and control in schools](#)

UNICEF / IFRC / WHO

- [Framework for reopening schools](#)

UNICEF

- [Guidance for COVID-19 prevention and control in schools](#)

UNICEF

- [WHO UNICEF webinar on COVID-19 and schools](#)

Part 1

WHO / UNICEF

- [WHO UNICEF webinar on COVID-19 and schools](#)

Part 2

WHO / UNICEF

- [COVID-19 in children and the role of school settings in COVID-19 transmission](#)

ECDC

- [Operating schools during COVID-19: CDC's considerations](#)

CDC



How to protect ourselves & others

9 important COVID-19 prevention measures



01 Stay home and self-isolate if you feel unwell, even with mild symptoms



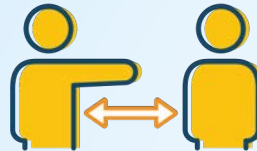
02 Clean hands frequently with soap & water for 40 seconds or with alcohol-based hand rub



03 Cover your nose and mouth with a disposable tissue or flexed elbow when you cough or sneeze



04 Avoid touching your eyes, nose and mouth



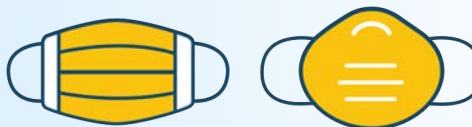
05 Maintain a minimum physical distance of at least 1 metre from others



06 Stay away from crowds and avoid poorly ventilated indoor spaces



07 Use a fabric mask where physical distancing of at least 1 metre is not possible



08 Use a medical / surgical mask if you may be at higher risk (age, medical conditions)



09 Regularly clean & disinfect frequently touched surfaces

WHO guidance on COVID-19

VIDEO RESOURCES

Masks



[Medical and fabric masks: who wears what when?](#)



[How to wear a fabric mask safely](#)



[How to wear a fabric mask](#)



[How to wear a medical mask](#)

Transmission



[How to break the chains of transmission](#)

Protecting ourselves



[How to protect yourself against COVID-19](#)



[Seven steps to prevent the spread of the virus](#)

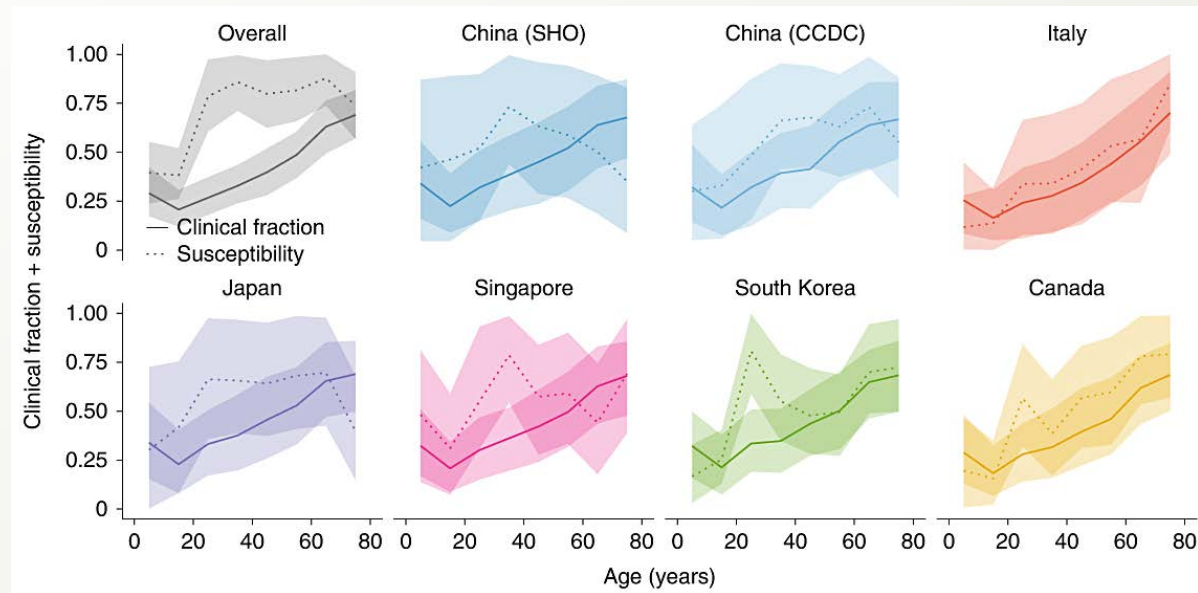
DATA ANNEX

Susceptibility to COVID-19 rises with age¹

In transmission models fitted to epidemic data from China, Italy, Japan, Singapore, Canada & South Korea

- The % of persons infected among the exposed (susceptibility) and the % with symptoms among those infected (clinical fraction) both generally increase with age

Figure: Susceptibility and clinical fraction by age group



Reproduced from Davis et al.

