# EVIDENCE SEARCH REPORT

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| **RESEARCH QUESTION:** What laboratory surveillance testing strategies are effective for COVID-19 in school settings? | **UNIQUE IDENTIFIER:** PH082501-01 ESR |

**RESOURCES USED:**

- CPG Infobase
- ECRI
- TRIP
- CADTH
- CDC- US
- BC Centre for Disease Control
- European Centre for Disease Control
- Norwegian Public Health
- WHO
- PHAC
- FDA
- CEBM
- NICE
- LitCovid
- MedRxiv
- BioRxiv
- Public Health Ontario
- Google Scholar
- Google
- Medline
- Pubmed
- Embase

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| **LIMITS/EXCLUSIONS/INCLUSIONS:** English | **REFERENCE INTERVIEW COMPLETED:** August 24, 2020 |
| **DATE:** August 25, 2020 | |
| **LIBRARIAN:** Brianna Howell-Spooner, Mark Mueller | **REQUESTOR:** Dr. Nazeem Muhajarine |
| **TEAM:** PUBLIC HEALTH | |
| **SEARCH ALERTS CREATED: Y** | |

**CITE AS:**

Howell-Spooner, B; Mueller, M. What laboratory surveillance testing strategies are effective for COVID-19 in school settings? 2020 Aug 25; Document no.: PH082501-01 ESR. In: COVID-19 Rapid Evidence Reviews [Internet]. SK: SK COVID Evidence Support Team, c2020. 15 p. (CEST evidence search report)

## LIBRARIAN NOTES/COMMENTS

Hello,
Here is what we were able to find on "effective laboratory surveillance strategies for COVID-19 in school settings".
The studies are mostly recommendations and models. Articles 7, 8, and 10, mention specific laboratory tests used in the studies, but their utility for Saskatchewan's conditions would need to be assessed.
Please let us know if you have any questions or concerns,
Cheers,
Brianna and Mark

## SEARCH RESULTS

**To obtain the full-text articles or to request offsite access, email library@saskhealthauthority.ca.**

## SUMMARIES, GUIDELINES & OTHER RESOURCES

**Centers for Disease Control and Prevention (US)**

- Screening K-12 Students for Symptoms of COVID-19: Limitations and Considerations. [July 23, 2020]. Available from https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/symptom-screening.html

  **LIBRARIAN'S NOTE:** CDC does not currently recommend universal symptom screenings (screening all students grades K-12) be conducted by schools.

- Interim Considerations for K-12 School Administrators for SARS-CoV-2 Testing. [June 30, 2020]. Available from https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-testing.html

**European Centre for Disease Prevention and Control**

- Objectives for COVID-19 Testing in School Settings. [August 10, 2020]. Available from https://www.ecdc.europa.eu/en/publications-data/objectives-covid-19-testing-school-settings

**Hospital for Sick Children (Toronto)**

- COVID-19: Guidance for School Reopening. [July 29, 2020]. Available from https://www.sickkids.ca/PDFs/About-SickKids/81407-COVID19-Recommendations-for-School-Reopening-SickKids.pdf

  **LIBRARIAN'S NOTE**: Refer to section 1 **Screening to Prevent Symptomatic Individuals from Entering the School** on page 8

**American Academy of Pediatrics**

- COVID-19 Planning Considerations: Guidance for School Re-entry. [August 19, 2020]. Available from https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/covid-19-planning-considerations-return-to-in-person-education-in-schools/

  **LIBRARIAN'S NOTE**: See section **Testing and Screening** (approximately 10 screens down)

## ARTICLES

**Note: References are sorted by year (newest to oldest)**

**1. Bracis C, Burns E, Moore M, et al. Widespread testing, case isolation and contact tracing may allow safe school reopening with continued moderate physical distancing: a modeling analysis of King County, WA data. medRxiv. 2020:2020.08.14.20174649. DOI: 10.1101/2020.08.14.20174649**
**ABSTRACT**: Background In late March 2020, a "Stay Home, Stay Healthy" order was issued in Washington State in response to the COVID-19 pandemic. On May 1, a 4-phase reopening plan began. If implemented without interruptions, all types of public interactions were planned to resume by July 15. We investigated whether adjunctive prevention strategies would allow less restrictive physical

distancing to avoid second epidemic waves and secure safe school reopening. Methods We developed a mathematical model, stratifying the population by age (0-19 years, 20-49 years, 50-69 years, and 70+ years), infection status (susceptible, exposed, asymptomatic, pre-symptomatic, symptomatic, recovered) and treatment status (undiagnosed, diagnosed, hospitalized) to project SARS-CoV-2 transmission during and after the reopening period. The model was parameterized with demographic and contact data from King County, WA and calibrated to confirmed cases, deaths (overall and by age) and epidemic peak timing. Adjunctive prevention interventions were simulated assuming different levels of pre-COVID physical interactions (pC_PI) restored. We made several predictions related to adjunctive interventions or increased pC_PI. Results The best model fit estimated ~35% pC_PI under lockdown. Gradually restoring 75% pC_PI for all age groups between May 15-July 15 resulted in ~350 daily deaths by early September 2020. Maintaining less than 45% pC_PI was required with current testing practices to ensure low levels of daily infections and deaths. If widespread community transmission persisted, isolating the elderly does not lower daily death rates significantly. Increased testing, isolation of symptomatic infections, and contact tracing permitted 60% pC_PI without significant increases in daily deaths before September, although this strategy may not be sufficient to eliminate community transmission. This combination strategy also allowed opening of schools with <15 daily deaths. Inpatient antiviral treatment reduces deaths significantly without lowering cases or hospitalizations. Conclusions We predict that widespread implementation of "test and isolate" policy alone is insufficient to prevent the rapid re-emergence of SARS CoV-2 without moderate physical distancing. However, widespread testing, contact tracing and case isolation would allow relaxation of physical distancing, as well as opening of schools, without a surge in local cases and deaths.Competing Interest StatementThe authors have declared no competing interest.Funding StatementDaniel Reeves is partially supported by Washington Research Foundation postdoctoral fellowship. The other authors received no payment or services from a third party for any aspect of the submitted work.Author DeclarationsI confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.YesThe details of the IRB/oversight body that provided approval or exemption for the research described are given below: The study requires no IRB approval.All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe analysis was based on publicly available data.
**URL**: http://medrxiv.org/content/early/2020/08/16/2020.08.14.20174649.abstract
**DOI**: 10.1101/2020.08.14.20174649

