

CLASSIFICATION OF CONTACTS FOR CHILDREN

RAG 10/08/2020

QUESTION

Whilst COVID-19 in children seems to present as a clinically mild disease, social distancing rules and school closures have severely impacted children's wellbeing and can have an important impact on the cognitive development of children. When schools and kindergartens gradually reopened, children were still frequently tested and isolated because they had been in proximity of a COVID-19 case. A previous RAG advice early June evaluated the possibility of using a different classification of high/low risk contacts in children than used for the adult population. After review of the literature, it was judged that there were still too many unknown factors. The RAG decided it was too early to recommend any major changes and decided to wait for more data. After raised concerns on over testing of children under the age of three, the RAG advised to restrict testing in this age group. The RAG further advised to keep bubbles in nurseries open after a single confirmed COVID-19 case and only quarantine the other children in the nursery-bubble when a cluster (min. 2 cases) was confirmed ([see RAG advice 30/06](#)). In the current advice we reevaluate the best available evidence on transmission of SARs-CoV-2 in children and analyze Belgian data, in order to formulate a guidance to help as many children as possible to return to school in September in a safe way.

CURRENT CLASSIFICATION APPLIED TO CHILDREN (0 to 18y)

High risk contact (or close contact):

Person with cumulative contact of at least 15 min within a distance of <1.5m (face to face), for example in a conversation → includes all friends (especially for adolescents) if non respect of distancing measures.

Person who was in the same room/closed environment with a COVID-19 case for more than 15 min, where a distance of 1.5m could not be kept or when objects were shared:

- household contacts
- ~~a section of a nursery~~ (removed following RAG advice 30/06)
- the entire class for children 3-6 years (kindergarten)
- possibly classroom neighbors ≥6 years.

Person having had physical contact with a COVID-19 case:

- household contacts
- friends at schools while playing/cuddling (especially for younger children).

Low risk contact:

Person who was in the same room/closed environment with a COVID-19 case, but no cumulative contact of at least 15 min within a distance of <1.5m:

- the whole classroom for children ≥6 years (except neighbors in the classroom).

For high-risk contacts, testing and quarantine are recommended. For low-risk contacts, an increased attention to the own health and to hygienic measures is recommended. Threshold for testing should be low in all contacts in case they develop symptoms that are compatible with COVID-19.

RECOMMENDATIONS

1. General recommendations

- For leisure activities and extracurricular activities, specific guidelines are available and should be followed. Activities should be as much as possible organized outdoor.
- **For kindergarten**, bubbles can mix both during indoor and outdoor activities.
- **For primary schools**, indoor activities (including lunch) should be organized within the classroom bubble. Several bubbles can use the same space, with respect of the distance between different bubbles and providing the room is regularly ventilated (especially between two shifts e.g.). For outdoor activities (in open air), bubbles of the same primary school can mix. Of note is that a covered playground is considered as an indoor space.
- **For secondary schools**, both indoor and outdoor activities should be organized within the classroom bubble, in accordance with the planned scenarios of the regions. In addition, the RAG expresses its concern that limiting secondary school activities on site to 50 % of the time in case of an orange/red scenario (FR, NL, DE) (which will probably be the case for several months) and limiting the number of students will have an important impact on both the psychosocial wellbeing, cognitive development and education of this age group. Efforts should be done to keep schools open as much as possible to as much as possible children. Alternative approaches to limit the impact of schools on transmission dynamics should be addressed, for example during transport to and from school (increasing public transport capacity, encouraging private transport such as cycling).

2. New recommendations with regards to testing

Testing in children 0-6 years is only recommended (as was previously recommended for 0-3 years of age) if there are clinical signs compatible with COVID-19 **and** :

- if the child needs to be hospitalized
- if the result will implicate that further measures such as quarantine or testing are needed to protect close contacts (e.g. family member at risk of a severe manifestation of COVID-19) or low risk contacts (cfr “measures for exposed children below).

For children ≥ 6 years, the testing strategy remains the same, for diagnosis¹ and for contacts².

3. Classification of contacts

The following classification of contacts is suggested.

3.1. All ages

- Within a household: children from the same household as a case of COVID-19 are considered as high risk contacts, further referred to as “close contacts”.
- Within boarding school/residential collectivities (jeugdzorg...): children from the same “bubble” are considered close contacts.

3.2. Children < 3 years

See previous RAG advice:

- If a child < 3y is a confirmed COVID-19 case, all contacts with the case, both children and adults, are considered low risk contacts, regardless of the duration or type of contact, unless they belong to the household of the case.

¹ https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Case%20definition_Testing_NL.pdf
https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Case%20definition_Testing_FR.pdf

² http://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_procedure_contact_NL.pdf
https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_procedure_contact_FR.pdf

- If a care-giver has COVID-19 in a nursery, the children and colleagues working in the same bubble are considered as close contacts (14 days quarantine for all contacts and testing for the adults).

3.3. Children in kindergarten (≈ 3 to 5 years)

- If a child in kindergarten is a confirmed COVID-19 case, all children of the class as well as the teacher are considered as low-risk contacts.
- If the teacher is a confirmed COVID-19 case, all children of the class are considered close contacts, as the teacher in kindergarten does not keep a distance of 1.5m (14 days quarantine for all contacts and testing for the adults)

3.4. Children in primary school (≈ 6 to 12 years)

- If a child in primary school is a confirmed COVID-19 case, all children of the class as well as the teacher, are considered low-risk contacts.
- If the teacher is a confirmed COVID-19 case, all children of the class are considered low-risk contacts (because primary school teachers can keep a distance of 1.5m).