¹ [Age dependant effects in the transmission and control of COVID-19 epidemics](#)

Fewer children under 10 have antibodies compared to adolescents and adults¹

Seroprevalence study of SARS-CoV-2 IgG antibodies in Geneva (May 2020)

- 7.9% of the population of Geneva had developed antibodies by May 9th
- Antibody prevalence was much lower in children aged 5-9 years and in adults 65 years or older than those aged 10-64 years.
- This suggests **fewer children under 10 had been infected**
- **Adolescents had a similar prevalence as young adults**
- Limitations:
 - Sample only included children 5 years or older
 - Younger children had a higher proportion of indeterminate test results.
 - The performance of the test is uncertain in children. The commercially available ELISA was only validated for adults

Table: Relative risk of seropositivity by age and sex

	SARS-CoV-2 serology test result			Relative risk (95% CI)	p value
	Positive	Negative	Indeterminate		
Age group, years					
5–9 (n=123)	1 (0.8%)	114 (92.7%)	8 (6.5%)	0.32 (0.11–0.63)	0.0008
10–19 (n=332)	32 (9.6%)	295 (88.9%)	5 (1.5%)	0.86 (0.57–1.22)	0.37
20–49 (n=1096)	108 (9.9%)	970 (88.5%)	18 (1.6%)	1 (ref)	..
50–64 (n=846)	63 (7.4%)	772 (91.3%)	11 (1.3%)	0.79 (0.57–1.04)	0.090
≥65 (n=369)	15 (4.1%)	348 (94.3%)	6 (1.6%)	0.50 (0.28–0.78)	0.0020
Sex					
Female (n=1454)	101 (6.9%)	1333 (91.7%)	20 (1.4%)	1 (ref)	..
Male (n=1312)	118 (9.0%)	1166 (88.9%)	28 (2.1%)	1.26 (1.00–1.58)	0.054

Data are n (%) unless otherwise stated. Age 20–49 years and female are the reference groups, with which other groups are compared. p values are Bayesian p values following Gelman and colleagues.¹⁴ SARS-CoV-2=severe acute respiratory syndrome coronavirus 2.

Table 1: Relative risk of seropositivity by age and sex

Reproduced from Stringini et al.

¹ [Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland \(SEROCoV-POP\): a population-based study](#)

Children under 10 are less likely to pass on the virus to others than adolescents and adults

A large contact-tracing study in the Republic of South Korea¹

- Among 59,073 contacts of 5,706 COVID-19 patients, 12% of household contacts tested positive for COVID-19
- Only 5% of contacts of children aged 0-9 years became infected, the lowest for all age groups
- This suggests young children are less contagious than older children and adults
- Limitations:
 - Direction of transmission was not rigorously documented, and this could account for significant bias
 - Numbers of cases and contacts were very small in the younger age-groups

Table: Coronavirus disease among household contacts, South Korea, January 20–March 27, 2020

Index patient age,	Household	
	No. 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)
Total	1,248/10,592	

¹ [Tracing during Coronavirus Disease Outbreak, South Korea, 2020](#); 20 January - 27 March 2020

Limited SARS-CoV-2 infection in schools with public health measures¹

England, June - 31 July 2020

- Public Health England (PHE) initiated enhanced surveillance following the reopening of schools during a summer mini-term on 01 June 2020
- Re-opening of schools was associated with few COVID-19 outbreaks when public health measures were in place
- 67 single confirmed cases, 4 co-primary cases and 30 COVID-19 outbreaks during June 2020
- Strong correlation between number of outbreaks and regional COVID-19 incidence
- Staff members had a higher risk of SARS-CoV-2 infection than students; most cases linked to outbreaks were in staff
- Additional interventions should focus on reducing transmission in and among staff members

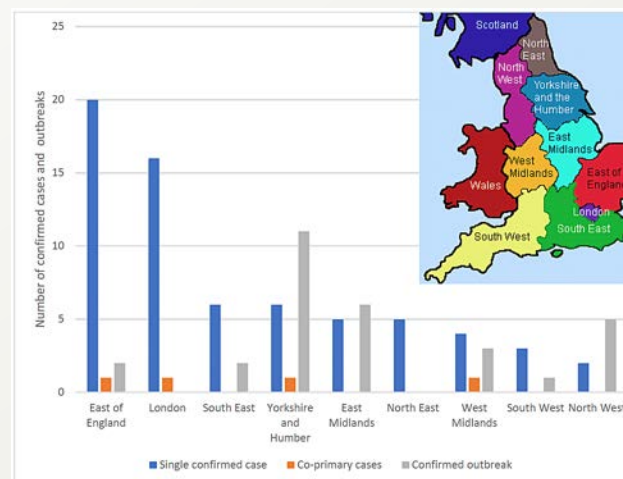


Figure 1: Regional distribution of single cases, clusters and outbreaks in schools across England, June 2020.