**2. Cooper DM, Guay-Woodford L, Blazar BR, et al. Reopening Schools Safely: The Case for Collaboration, Constructive Disruption of Pre-Coronavirus 2019 Expectations, and Creative Solutions. J Pediatr. 2020;223:183-5. DOI: 10.1016/j.jpeds.2020.05.022**
In the US, 40% of families have school-aged children and in more than 90% of these households, at least 1 parent is employed outside the home. Schools play an important role in these working families. Yet, schools have been closed for approximately 2 months in an effort to curb the coronavirus 2019 (COVID-19) pandemic, and closing has had a profound influence on family health and well-being. When and how should they reopen? We approach these questions with limited data, and past epidemics provide little guidance for COVID-19. However, we know this: schools will reopen. Their closure is too burdensome on

parents, communities, and the economy. Simply put, we cannot fully reopen society without reopening schools. This requires that children will be part of the first wave to re-emerge from shelter-in-place policies. With fast-approaching preparations required for a new school year, a collaborative team of clinicians, scientists, and educators developed this commentary to begin to highlight issues that must be considered to ensure a safe and strategically planned reopening of schools. The American Academy of Pediatrics also has recently posted considerations important to the reopening of schools.
In the US, in an urgent attempt to curb spread of severe acute respiratory syndrome coronavirus 2 and save lives, the nationwide closure of K-12 schools occurred rapidly. Planning for school reopenings must be more deliberate, delineating precisely how, when, under what conditions, and base the reopening on available data. School reopening can mitigate risks to children, families, and school personnel only if it is sensitive to community needs. Models such as the Center for Disease Control and Prevention's Whole School, Whole Community, Whole Child and the School Health Index can provide a helpful framework.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7239776/
**DOI**: 10.1016/j.jpeds.2020.05.022

**3. Head JR, Andrejko K, Cheng Q, et al. The effect of school closures and reopening strategies on COVID-19 infection dynamics in the San Francisco Bay Area: a cross-sectional survey and modeling analysis. medRxiv. 2020. DOI: 10.1101/2020.08.06.20169797**
**ABSTRACT**: Background Large-scale school closures have been implemented worldwide to curb the spread of COVID-19. However, the impact of school closures and re-opening on epidemic dynamics remains unclear. Methods We simulated COVID-19 transmission dynamics using an individual-based stochastic model, incorporating social-contact data of school-aged children during shelter-in-place orders derived from Bay Area (California) household surveys. We simulated transmission under observed conditions and counterfactual intervention scenarios between March 17-June 1, and evaluated various fall 2020 K-12 reopening strategies. Findings Between March 17-June 1, assuming children <10 were half as susceptible to infection as older children and adults, we estimated school closures averted a similar number of infections (13,842 cases; 95% CI: 6,290, 23,040) as workplace closures (15,813; 95% CI: 9,963, 22,617) and social distancing measures (7,030; 95% CI: 3,118, 11,676). School closure effects were driven by high school and middle school closures. Under assumptions of moderate community transmission, we estimate that fall 2020 school reopenings will increase symptomatic illness among high school teachers (an additional 40.7% expected to experience symptomatic infection, 95% CI: 1.9, 61.1), middle school teachers (37.2%, 95% CI: 4.6, 58.1), and elementary school teachers (4.1%, 95% CI: -1.7, 12.0). Results are highly dependent on uncertain parameters, notably the relative susceptibility and infectiousness of children, and extent of community transmission amid re-opening. The school-based interventions needed to reduce the risk to fewer than an additional 1% of teachers infected varies by grade level. A hybrid-learning approach with halved class sizes of 10 students may be needed in high schools, while maintaining small cohorts of 20 students may be needed for elementary schools. Interpretation Multiple in-school intervention strategies and community transmission reductions, beyond the extent achieved to date, will be necessary to avoid undue excess risk associated with school reopening. Policymakers must urgently enact policies that curb community transmission and implement within-school control measures to simultaneously address the tandem health crises posed by COVID-19 and adverse child health and development consequences of long-term school closures.
**URL**: https://www.medrxiv.org/content/10.1101/2020.08.06.20169797v1
**DOI**: 10.1101/2020.08.06.20169797

**4. Heavey L, Casey G, Kelly C, et al. No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020. Euro Surveill. 2020;25(21). DOI: 10.2807/1560-7917.Es.2020.25.21.2000903**