3.5. Children in secondary schools (≈ 13 to 18 years)

The same classification is used as for adults:

- A close contact is a person with cumulative contact of at least 15 minutes within a distance of <1.5m (face to face), for example in a conversation or through physical contact. This includes all the friends/classmates if a distance of > 1.5m was not respected.
- A low risk contact is any person who was in the same room/closed environment with the COVID-19 case, but without cumulative contact of at least 15 minutes within a distance of <1.5m. This includes the teachers and classmates/other friends.

4. Measures for exposed children

4.1. Nursery/kindergarten

- **Index case belongs to same household:** no testing required. If the child develops symptoms during quarantine, testing is not necessary neither, but the child is considered as a COVID-19 case. As a COVID-19 case, he/she can return to nursery/school 7 days after the onset of the symptoms, if without fever for at least 3 days and if the symptoms significantly improved.
- **Index case is care-giver or teacher:** no testing required. However, testing is indicated if symptoms of possible COVID-19 arise³ within 14 days of last exposure. If the PCR result is positive, the whole bubble is closed and put 14 days in quarantine.
 - ➔ All further members of the bubble that develop symptoms of possible COVID-19 during quarantine will be tested. This will allow to take the necessary measures for their close contacts (e.g. if PCR test is positive, household contacts will become close contacts, with quarantine and testing as defined in contact procedure⁴).
- **Index case is a child in a nursery section/class room:** if one of the low risk contacts of the bubble develops symptoms of possible COVID-19 within 14 days, he/she has to be tested. If the PCR result is positive, the whole bubble is closed and put 14 days in quarantine.
 - ➔ All further members of the bubble that develop COVID-19 compatible symptoms during quarantine will be tested, as above.

³ As defined by the case definition:

https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Case%20definition_Testing_NL.pdf
https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_Case%20definition_Testing_FR.pdf

⁴ http://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_procedure_contact_NL.pdf
https://covid-19.sciensano.be/sites/default/files/Covid19/COVID-19_procedure_contact_FR.pdf

4.2. Primary and secondary schools

- Quarantine and testing as defined in contact procedure [Error! Bookmark not defined.](#)

ELEMENTS OF DISCUSSION

- For a purpose of harmonization of procedures and advices and to avoid confusion, the same terminology is used for children and adults: contacts are classified as close contacts (“high-risk”) and low risk contacts.
- Compared to the previous RAG advice on children, there have been reassuring data collected in Belgium regarding secondary transmission in schools and youth camps. From literature (cfr. Section “Background information” below), the evidence to date seems to indicate that children are not the drivers of the epidemic. Firstly, children might be less susceptible to SARS-CoV2 than adults, as shown by evidence from seroprevalence studies, widespread community testing, contact tracing and pathophysiological studies. Secondly, when children become infected there seems to be a lower risk of onwards transmission to contacts in children than for adolescents and adults, especially outside the household. Transmission dynamics seem to be different in younger children (up to primary school) than in older children and adolescents (secondary school and higher education). However, some outlier studies have been published, but it is difficult to evaluate the importance of these studies, and the possible impact of super spreaders belonging to the index case(s). All in all, data on children remain somewhat difficult to interpret, as long as there are no really systematic prospective large-scale studies.
- For kindergarten children, the same rule is applied as for the children less than 3y, “first do not harm”, since children of this age category will frequently present symptoms compatible with the (broad) case definition of a possible COVID-19 case, especially during the coming colder months. A test should only be performed if the result leads to a change in behavior or action. Unnecessary repeated testing should be avoided.
Likewise, testing $\leq 6y$ olds that are identified as close contacts within households is not recommended (even if they develop symptoms), because the result will not impact the measures taken (the child remains in quarantine) and the child will seldom be the index case of the household infections (= reason for first test for close contacts is identifying a possible index case among the close contacts to perform further contact tracing). However, testing contacts that develop symptoms after exposure within their nursery/school is essential for cluster detection and management. Although it is important to still collect contact data on COVID-infection for this age group, this should be done through studies and not by testing the whole group of contacts. This may be reevaluated when new non-invasive sampling technics will be available (for example saliva testing).
- For the classification of contacts in children ≥ 3 , the recommendations are defined by level of school education (kindergarten, primary, secondary) rather than by age group. Indeed, these measures have to be applicable to the school setting in which not all children of the same class are of the same age.
- Wearing a mask in school setting is mandatory for teachers in primary school and students and teachers in secondary school. But contact classification is based on safety distance observance mainly, because adequate mask use can’t be verified.
- In primary school: all close contacts are tested to help investigate if the child is the index case. (cluster detection).
- In-presence schooling and peer contacts are essential for secondary school children in terms of their psychosocial well-being, development and future as healthy and well-schooled adults. According to the latest scientific insights, the risks of being infected and of transmitting COVID-19 seem smaller for secondary school children than for adults but are bigger than for younger children. In the balance between the psychosocial benefits versus the infection risks of in-presence schooling, the former are much bigger than the latter. This implicates that secondary school children should be able to go to school and have peer contacts in normal size class groups without having to keep distances between each other (but while respecting other recommended hygienic measures). Indeed, schools should be able to offer maximum in-presence schooling in a familiar

way and in a fear-free climate. This approach is also recommended by RIVM ([link](#)). Towards teachers and other adults however, they should always keep their distances. This would implicate that if there is a case of COVID-19 in a class, the whole class will be considered as close contacts. Despite general agreement with the above rationale, no consensus was reached within the RAG whether to recommend or not the withdrawal of social distancing in 13-18y olds children in the context of their school bubble. Risk of mixed messages to these youths, with differential rules within and outside de school were highlighted. Further discussion is warranted.