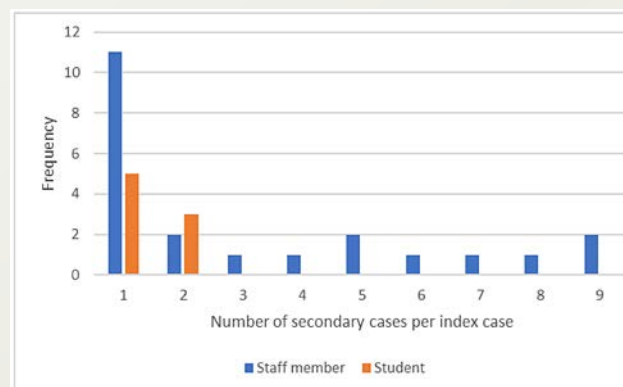


Figure 2: Number of secondary cases for school outbreaks in England in June 2020, by index case

¹ [SARS-CoV-2 infection and transmission in educational settings: cross-sectional analysis of clusters and outbreaks in England](#)

Large COVID-19 outbreak in a high school with insufficient public health measures

- On 13 March 2020, Israel closed all schools; then fully reopened on 17 May
- Measures included daily health reports, hygiene, facemasks, social distancing and minimal interaction between classes
- On 19-21 May during an extreme heatwave, the Ministry of Health exempted pupils from wearing masks. Windows were closed and air-conditioning functioned continuously
- Ten days later**, a major COVID-19 outbreak occurred in a high school
- 1,164 students (aged 12–18 years, grades 7–12) and 152 staff were tested
 - 178 confirmed cases: 153 students (Attack rate: 13%) and 25 staff (Attack rate: 17%)
 - 43% of student cases and 76 % of staff cases reported symptoms
- Classes were reported crowded (36-38 students / 39-49 m²)
- It was concluded that public health measures were not adequate and contributed to the outbreak

¹ [A large COVID-19 outbreak in a high school 10 days after schools' reopening](#), Israel, May 2020

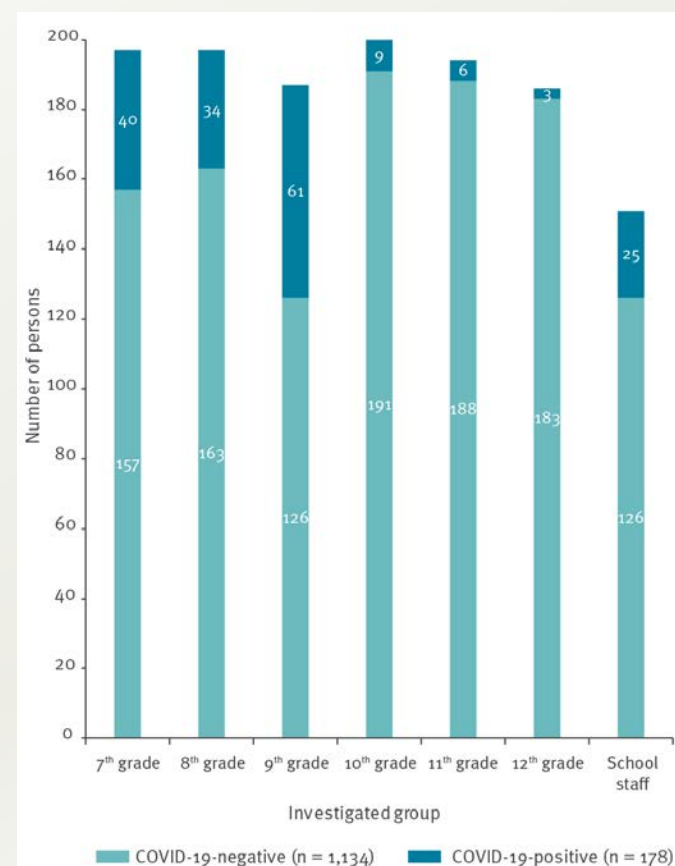


Figure: Results of COVID-19 testing, school outbreak, Jerusalem, May 2020 (n = 1,312)



EPI•WiN

infodemic
MANAGEMENT

www.who.int/epi-win