**ABSTRACT**: As many countries begin to lift some of the restrictions to contain COVID-19 spread, lack of evidence of transmission in the school setting remains. We examined Irish notifications of SARS-CoV2 in the school setting before school closures on 12 March 2020 and identified no paediatric transmission. This adds to current evidence that children do not appear to be drivers of transmission, and we argue that reopening schools should be considered safe accompanied by certain measures.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7268273/
**DOI**: 10.2807/1560-7917.Es.2020.25.21.2000903

**5. Jew B, Korb A, Lou P, et al. Expanding COVID-19 symptom screening to retail, restaurants, and schools by preserving privacy using relaxed digital signatures. medRxiv. 2020:2020.08.06.20169839. DOI: 10.1101/2020.08.06.20169839**

**ABSTRACT**: Symptom screening is a widely deployed strategy to mitigate the COVID-19 pandemic and many public health authorities are mandating its use by employers for all employees in the workplace. While symptom screening has the benefit of reducing the number of infected individuals in the workplace, it raises some inherently difficult privacy issues as a traditional approach requires the employer to collect symptom data from each employee which is essentially medical information. In this paper, we describe a system to implement Cryptographic Anonymous Symptom Screening (CASS) which allows for individuals to perform COVID symptom screening anonymously while avoiding the privacy issues of traditional approaches. In the system, individuals report their symptoms without any identifying information and are issued a completion certificate. This certificate contains a cryptographic code which certifies that the certificate was obtained from the screener after reporting no symptoms. The codes can be verified using a cryptographic algorithm which is publicly available. A standard cryptography approach to implement such a system would be to use digital signatures. Unfortunately, standard digital signatures have some limitations for this application in that the signatures are often hundreds of characters long and if the signature contains the name of the individual, then there is also a risk of compromising privacy. In our approach, we develop and utilize a relaxed digital signature scheme to provide 16 character long codes and handle names using equivalence classes which helps preserve privacy. Both of these extensions technically compromise the security but in a way that is negligible for this application. Our system can either serve the function of standard symptom screening system approaches for employees, but can also extend symptom screening to non-employees such as visitors or customers. In this case, the system can be utilized in retail, restaurants and schools to ensure that everyone in the physical space, including employees, customers, visitors and students have performed symptom screening.Competing Interest StatementThe authors have declared no competing interest.Funding StatementNo external funding.Author DeclarationsI confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.YesThe details of the IRB/oversight body that provided approval or exemption for the research described are given below:IRB exempt status was granted by the UCLA Institutional Review BoardAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesNo applicable data.
**URL**: http://medrxiv.org/content/early/2020/08/11/2020.08.06.20169839.abstract
**DOI**: 10.1101/2020.08.06.20169839

**6. Kucharski AJ, Klepac P, Conlan AJK, et al. Effectiveness of isolation, testing, contact tracing, and physical distancing on reducing transmission of SARS-CoV-2 in different settings: a mathematical modelling study. Lancet Infect Dis. 2020. DOI: 10.1016/s1473-3099(20)30457-6**

**ABSTRACT**: BACKGROUND: The isolation of symptomatic cases and tracing of contacts has been used as an early COVID-19 containment measure in many countries, with additional physical distancing measures also introduced as outbreaks have grown. To maintain control of infection while also reducing disruption to populations, there is a need to understand what combination of measures-including novel digital tracing approaches and less intensive physical distancing-might be required to reduce transmission. We aimed to estimate the reduction in transmission under different control measures across settings and how many contacts would be quarantined per day in different strategies for a given level of symptomatic case incidence. METHODS: For this mathematical modelling study, we used a model of individual-level transmission stratified by setting (household, work, school, or other) based on BBC Pandemic data from 40 162 UK participants. We simulated the effect of a range of different testing, isolation, tracing, and physical distancing scenarios. Under optimistic but plausible assumptions, we estimated reduction in the effective reproduction number and the number of contacts that would be newly quarantined each day under different strategies. RESULTS: We estimated that combined isolation and tracing strategies would reduce transmission more than mass testing or self-isolation alone: mean transmission reduction of 2% for mass random testing of 5% of the population each week, 29% for self-isolation alone of symptomatic cases within the household, 35% for self-isolation alone outside the household, 37% for self-isolation plus household quarantine, 64% for self-isolation and household quarantine with the addition of manual contact tracing of all contacts, 57% with the addition of manual tracing of acquaintances only, and 47% with the addition of app-based tracing only. If limits were placed on gatherings outside of home, school, or work, then manual contact tracing of acquaintances alone could have an effect on transmission reduction similar to that of detailed contact tracing. In a scenario where 1000 new symptomatic cases that met the definition to trigger contact tracing occurred per day, we estimated that, in most contact tracing strategies, 15 000-41 000 contacts would be newly quarantined each day. INTERPRETATION: Consistent with previous modelling studies and country-specific COVID-19 responses to date, our analysis estimated that a high proportion of cases would need to self-isolate and a high proportion of their contacts to be successfully traced to ensure an effective reproduction number lower than 1 in the absence of other measures. If combined with moderate physical distancing measures, self-isolation and contact tracing would be more likely to achieve control of severe acute respiratory syndrome coronavirus 2 transmission. FUNDING: Wellcome Trust, UK Engineering and Physical Sciences Research Council, European Commission, Royal Society, Medical Research Council.