- Schools are concerned about the feasibility of keeping the distance between bubbles (for example: on the playground, during lunch, before and after class 'daycare',...). If restrictions are too difficult to follow, schools might not be able to remain open.
- A recent ECDC document reviews COVID-19 in children and the role of school settings in COVID-19 (cfr. Point 4.6) (1). Among the key points identified are:
 - Investigations of cases identified in school settings suggest that child to child transmission in schools is uncommon and not the primary cause of SARS-CoV-2 infection in children whose onset of infection coincides with the period during which they are attending school, particularly in preschools and primary schools.
 - Closures of childcare and educational institutions are unlikely to be an effective single control measure for community transmission of COVID-19 nor would such closures be likely to provide significant additional protection of the health of children, most of whom develop a very mild form of COVID-19, if any.

The following persons participated to this RAG advice:

Katrien Bonneux (OND), Laura Cornelissen (Sciensano), Herman Goossens (UA), Alice Hannecart (Sciensano), Tinne Lernout (Sciensano), Sophie Lokietek (AViQ), Romain Mahieu (COCOM), Nathalie Ribesse (ONE), Stefan Teughels (Wachtposten Vlaanderen), Anouk Vanlander (VWJ), Bart Van Overmeire (K&G – Opgroeien), Chloé Wyndham-Thomas (Sciensano) and the Pediatric Task Force: Annick Covents, Ann De Guchtanaere, Siel Daelemans, Els Duval, Julie Frère, Marc Hainaut, Delphine Jacobs, Tyl Jonckheer, Marianne Michel, Stéphane Moniotte, Petra Schelstraete, Anne Tilmanne, Daan Van Brusselen, Sabine Vandaele, Koen Vanden Driessche, Stijn Verhulst.

BACKGROUND INFORMATION

4.3. SITUATION IN BELGIUM FOR CHILDREN

4.3.1. Testing and confirmed cases

Global reported case numbers in children are low. In Belgium, confirmed cases in children <18y until 28/06 made up only 6% of total confirmed cases, whilst children make up 20% of the population and 10% of the total number of tests.

The number of tests carried out is influenced by the test strategy. From 4/5/2020 all possible cases could be tested and from 11/06 all asymptomatic contacts should be tested. The number of (positive) tests is also influenced by the number of social contacts children have. From 15/05/2020 onwards, on-site teaching gradually restarted until summer holidays. On-site classes remained suspended for most pupils in secondary schools, whose social interactions likely only increased with the lifting of the social distancing rules. We see an increase in test-positivity rate and case numbers in this age group since the beginning of July. For primary school children, the increase is less steep. Reassuringly, we do not see the same increase in the younger age group, although crèches remained open.

Fig. 1. Test positivity rates by day and by age group

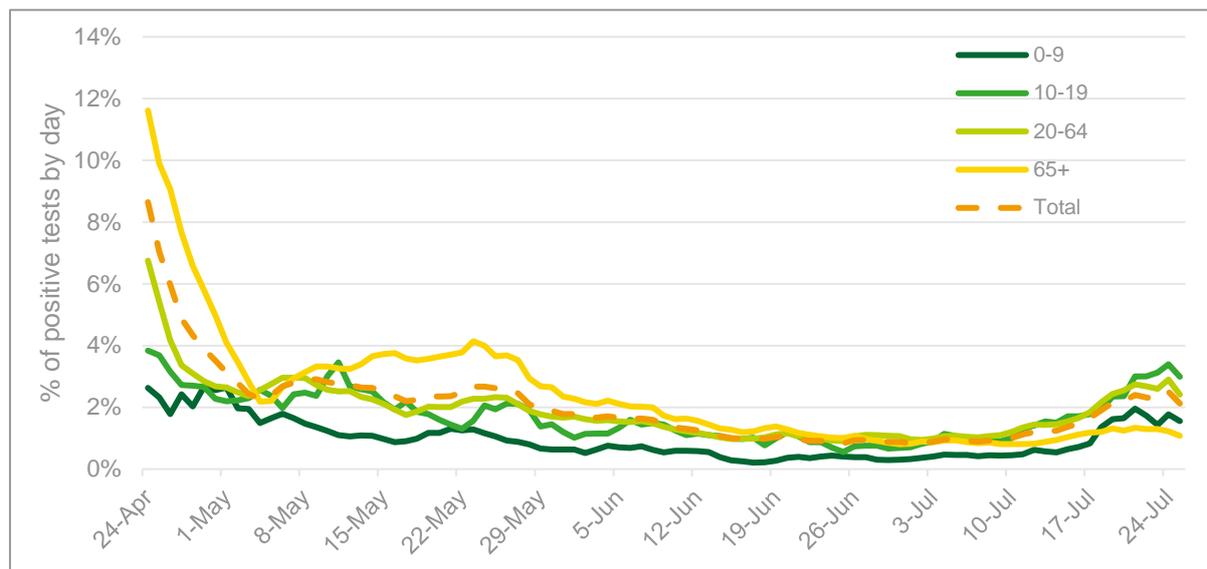
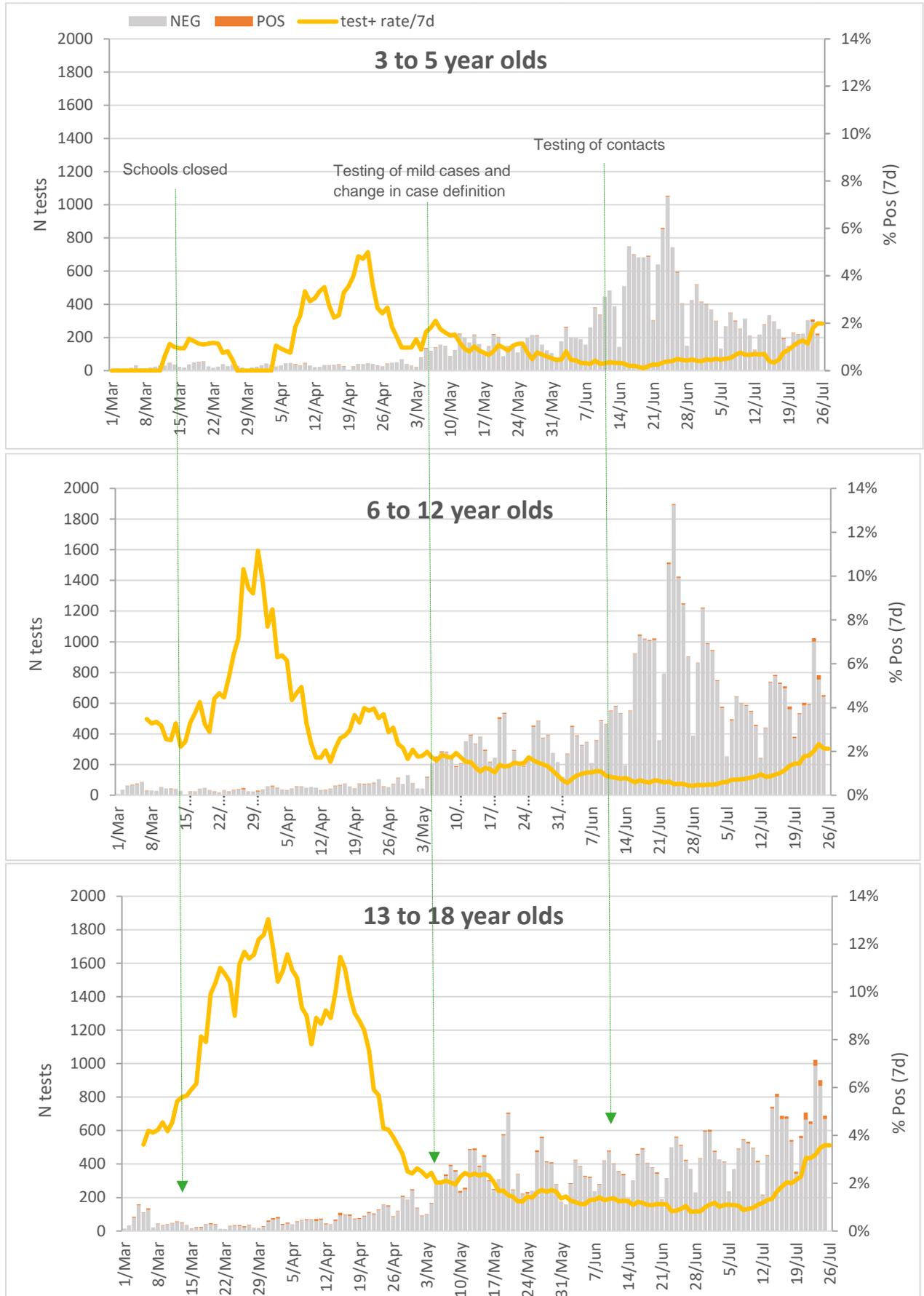


Fig 2. Number of tests performed (positive and negative), and test positivity rates (average 7days)



4.3.2. Clusters

Data on clusters is incomplete, but to our knowledge no clusters have been notified in crèches since the change of testing policy. For 12 out of 18 camp bubbles in Flanders that were put in quarantine, no secondary transmissions were observed. In five bubbles with secondary cases (of which one with a total of 27 cases!), cases occurred in the camp leaders. Two bubbles had secondary transmission among the members, which were all between 12-18 years old.

Of the approximately 13,000 camps and youth activities (camps, playground activities, ...) in Flanders in July 2020, 24 reported COVID-19 cases (of which 75% involved only one case per activity) and in total 33 were eventually (preventively) cancelled, representing 0.2% of the activities ([link](#)).

4.3.3. Schools (source: CLB/PSE)

Of the 58 Dutch-speaking CLBs, 54 reported data. Data is available for the French-speaking community for 85% of the school-going population.

For most of the period for which we have data, distance learning has been the rule, especially for high school students. A total of 378 cases were reported at school, 270 of which were among students and 108 among staff. Reports at school resulted in more than 4,715 individuals (243 adults) being quarantined preventively. The high quarantine rate contrasts with the limited number of secondary cases reported: 11 staff (4.7% of quarantined staff) and 36 students (0.8% of 4472 quarantined students) were suspected to be infected after contact at school.

The table below shows the number of persons (students and staff undistinguished) in quarantine and the number of secondary cases in this group according to the age of the index patient and only for cases where the age of the index patient was known. According to these figures, the percentage of confirmed secondary infections in the quarantined group does not vary much according to the age of the index patient. Secondary cases reported in school settings were most often associated with index patients in the 6-9 year age group (16/47 = 34%), 16-18 year age group (8/47 = 17%) or staff members (7/47 = 15%). However, it should be kept in mind that for older people, there was less contact at school because classes resumed later, which may distort the figures. In addition, some secondary cases may not have been reported.

Age group of index case	Number index cases			Number in quarantine (children and staff combined)			Number of secondary (children and staff combined) (% quarantine)		
	CLB	PSE	Tot.	CLB	PSE	Tot.	CLB	PSE	Tot.
<6	33	24	57	428	552	980	2 (0,5%)	3 (0,5%)	5 (0,5%)
6-9	48	30	78	456	849	1305	5 (1,1%)	11 (1,3%)	16 (1,2%)
10-12	29	21	50	164	803	967*	3 (1,8%)	2 (0,2%)	5 (1,2%)
13-15	17	14	31	132	14	146	0 (0%)	0 (0%) 6** (42,9%)	0 (0%) 6** (4,1%)
16-18	30	24	54	122	39	161	1 (0,8%)	1 (2,6%) 7** (17,9%)	2 (1,2%) 8** (5,0%)
<i>Subtotal children</i>	<i>157</i>	<i>113</i>	<i>270</i>	<i>1302</i>	<i>2257</i>	<i>3559</i>	<i>11 (0,8%)</i>	<i>17 (0,8%)</i> <i>29** (1,3%)</i>	<i>28 (0,8%)</i> <i>40** (1,1%)</i>
<i>Staff</i>	39	68	107*	511	622	1133	4 (0,8%)	3 (0,5%)	7 (0,6%)
Total	196	181	377	1813	2879	4692	15 (0,8%)	32 (1,1%)	47 (1,0%)

CLB = Centra voor LeerlingenBegeleiding, PSE = Promotion de la Santé à l'École, Tot. = total
 *This number is probably an underestimate. At least 3 schools were completely closed after reporting an index case of 10-12 years old. For only 1 of the 3 schools, the total number of pupils is known, which is included here.