**URL**: https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30457-6/fulltext
**DOI**: 10.1016/s1473-3099(20)30457-6

**7. Macartney K, Quinn HE, Pillsbury AJ, et al. Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study. The Lancet Child & adolescent health. 2020. DOI: 10.1016/s2352-4642(20)30251-0**

**ABSTRACT**: BACKGROUND: School closures have occurred globally during the COVID-19 pandemic. However, empiric data on transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) among children and in educational settings are scarce. In Australia, most schools have remained open during the first epidemic wave, albeit with reduced student physical attendance at the epidemic peak. We examined SARS-CoV-2 transmission among children and staff in schools and early childhood education and care (ECEC) settings in the Australian state of New South Wales (NSW). METHODS: Laboratory-confirmed paediatric (aged ≤18 years) and adult COVID-19 cases who attended a school or ECEC setting while considered infectious (defined as 24 h before symptom onset based on national

guidelines during the study period) in NSW from Jan 25 to April 10, 2020, were investigated for onward transmission. All identified school and ECEC settings close contacts were required to home quarantine for 14 days, and were monitored and offered SARS-CoV-2 nucleic acid testing if symptomatic. Enhanced investigations in selected educational settings included nucleic acid testing and SARS-CoV-2 antibody testing in symptomatic and asymptomatic contacts. Secondary attack rates were calculated and compared with state-wide COVID-19 rates. FINDINGS: 15 schools and ten ECEC settings had children (n=12) or adults (n=15) attend while infectious, with 1448 contacts monitored. Of these, 633 (43·7%) of 1448 had nucleic acid testing, or antibody testing, or both, with 18 secondary cases identified (attack rate 1·2%). Five secondary cases (three children; two adults) were identified (attack rate 0·5%; 5/914) in three schools. No secondary transmission occurred in nine of ten ECEC settings among 497 contacts. However, one outbreak in an ECEC setting involved transmission to six adults and seven children (attack rate 35·1%; 13/37). Across all settings, five (28·0%) of 18 secondary infections were asymptomatic (three infants [all aged 1 year], one adolescent [age 15 years], and one adult). INTERPRETATION: SARS-CoV-2 transmission rates were low in NSW educational settings during the first COVID-19 epidemic wave, consistent with mild infrequent disease in the 1·8 million child population. With effective case-contact testing and epidemic management strategies and associated small numbers of attendances while infected, children and teachers did not contribute significantly to COVID-19 transmission via attendance in educational settings. These findings could be used to inform modelling and public health policy regarding school closures during the COVID-19 pandemic. FUNDING: NSW Government Department of Health.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7398658/
**DOI**: 10.1016/s2352-4642(20)30251-0

**8. Panovska-Griffiths J, Kerr CC, Stuart RM, et al. Determining the optimal strategy for reopening schools, the impact of test and trace interventions, and the risk of occurrence of a second COVID-19 epidemic wave in the UK: a modelling study. The Lancet Child & adolescent health. 2020. DOI: 10.1016/s2352-4642(20)30250-9**
**ABSTRACT**: BACKGROUND: As lockdown measures to slow the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection begin to ease in the UK, it is important to assess the impact of any changes in policy, including school reopening and broader relaxation of physical distancing measures. We aimed to use an individual-based model to predict the impact of two possible strategies for reopening schools to all students in the UK from September, 2020, in combination with different assumptions about relaxation of physical distancing measures and the scale-up of testing. METHODS: In this modelling study, we used Covasim, a stochastic individual-based model for transmission of SARS-CoV-2, calibrated to the UK epidemic. The model describes individuals' contact networks stratified into household, school, workplace, and community layers, and uses demographic and epidemiological data from the UK. We simulated six different scenarios, representing the combination of two school reopening strategies (full time and a part-time rota system with 50% of students attending school on alternate weeks) and three testing scenarios (68% contact tracing with no scale-up in testing, 68% contact tracing with sufficient testing to avoid a second COVID-19 wave, and 40% contact tracing with sufficient testing to avoid a second COVID-19 wave). We estimated the number of new infections, cases, and deaths, as well as the effective reproduction number (R) under different strategies. In a sensitivity analysis to account for uncertainties within the stochastic simulation, we also simulated infectiousness of children and young adults aged younger than 20 years at 50% relative to older ages (20 years and older). FINDINGS: With increased levels of testing (between 59% and 87% of symptomatic people tested at some point during an active SARS-CoV-2 infection, depending on the scenario), and effective contact tracing and isolation, an epidemic rebound might be prevented. Assuming 68% of contacts could be traced, we estimate that 75% of individuals with symptomatic infection would need to be tested and

positive cases isolated if schools return full-time in September, or 65% if a part-time rota system were used. If only 40% of contacts could be traced, these figures would increase to 87% and 75%, respectively. However, without these levels of testing and contact tracing, reopening of schools together with gradual relaxing of the lockdown measures are likely to induce a second wave that would peak in December, 2020, if schools open full-time in September, and in February, 2021, if a part-time rota system were adopted. In either case, the second wave would result in R rising above 1 and a resulting second wave of infections 2·0-2·3 times the size of the original COVID-19 wave. When infectiousness of children and young adults was varied from 100% to 50% of that of older ages, we still found that a comprehensive and effective test-trace-isolate strategy would be required to avoid a second COVID-19 wave. INTERPRETATION: To prevent a second COVID-19 wave, relaxation of physical distancing, including reopening of schools, in the UK must be accompanied by large-scale, population-wide testing of symptomatic individuals and effective tracing of their contacts, followed by isolation of diagnosed individuals. FUNDING: None.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7398659/
**DOI**: 10.1016/s2352-4642(20)30250-9