** Including cases for which only a clinical diagnosis and no laboratory result is available.

*** An index case involving a staff member was not included due to a lack of information on related infections.

4.3.4. Hospitalisations

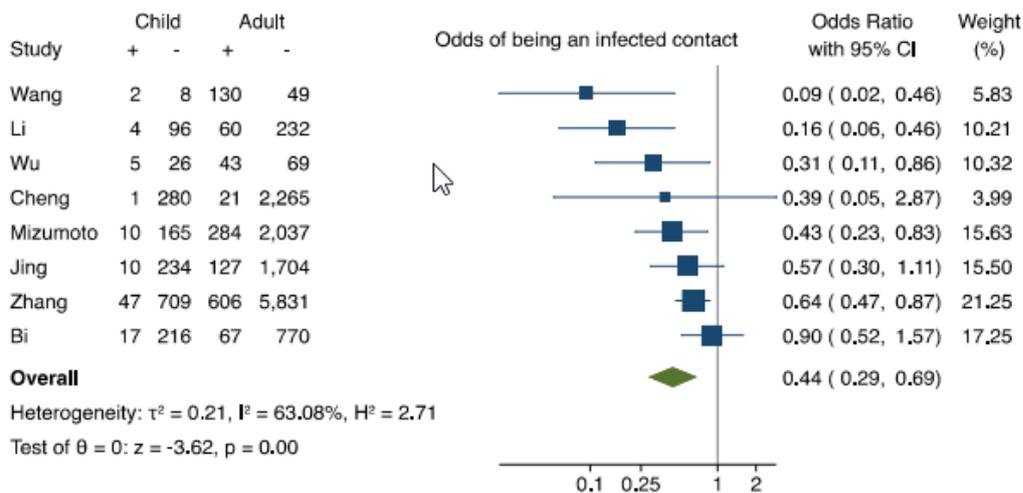
More detailed information can be found in the thematic report on COVID-19 in Children in Belgium (to be published soon). Until 28th of June, clinical info was reported for 267 children with COVID-19. Most hospital stays were short (median=3 days) and 81% of children did not present any severity indicator. Three percent of hospitalized children required intensive care. Until 31/07/2020, two deaths were notified in children <18y in Belgium. One death concerned a 3y-old with severe comorbidities.

4.4. LITERATURE

4.4.1. Susceptibility of children to SARS-CoV-2

Global case numbers in children are low. In Europe and the UK, as of 13 May 2020 only 0.7% of the 576 024 laboratory-confirmed cases reported to the ECDC was <4 year old, 0.6% was 5-9 years and 0.9% was 10-14 years (2). In countries where widespread community testing (either PCR or serology) has been implemented, children were less likely to test positive than adults (3–7). These results might be however biased if children had less exposure to the virus, e.g. because school closures were in place. Data from contact tracing studies indicates however that even after a known exposure, children are less likely to get infected than adults (8–12). Both a meta-analysis and mathematical modelling concluded that children are about half as likely to get infected than adults (8,9). Even after exposure within the household, children are less likely to become infected than adults (13,14). These effects seem greater for younger children (either <5y or <10y) compared to older children (13,15). Several mechanisms have been proposed to explain this relative resistance, from immune imprinting by other viruses (16) to distribution, maturation, and functioning of viral receptors (17).

Figure 2. Pooled estimate of odds of being an infected contact in children compared adults for all contact tracing studies



Source: Viner et al (7)

4.4.2. Onwards transmission from children

Transmission of SARS-CoV-2 from children, even neonates, is plausible as shown by successful viral cultures of SARS-CoV-2 from approximately half of twenty-three RT-PCR positive symptomatic children (18). In addition, a study of 3,712 COVID-19 patients by the group of Christian Drosten in Germany, reported viral loads (estimated by real-time RT-PCR threshold cycle values) to be similar in children and adults (19) and a recent study even indicated higher viral loads in children <5 years old (20). However, the significance of the findings is unknown. In contrast, in a literature review including 31

articles on household transmission, children were found to be the index case for household clusters in only 10% (21). Most of these studies were from Asia, but a Swiss study found similar results (8% children as index cases in the household) (22). Again, these data need to be interpreted with caution, as the likelihood of exposure for children (and hence introducing the virus into the household) might be different than for adults when strict lockdown measures are in place (23).

Transmission in school settings/youth gatherings

Data is limited but increasing. Contact tracing and cluster investigations in schools before lockdown done in Ireland (24), France (25) and New South Wales (26) report very limited onwards transmission. Finland and Sweden have very similar schooling systems but Sweden decided to keep primary schools open (pupils <15y). A comparison between both countries did not show any measurable impact of the school closure on the number of laboratory-confirmed cases in children. Moreover, outbreak investigations in Finland did not show transmission by children to be contributing much and teachers in Sweden were not at higher risk of infection than other professions (27).

One worry is that, as cases in children are usually mild to asymptomatic, cases will go unknown and contribute to transmission without being perceived. Recently published result from France are therefore of particular interest. Investigations point out that SARS-CoV-2 was introduced in the region of Oise already early February. Fontanet and colleagues decided to study the seroprevalence of students in the region for both a high school (28) and a primary school (29). Parents and siblings of the students were also invited to participate to the study. Despite both schools having had introduction of the virus, the infection attack rate was estimated at 8.8% in primary school students compared to 38.3% in the high school students. Although the attack rate was relatively low in the primary school group and the retrospective design makes it impossible to establish with certainty who infected who in the household, children did seem to be able to pass on the infection to their household members: the infection attack rate was 61% in parents of infected pupils as compared to 6.9% in parents of non-infected pupils. Fontanet and colleagues conclude that their findings are in line with what has been previously reported, namely that transmission in primary schools seems limited.

That high schools present a higher risk of transmission is supported by the report of a large outbreak in a high school in Israel. In the outbreak, 153 students and 25 staff members got infected and passed on the infection to relatives and friends to amount to a total of 260 infected individuals (including staff and students) linked to the outbreak (30). However, several risk factors for transmission were reported: classes were crowded (35–38 students per class), distancing among students and between students and teachers was not possible and there was continuous use of air-conditioning. An outbreak in a high school has also been reported from New Zealand (31).

A recent report from a multiple day/overnight youth camp in Georgia with 590 young participants (aged 6 to 21 years) and 7 staff members (22+) identified a high attack rate in all age groups, including those 6 to 10 years old, after a teenage staff member was confirmed with COVID-19 during the camp. Out of 344 people tested, 76% had a positive result. Of note is that there were indoor activities organized without extra ventilation of the rooms, there was a lot of loud singing, shouting and cheering and given the increasing incidence of COVID-19 in Georgia in June and July, some cases might have resulted from transmission occurring before or after camp attendance (29).

Finally, a temporal association between statewide school closure and lower COVID-19 incidence and mortality in the US was recently reported (32). However, as mentioned by the authors, completely isolating the effects of any single non-pharmaceutical intervention such as school closure is impossible because recommendations for increased handwashing, cleaning, and wearing of masks evolved simultaneously. Measured COVID-19 incidence used in this study also was affected by testing availability, which was limited early in the pandemic and varied nationally.

4.4.3. Severity of the disease in children

Whilst their role in the transmission of the disease is important from an epidemiological point of view, we should first and foremost bear in mind what the effect of COVID-19 on the individual child is. COVID-

19 infections in children are usually mild or moderate (33). A recent multinational cohort study of children and adolescents hospitalized with COVID-19 in Europe showed a relatively high proportion (8.2%) of admissions to ICU and identified age <1 month as a risk factor for ICU admission (34). More severe cases might have been overrepresented in this study as mainly tertiary and quaternary care institutions participated. According to Belgian hospitalization data, a majority of hospitalized children (81%) had no severe event (defined as radiological confirmed pneumonia, bacterial/fungal superinfection, ARDS, or admission to ICU). In contrast with Göttinger et al, less severe disease was found in children <1 year. However, younger ages were overrepresented in our data, possibly due to a lower threshold for precautionary hospitalization (data submitted for publication). Finally, concern has been raised about the newly identified Paediatric Inflammatory Multisystem Syndrome temporally associated with SARS-CoV-2 (PIMS-TS) which is indeed a severe condition that requires specialized care but it is rare (estimated incidence 0.1%) and survival is high (35). Nevertheless data are lacking in regard to both cardiac and non-cardiac long term health sequelae.

The dangers of SARS-CoV-2 need to be balanced against developmental and psychosocial needs of children (36–38).

Note: Additional reviews on transmission dynamics in children:

- Transmission of SARS-CoV-2 by children. Dtsch Arztebl Int 2020; 117: 553-60. DOI: 10.3238/arztebl.2020.0553; COVID-19 transmission and children.
- KCE. Vicky Jaspers. https://kce.fgov.be/sites/default/files/atoms/files/2020-57_COVID_children%20KCE%20report%20FINAL_19052020.pdf
- National Collaborating Centre for Methods and Tools. (2020, August 11). Rapid Evidence Review: What is the specific role of daycares and schools in COVID-19 transmission? <https://www.nccmt.ca/knowledge-repositories/covid-19-rapid-evidence-service>.
- Ludvigsson, JF. Children are unlikely to be the main drivers of the COVID-19 pandemic – A systematic review. Acta Paediatr. 2020; 109: 1525– 1530. <https://doi.org/10.1111/apa.15371>

4.5. ECDC DOCUMENT (6TH AUGUST 2020): COVID-19 IN CHILDREN AND THE ROLE OF SCHOOL SETTINGS IN COVID-19 TRANSMISSION – KEY MESSAGES (1)

- A small proportion (<5%) of overall COVID-19 cases reported in the EU/EEA and the UK are among children (those aged 18 years and under). When diagnosed with COVID-19, children are much less likely to be hospitalised or have fatal outcomes than adults.
- Children are more likely to have mild or asymptomatic infection, meaning that the infection may go undetected or undiagnosed.
- When symptomatic, children shed virus in similar quantities to adults and can infect others similar to adults. It is unknown how infectious asymptomatic children are.
- While very few significant outbreaks of COVID-19 in schools have been documented, they do occur, and may be difficult to detect due to the relative lack of symptoms in children.
- Available evidence indicates a tendency towards lower proportions of antibodies following COVID-19 infection among children and adolescents than in adults in most settings. More specialised studies need to be performed with focus on this population to better understand infection and antibody dynamics.
- Investigations of cases identified in school settings suggest that child to child transmission in schools is uncommon and not the primary cause of SARS-CoV-2 infection in children whose onset of infection coincides with the period during which they are attending school, particularly in preschools and primary schools.
- If appropriate physical distancing and hygiene measures are applied, schools are unlikely to be more effective propagating environments than other occupational or leisure settings with similar densities of people.
- Closures of childcare and educational institutions are unlikely to be an effective single control measure for community transmission of COVID-19 nor would such closures be likely to provide significant additional protection of the health of children, most of whom develop a very mild form of COVID-19, if any.
- Decisions on control measures in schools and school closures/openings should be consistent with decisions on other physical distancing and public health response measures within the community.