**9. Stein-Zamir C, Abramson N, Shoob H, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. Euro Surveill. 2020;25(29). DOI: 10.2807/1560-7917.Es.2020.25.29.2001352**
**ABSTRACT**: On 13 March 2020, Israel's government declared closure of all schools. Schools fully reopened on 17 May 2020. Ten days later, a major outbreak of coronavirus disease (COVID-19) occurred in a high school. The first case was registered on 26 May, the second on 27 May. They were not epidemiologically linked. Testing of the complete school community revealed 153 students (attack rate: 13.2%) and 25 staff members (attack rate: 16.6%) who were COVID-19 positive.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7384285/
**DOI**: 10.2807/1560-7917.Es.2020.25.29.2001352

**10. Torres JP, Pinera C, De La Maza V, et al. SARS-CoV-2 antibody prevalence in blood in a large school community subject to a Covid-19 outbreak: a cross-sectional study. Clin Infect Dis. 2020;10:10.**
**ABSTRACT**: BACKGROUND: A SARS-CoV-2 outbreak affecting 52 people from a large school community in Santiago, Chile was identified (March 12), nine days after the first country case. We assessed the magnitude of the outbreak and the role students and staff played using a self-administered antibody detection test and survey.
METHODS: The school was closed on March 13, and the entire community was placed under quarantine. We implemented a home-delivery, self-administered, IgG/IgM antibody test and survey to a classroom stratified sample of students and all staff from May 4-19. We aimed to determine overall seroprevalence rates by age group, reported symptoms, contact exposure and to explore dynamics of transmission.
RESULTS: Antibody positivity rates were 9.9% (95%CI: 8.2-11.8) for 1,009 students and 16.6% (95%CI: 12.1-21.9) for 235 staff. Among students, positivity was associated with younger age (P=0.01), lower grade level (P=0.05), prior RT-PCR positivity (P=0.03), and history of contact with a confirmed case (P<0.001). Among staff, positivity was higher in teachers (P=0.01) and in those previously RT-PCR positive (P<0.001). Excluding RT-PCR positive individuals, antibody positivity was associated with fever in adults and children (P=0.02; P=0.002), abdominal pain in children (P=0.001), and chest pain in adults (P=0.02). Within antibody positive individuals, 40% of students and 18% of staff reported no symptoms (P=0.01).
CONCLUSIONS: Teachers were more affected during the outbreak and younger children were at higher infection risk, likely because index case(s) were teachers and/or parents from preschool. Self-

administered antibody testing, supervised remotely, proved to be a suitable and rapid tool. Our study provides useful information for school re-openings.

**11. Walger P, Heininger U, Knuf M, et al. Children and adolescents in the CoVid-19 pandemic: Schools and daycare centers are to be opened again without restrictions. The protection of teachers, educators, carers and parents and the general hygiene rules do not conflict with this. GMS Hygiene & Infection Control. 2020;15:1-9.**

**ABSTRACT**: In the opinion of the medical societies of hygiene and pediatrics undersigning the present statement, the analyses published to date regarding transmission of SARS-CoV-2 and the course of CoVid-19 show that children play a much less significant role in the spread of the virus than do adults. According to the findings available to date, not only do children and adolescents less frequently fall ill with CoVid-19, they also generally become less severely ill than do adults. The vast majority of infections in children and adolescents are asymptomatic or oligosymptomatic. Even the first analyses from China demonstrated that children and ad- olescents play a subordinate role in the transmission of the virus – not only to other children and adolescents, but also to adults. Taking into account regional infection rates and available resources, daycare centers, kindergartens and elementary schools promptly should be reopened. For children, this should be possible without excessive restrictions, such as clustering into very small groups, implementation of barrier precautions, maintaining appropriate distance from others or wearing masks. A factor more decisive than individual group size is the issue of sustaining the constancy of respective group members and the avoidance of intermixing. Children can be taught basic rules of hygiene such as handwashing and careful hygiene behavior when coming into contact with others during mealtimes and/or when using sanitary facilities. Independent of the prevention measures implemented for children and adolescents, the protection of teachers, educators and caregivers is crucial, (e.g., the maintenance of appropriate distance from others, use of medical masks, situation-dependent hand disinfection, when necessary, supported by regular pool testing). Children over the age of 10 and adolescents up to school graduation age are more capable of actively understanding and conforming to specific hygiene rules. For this group, maintaining appropriate distance from others (1.5 meters), wearing a mouth-and-nose protection (whenever they are not sitting in their assigned classroom seats) and consistent education regarding the basic rules of infection prevention may provide increased options for normalizing teaching activities. Children and adolescents suspected of infection with SARS-CoV-2 should be tested immediately in order to either confirm or rule out such an infection. Evidence of individual infections in children or students must not automatically lead to the closure of the entire daycare center or school. A detailed analysis of the chain of infection is a prerequisite for a balanced approach to infection control. The opening of schools and children's facilities should be accompanied by specifically structured,model surveillance studies that further clarify outstanding questions about infectious disease events and hygiene control. These prospective, concomitant examinations will be essential Germany for the purpose of evaluating and verifying the effectiveness of the required hygiene measures.