REFERENCES

1. COVID-19 in children and the role of school settings in COVID-19 transmission [Internet]. European Centre for Disease Prevention and Control. 2020 [cited 2020 Aug 10]. Available from: <https://www.ecdc.europa.eu/en/publications-data/children-and-school-settings-covid-19-transmission>
2. Rapid risk assessment: Paediatric inflammatory multisystem syndrome and SARS -CoV-2 infection in children [Internet]. European Centre for Disease Prevention and Control. 2020 [cited 2020 May 15]. Available from: <https://www.ecdc.europa.eu/en/publications-data/paediatric-inflammatory-multisystem-syndrome-and-sars-cov-2-rapid-risk-assessment>
3. Gudbjartsson DF, Helgason A, Jonsson H, Magnusson OT, Melsted P, Norddahl GL, et al. Spread of SARS-CoV-2 in the Icelandic Population. *N Engl J Med*. 2020 Apr 14;NEJMoa2006100.
4. Lavezzo E, Franchin E, Ciavarella C, Cuomo-Dannenburg G, Barzon L, Del Vecchio C, et al. Suppression of a SARS-CoV-2 outbreak in the Italian municipality of Vo'. *Nature*. 2020 Jun 30;1–5.
5. Stringhini S, Wisniak A, Piumatti G, Azman AS, Lauer SA, Baysson H, et al. Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study. *The Lancet*. 2020 Aug;396(10247):313–9.
6. Pollán M, Pérez-Gómez B, Pastor-Barriuso R, Oteo J, Hernán MA, Pérez-Olmeda M, et al. Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. *The Lancet* [Internet]. 2020 Jul 6 [cited 2020 Jul 31];0(0). Available from: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31483-5/abstract](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31483-5/abstract)
7. Li X, Xu W, Dozier M, He Y, Kirolos A, Theodoratou E. The role of children in transmission of SARS-CoV-2: A rapid review. *J Glob Health* [Internet]. [cited 2020 Jul 26];10(1). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7323934/>
8. Viner RM, Mytton OT, Bonell C, Melendez-Torres GJ, Ward JL, Hudson L, et al. Susceptibility to and transmission of COVID-19 amongst children and adolescents compared with adults: a systematic review and meta-analysis [Internet]. *Public and Global Health*; 2020 May [cited 2020 Jul 15]. Available from: <http://medrxiv.org/lookup/doi/10.1101/2020.05.20.20108126>
9. Davies NG, Klepac P, Liu Y, Prem K, Jit M, Eggo RM. Age-dependent effects in the transmission and control of COVID-19 epidemics. *Nat Med*. 2020 Jun 16;1–7.
10. Mizumoto K, Omori R, Nishiura H. Age specificity of cases and attack rate of novel coronavirus disease (COVID-19). *medRxiv*. 2020 Mar 13;2020.03.09.20033142.
11. Zhang J, Litvinova M, Liang Y, Wang Y, Wang W, Zhao S, et al. Changes in contact patterns shape the dynamics of the COVID-19 outbreak in China. *Science* [Internet]. 2020 Apr 29 [cited 2020 May 15]; Available from: <https://science.sciencemag.org/content/early/2020/05/04/science.abb8001>
12. Roland AM& D. The missing link? Children and transmission of SARS-CoV-2. *Dont Forget Bubbles* [Internet]. 2020 May 5 [cited 2020 Jul 31]; Available from: <://dontforgetthebubbles.com//the-missing-link-children-and-transmission-of-sars-cov-2/>
13. Somekh E, Gleyzer A, Heller E, Lopian M, Kashani-Ligumski L, Czeiger S, et al. The Role of Children in the Dynamics of Intra Family Coronavirus 2019 Spread in Densely Populated Area. *Pediatr Infect Dis J*. 2020 Aug;39(8):e202.
14. Household Secondary Attack Rate of COVID-19 and Associated Determinants | medRxiv [Internet]. [cited 2020 Jul 31]. Available from: <https://www.medrxiv.org/content/10.1101/2020.04.11.20056010v1>