**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7273848/

**12. Wise J. Covid-19: NHS Test and Trace must improve for schools to reopen safely, say researchers. BMJ. 2020;370:m3083. DOI: 10.1136/bmj.m3083**

**ABSTRACT**: The current NHS Test and Trace programme in England must significantly improve if schools are to reopen safely in September and to avoid a second wave of covid-19, the authors of a new UK modelling study have warned.The model suggests that reopening schools full time from September alongside relaxation of other social distancing measures, and without scaling up testing, will induce a second wave that would peak in December. If schools reopened on a part time rota basis, this peak is likely to be in February 2021. In both cases the second wave of infections could be between 2 and 2.3

times the size of the original covid-19 wave, say the authors of the study, published in Lancet Child & Adolescent Health. …
**URL**: http://www.bmj.com/content/370/bmj.m3083.abstract
**DOI**: 10.1136/bmj.m3083

**13. Yeng PK, Woldaregay AZ, Solvoll T, et al. Cluster Detection Mechanisms for Syndromic Surveillance Systems: Systematic Review and Framework Development. JMIR Public Health Surveill. 2020;6(2):e11512. DOI: 10.2196/11512**
**ABSTRACT**: BACKGROUND: The time lag in detecting disease outbreaks remains a threat to global health security. The advancement of technology has made health-related data and other indicator activities easily accessible for syndromic surveillance of various datasets. At the heart of disease surveillance lies the clustering algorithm, which groups data with similar characteristics (spatial, temporal, or both) to uncover significant disease outbreak. Despite these developments, there is a lack of updated reviews of trends and modelling options in cluster detection algorithms. OBJECTIVE: Our purpose was to systematically review practically implemented disease surveillance clustering algorithms relating to temporal, spatial, and spatiotemporal clustering mechanisms for their usage and performance efficacies, and to develop an efficient cluster detection mechanism framework. METHODS: We conducted a systematic review exploring Google Scholar, ScienceDirect, PubMed, IEEE Xplore, ACM Digital Library, and Scopus. Between January and March 2018, we conducted the literature search for articles published to date in English in peer-reviewed journals. The main eligibility criteria were studies that (1) examined a practically implemented syndromic surveillance system with cluster detection mechanisms, including over-the-counter medication, school and work absenteeism, and disease surveillance relating to the presymptomatic stage; and (2) focused on surveillance of infectious diseases. We identified relevant articles using the title, keywords, and abstracts as a preliminary filter with the inclusion criteria, and then conducted a full-text review of the relevant articles. We then developed a framework for cluster detection mechanisms for various syndromic surveillance systems based on the review. RESULTS: The search identified a total of 5936 articles. Removal of duplicates resulted in 5839 articles. After an initial review of the titles, we excluded 4165 articles, with 1674 remaining. Reading of abstracts and keywords eliminated 1549 further records. An in-depth assessment of the remaining 125 articles resulted in a total of 27 articles for inclusion in the review. The result indicated that various clustering and aberration detection algorithms have been empirically implemented or assessed with real data and tested. Based on the findings of the review, we subsequently developed a framework to include data processing, clustering and aberration detection, visualization, and alerts and alarms. CONCLUSIONS: The review identified various algorithms that have been practically implemented and tested. These results might foster the development of effective and efficient cluster detection mechanisms in empirical syndromic surveillance systems relating to a broad spectrum of space, time, or space-time.
**URL**: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7284413/
**DOI**: 10.2196/11512

## SEARCH STRATEGIES

**Database: Ovid MEDLINE(R) ALL <1946 to August 24, 2020> - August 25, 2020, 10:30am**
Search Strategy:

| # | Searches | Results |
|---|---|---|
| 1 | exp coronavirus/ | 27388 |
| 2 | exp coronavirus infections/ | 28585 |

| | | |
|---|---|---|
| 3 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw,kf. | 1693 |
| 4 | (coronavirus* or coronovirus* or coronavirinae* or CoV).ti,ab,kw,kf. | 36631 |
| 5 | ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2").ti,ab,kw,kf. | 43155 |
| 6 | (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. | 509 |
| 7 | (("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. | 1508 |
| 8 | ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw. | 288 |
| 9 | "severe acute respiratory syndrome*".ti,ab,kw,kf. | 9841 |
| 10 | or/1-9 | 67489 |
| 11 | real-time polymerase chain reaction/ or nucleic acid amplification techniques/ or serologic tests/ or sentinel surveillance/ | 93940 |
| 12 | (LAMP assay? LAMP test? or loop-mediated isothermal amplification or isothermal amplification loop-mediated or LAMP technique? or loop mediated isothermal amplification or RT-LAMP assay? or RT-LAMP or RT-PCR? or RT-PCR test? or real time polymerase chain reaction? or real-time polymerase chain reaction? or real-time PCR? or real time PCR? or qRT-PCR or quantitative real-time polymerase chain reaction? or quantitative real time polymerase chain reaction? or quantitative real-time PCR? or quantitative real time PCR? or rapid antigen detection test? or RAD test? or direct viral antigen test? or rapid antigen test? or antigen detection test? or RDT or antigen test? or serologic* test* or serodiagnos#s or ((sentinel or syndromic or symptom*) adj1 surveillance) or biosurveillance system? or sentinel health event? or (symptom* adj2 (screening or surveillance or monitoring or testing)) or ((asymptomatic or a-symptomatic or presymptomatic or pre-symptomatic or never symptomatic or subclinical infection? or sub-clinical infection? or healthy carrier? or silent spread* or covert transmitter? or paucisymptomatic or oligosymptomatic) adj2 (screening or monitoring or surveillance or testing)) or genomic screening).tw,kf. | 301803 |
| 13 | 11 or 12 | 360711 |
| 14 | schools/ or schools, nursery/ | 39630 |
| 15 | (kindergarten* or elementary school* or high school* or grade school* or primary school* or school-age* or preschool* or schoolchildren or nursery school*).tw,kf. | 116302 |
| 16 | 14 or 15 | 142429 |
| 17 | 10 and 13 and 16 | 12 |
| 18 | limit 17 to (english language and yr="2019 -Current") | 2 |

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**Embase <1974 to 2020 August 24> - August 25, 2020 10:50am**

| # | Searches | Results |
|---|---|---|
| 1 | exp coronavirus/ | 17955 |
| 2 | exp coronavirus infections/ | 18900 |
| 3 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw,hw. | 1387 |
| 4 | (coronavirus* or coronovirus* or coronavirinae* or CoV).ti,ab,kw,hw. | 65701 |
| 5 | ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2").ti,ab,kw,hw. | 42742 |
| 6 | (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,hw. | 693 |
| 7 | (("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,hw. | 1862 |
| 8 | ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,hw. | 140 |
| 9 | "severe acute respiratory syndrome*".ti,ab,kw,hw. | 24148 |
| 10 | or/1-9 | 75476 |
| 11 | real-time polymerase chain reaction/ or nucleic acid amplification techniques/ or serologic tests/ or sentinel surveillance/ | 345598 |
| 12 | (LAMP assay? LAMP test? or loop-mediated isothermal amplification or isothermal amplification loop-mediated or LAMP technique? or loop mediated isothermal amplification or RT-LAMP assay? or RT-LAMP or RT-PCR? or RT-PCR test* or real time polymerase chain reaction? or real-time polymerase chain reaction? or real-time PCR? or real time PCR? or qRT-PCR or quantitative real-time polymerase chain reaction? or quantitative real time polymerase chain reaction? or quantitative real-time PCR? or quantitative real time PCR? or rapid antigen detection test* or RAD test* or direct viral antigen test* or rapid antigen test* or antigen detection test* or RDT or antigen test* or serologic* test* or serodiagnos#s or ((sentinel or syndromic or symptom*) adj1 surveillance) or biosurveillance system? or sentinel health event? or (symptom* adj2 (screening or surveillance or monitoring or test*)) or ((asymptomatic or a-symptomatic or presymptomatic or pre-symptomatic or never symptomatic or subclinical infection? or sub-clinical infection? or healthy carrier? or silent spread* or covert transmitter? or paucisymptomatic or oligosymptomatic) adj2 (screening or monitoring or surveillance or test*)) or genomic screening).tw,hw,kw. | 590916 |
| 13 | 11 or 12 | 655258 |
| 14 | schools/ or schools, nursery/ | 52864 |
| 15 | (kindergarten* or elementary school* or high school* or grade school* or primary school* or school-age* or preschool* or schoolchildren or nursery school*).tw,hw,kw. | 661688 |
| 16 | 14 or 15 | 699328 |
| 17 | 10 and 13 and 16 | 267 |
| 18 | limit 17 to (english language and yr="2019 -Current") | 54 |

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**CINAHL – August 25, 2020, 11:21am**

| # | Query | Results |
|---|---|---|
| S1 | (MH "Coronavirus+") OR (MH "Coronavirus Infections+") OR (MH "COVID-19") | 13,916 |
| S2 | TI ( ((corona* or corono*) n1 (virus* or viral* or virinae*)) ) OR AB ( ((corona* or corono*) n1 (virus* or viral* or virinae*)) ) | 223 |
| S3 | TI ( (coronavirus* or coronovirus* or coronavirinae* or CoV) ) OR AB ( (coronavirus* or coronovirus* or coronavirinae* or CoV) ) | 6,182 |
| S4 | TI ( ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2") ) OR AB ( ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2") ) | 12,248 |
| S5 | TI ( (respiratory* n2 (symptom* or disease* or illness* or condition*) n10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) OR AB ( (respiratory* n2 (symptom* or disease* or illness* or condition*) n10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) | 133 |
| S6 | TI ( (("wet market" or "seafood market*" or "food market*" or pneumonia*) n10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) OR AB ( (("wet market" or "seafood market*" or "food market*" or pneumonia*) n10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) | 344 |
| S7 | TI ( ((outbreak* or wildlife* or pandemic* or epidemic*) n1 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) OR AB ( ((outbreak* or wildlife* or pandemic* or epidemic*) n1 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)) ) | 275 |
| S8 | TI "severe acute respiratory syndrome*" OR AB "severe acute respiratory syndrome*" | 1,896 |
| S9 | S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 | 19,465 |
| S10 | ( (MH "Population Surveillance+") OR (MH "Disease Surveillance") ) OR (MH "Serologic Tests") OR (MH "Nucleic Acid Amplification Techniques") OR (MH "Polymerase Chain Reaction+") | 74,398 |
| S11 | TI ( (LAMP assay# LAMP test# or loop-mediated isothermal amplification or isothermal amplification loop-mediated or LAMP technique# or loop mediated isothermal amplification or RT-LAMP assay# or RT-LAMP or RT-PCR# or RT-PCR test* or real time polymerase chain reaction# or real-time polymerase chain reaction# or real-time PCR# | 28,115 |