15. Park YJ, Choe YJ, Park O, Park SY, Kim Y-M, Kim J, et al. Early Release - Contact Tracing during Coronavirus Disease Outbreak, South Korea, 2020 - Volume 26, Number 10—October 2020 - Emerging Infectious Diseases journal - CDC. [cited 2020 Jul 31]; Available from: https://wwwnc.cdc.gov/eid/article/26/10/20-1315_article
16. Mizumoto K, Omori R, Nishiura H. Age specificity of cases and attack rate of novel coronavirus disease (COVID-19) [Internet]. Infectious Diseases (except HIV/AIDS); 2020 Mar [cited 2020 Mar 31]. Available from: <http://medrxiv.org/lookup/doi/10.1101/2020.03.09.20033142>
17. Lee P-I, Hu Y-L, Chen P-Y, Huang Y-C, Hsueh P-R. Are children less susceptible to COVID-19? J Microbiol Immunol Infect [Internet]. 2020 Feb 25 [cited 2020 Mar 11]; Available from: <http://www.sciencedirect.com/science/article/pii/S1684118220300396>
18. L'Huillier AG, Torriani G, Pigny F, Kaiser L, Eckerle I. Shedding of infectious SARS-CoV-2 in symptomatic neonates, children and adolescents [Internet]. Infectious Diseases (except HIV/AIDS); 2020 May [cited 2020 Jun 5]. Available from: <http://medrxiv.org/lookup/doi/10.1101/2020.04.27.20076778>
19. Jones TC, Mühlemann B, Veith T, Zuchowski M, Hofmann J, Stein A, et al. An analysis of SARS-CoV-2 viral load by patient age. :19.
20. Heald-Sargent T, Muller WJ, Zheng X, Rippe J, Patel AB, Kociolek LK. Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Levels in Patients With Mild to Moderate Coronavirus Disease 2019 (COVID-19). JAMA Pediatr [Internet]. 2020 Jul 30 [cited 2020 Jul 31]; Available from: <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2768952>
21. Zhu Y, Bloxham CJ, Hulme KD, Sinclair JE, Tong ZWM, Steele LE, et al. Children are unlikely to have been the primary source of household SARS-CoV-2 infections. medRxiv. 2020 Mar 30;2020.03.26.20044826.
22. Posfay-Barbe KM, Wagner N, Gauthey M, Moussaoui D, Loevy N, Diana A, et al. COVID-19 in Children and the Dynamics of Infection in Families. Pediatrics. 2020 Aug;146(2):e20201576.
23. Hyde Z. COVID-19, children, and schools: overlooked and at risk. Med J Aust. 2020 Aug 12;1. <https://www.mja.com.au/journal/2020/covid-19-children-and-schools-overlooked-and-risk>
24. Heavey L, Casey G, Kelly C, Kelly D, McDarby G. No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020. Eurosurveillance. 2020 May 28;25(21):2000903.
25. Danis K, Epaulard O, Bénet T, Gaymard A, Campoy S, Bothelo-Nevers E, et al. Cluster of coronavirus disease 2019 (Covid-19) in the French Alps, 2020. Clin Infect Dis [Internet]. [cited 2020 Apr 27]; Available from: <https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa424/5819060>
26. National Centre for Immunisation Research and Surveillance. COVID-19 in schools - the experience in NSW [Internet]. 2020 Apr [cited 2020 Jul 28]. Available from: http://ncirs.org.au/sites/default/files/2020-04/NCIRS%20NSW%20Schools%20COVID_Summary_FINAL%20public_26%20April%202020.pdf
27. Public Health Agency of Sweden. Covid-19 in schoolchildren. A comparison between Finland and Sweden [Internet]. Report No.: 20108-1. Available from: www.folkhalsomyndigheten.se/publicerat-material/
28. Fontanet A, Tondeur L, Madec Y, Grant R, Besombes C, Jolly N, et al. Cluster of COVID-19 in northern France: A retrospective closed cohort study. medRxiv. 2020 Apr 23;2020.04.18.20071134.

29. Fontanet A, Grant R, Tondeur L, Madec Y, Grzelak L, Cailleau I, et al. SARS-CoV-2 infection in primary schools in northern France: A retrospective cohort study in an area of high transmission. medRxiv. 2020 Jun 29;2020.06.25.20140178.
30. Stein-Zamir C, Abramson N, Shoob H, Libal E, Bitan M, Cardash T, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. Eurosurveillance [Internet]. 2020 Jul 23 [cited 2020 Jul 26];25(29). Available from: <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.29.2001352>
31. Couzin-Frankel J, Vogel G, Weil M, Jul. 7, 2020, Pm 4:00. School openings across globe suggest ways to keep coronavirus at bay, despite outbreaks [Internet]. Science | AAAS. 2020 [cited 2020 Jul 31]. Available from: <https://www.sciencemag.org/news/2020/07/school-openings-across-globe-suggest-ways-keep-coronavirus-bay-despite-outbreaks>
32. Auger KA, Shah SS, Richardson T, Hartley D, Hall M, Warniment A, et al. Association Between Statewide School Closure and COVID-19 Incidence and Mortality in the US. JAMA [Internet]. 2020 Jul 29 [cited 2020 Aug 6]; Available from: <https://jamanetwork.com/journals/jama/fullarticle/2769034>
33. Liguoro I, Pilotto C, Bonanni M, Ferrari ME, Pusiolo A, Nocerino A, et al. SARS-COV-2 infection in children and newborns: a systematic review. Eur J Pediatr [Internet]. 2020 May 18 [cited 2020 May 28]; Available from: <https://doi.org/10.1007/s00431-020-03684-7>
34. Götzinger F, Santiago-García B, Noguera-Julián A, Lanaspá M, Lancella L, Carducci FIC, et al. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. Lancet Child Adolesc Health [Internet]. 2020 Jun 25 [cited 2020 Jun 26];0(0). Available from: [https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642\(20\)30177-2/abstract](https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(20)30177-2/abstract)
35. Davies P, Evans C, Kanthimathinathan HK, Lillie J, Brierley J, Waters G, et al. Intensive care admissions of children with paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) in the UK: a multicentre observational study. Lancet Child Adolesc Health [Internet]. 2020 Jul 9 [cited 2020 Jul 31];0(0). Available from: [https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642\(20\)30215-7/abstract](https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(20)30215-7/abstract)
36. 1,500* paediatricians sign open letter to Prime Minister urging Government to make reopening of schools a priority [Internet]. RCPCH. [cited 2020 Jul 31]. Available from: <https://www.rcpch.ac.uk/news-events/news/1500-paediatricians-sign-open-letter-prime-minister-reopening-schools>
37. <https://plus.google.com/+UNESCO>. Education: From disruption to recovery [Internet]. UNESCO. 2020 [cited 2020 Jul 31]. Available from: <https://en.unesco.org/covid19/educationresponse>
38. Lee B, Raszka WV. COVID-19 Transmission and Children: The Child Is Not to Blame. Pediatrics [Internet]. 2020 Jul 1 [cited 2020 Jul 20]; Available from: <https://pediatrics.aappublications.org/content/early/2020/07/08/peds.2020-004879>