| | | |
|---|---|---|
| | or real time PCR# or qRT-PCR or quantitative real-time polymerase chain reaction# or quantitative real time polymerase chain reaction# or quantitative real-time PCR# or quantitative real time PCR# or rapid antigen detection test* or RAD test* or direct viral antigen test* or rapid antigen test* or antigen detection test* or RDT or antigen test* or serologic* test* or serodiagnos?s or ((sentinel or syndromic or symptom*) n1 surveillance) or biosurveillance system# or sentinel health event# or (symptom* n2 (screening or surveillance or monitoring or test*)) or ((asymptomatic or a-symptomatic or presymptomatic or pre-symptomatic or never symptomatic or subclinical infection# or sub-clinical infection# or healthy carrier# or silent spread* or covert transmitter# or paucisymptomatic or oligosymptomatic) n2 (screening or monitoring or surveillance or test*)) or genomic screening) ) OR AB ( (LAMP assay# LAMP test# or loop-mediated isothermal amplification or isothermal amplification loop-mediated or LAMP technique# or loop mediated isothermal amplification or RT-LAMP assay# or RT-LAMP or RT-PCR# or RT-PCR test* or real time polymerase chain reaction# or real-time polymerase chain reaction# or real-time PCR# or real time PCR# or qRT-PCR or quantitative real-time polymerase chain reaction# or quantitative real time polymerase chain reaction# or quantitative real-time PCR# or quantitative real time PCR# or rapid antigen detection test* or RAD test* or direct viral antigen test* or rapid antigen test* or antigen detection test* or RDT or antigen test* or serologic* test* or serodiagnos?s or ((sentinel or syndromic or symptom*) n1 surveillance) or biosurveillance system# or sentinel health event# or (symptom* n2 (screening or surveillance or monitoring or test*)) or ((asymptomatic or a-symptomatic or presymptomatic or pre-symptomatic or never symptomatic or subclinical infection# or sub-clinical infection# or healthy carrier# or silent spread* or covert transmitter# or paucisymptomatic or oligosymptomatic) n2 (screening or monitoring or surveillance or test*)) or genomic screening) ) | |
| S12 | S10 OR S11 | 92,030 |
| S13 | (MH "Schools") OR (MH "Schools, Elementary") OR (MH "Schools, Middle") OR (MH "Schools, Nursery") OR (MH "Schools, Secondary") OR (MH "Schools, Special") OR (MH "School Policies") OR (MH "Students, Elementary") OR (MH "Students, Disabled") OR (MH "Students, Middle School") OR (MH "Students, Minority") OR (MH "Teachers") | 46,999 |
| S14 | TI ( (kindergarten* or elementary school* or high school* or grade school* or primary school* or school-age* or preschool* or schoolchildren or nursery school*) ) OR AB ( (kindergarten* or elementary school* or high school* or grade school* or primary school* or school-age* or preschool* or schoolchildren or nursery school*) ) | 54,490 |
| S15 | S13 OR S14 | 89,591 |
| S16 | S9 AND S12 AND S15 | 5 |
| S17 | S9 AND S12 AND S15 [limit to 2019-2020] | 2 |

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**Pubmed – August 25, 2020, 11:51am**

((wuhan[tw] AND (coronavirus[tw] OR corona virus[tw])) OR coronavirus*[ti] OR COVID*[tw] OR nCov[tw] OR 2019 ncov[tw] OR novel coronavirus[tw] OR novel corona virus[tw] OR covid-19[tw] OR SARS-COV-2[tw] OR Severe Acute Respiratory Syndrome Coronavirus 2[tw] OR coronavirus disease 2019[tw] OR corona virus disease 2019[tw] OR new coronavirus[tw] OR new corona virus[tw] OR new coronaviruses[all] OR novel coronaviruses[all] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[nm] OR 2019 ncov[tw] OR nCov 2019[tw] OR SARS Coronavirus 2[all]) AND (Polymerase Chain

Reaction[mh] OR seroconversion[mh] OR serologic tests[mh] OR Reverse Transcriptase Polymerase Chain Reaction[mh] OR Nucleic Acid Amplification[mh] OR Enzyme-Linked Immunosorbent Assay[mh] OR PCR[tw] OR rt-PCR[tw] OR nucleic test*[tw] OR seroconvert*[tw] OR elisa [tw] OR laborator*[tw] OR serolog*[tw] OR Real Time Reverse Transcriptase Polymerase Chain[tw] OR LAMP assay[nm] OR assay[tw]) OR COVID-19 diagnostic testing[nm] OR antigen test*[tw] OR serologic* test*[tw] OR serodiagnoses[tw] OR serodiagnosis[tw] OR sentinel surveillance[tw] OR syndromic surveillance[tw] OR biosurveillance system*[tw] OR sentinel health event*[tw] OR genomic screening[tw]) AND (((school*[tw] OR student*[tw] OR kindergarten*[tw] OR elementary school*[tw] OR high school*[tw] OR grade school*[tw] OR primary school*[tw] OR school-age*[tw] OR preschool*[tw] OR schoolchildren[tw] OR nursery school*[tw])) AND (2019/12[dp]:2020[dp])
**Results - 260**

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**Google Scholar**

(students OR high-school OR middle-school OR elementary-school OR primary-school OR schoolchildren OR junior-high) AND (test OR testing OR screening OR mass-screening OR monitor OR surveillance OR bio surveillance) AND (PCR OR serological OR syndromic OR symptom OR asymptomatic OR genomic) AND (covid-19 OR coronavirus)

**Search terms for other resources used in various combinations:**

COVID-19 | Coronavirus

Students | School | Schoolchildren | Middle-School | High-School | Primary-School | Kindergarten

Test | Testing | Surveillance | Biosurveillance | Monitoring | Screening | Mass-screening

PCR | Serological | Syndromic | Symptom | Asymptomatic | genomic

COVID | school | (testing|surveillance) | (recommendation*|Protocol*)