

The NEA Quick Guide to Indoor Air Quality Strategies to Mitigate COVID-19

October 28, 2020

The National Education Association designed this short guide to help local leaders, staff, and members address ventilation as part of COVID-19 mitigation strategies. The goal is to provide quick identification of issues, authoritative citations, and, where appropriate, suggested language for collective bargaining or other labor-management engagements. The language can also serve as the basis of school board policies or resolutions.

This is a condensed version of a longer NEA publication—Designing and Implementing a COVID-19 Indoor Air Quality Plan in Schools—that provides much more detail on the issues summarized here, including why these arguments and goals matter, how they fit together in an overall COVID-19 mitigation strategy, and resources that can help in the design and implementation of indoor air quality (IAQ) initiatives focusing on more than COVID-19. Full source citations and additional resources can be found at the end of this document.

As a first step, it is important to factor into COVID-19 mitigation strategies both the airborne transmission of the disease and how ventilation can help address that problem.

According to the U.S. Centers for Disease Control and Prevention (CDC): “Some infections can be spread by exposure to virus in small droplets and particles that can linger in the air for minutes to hours. These viruses may be able to infect people who are further than 6 feet away from the person who is infected or after that person has left the space” (CDC, “How COVID-19 Spreads”). ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers) puts it this way: “Transmission of SARS-CoV-2 [the novel coronavirus] through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures” (ASHRAE, “Position Document on Infectious Aerosols”).

The U.S. Environmental Protection Agency (EPA) emphasizes the importance of incorporating ventilation into a broader plan: “Although improvements to ventilation and air cleaning cannot on their own eliminate the risk of airborne transmission of the SARS-CoV-2 virus, EPA recommends precautions to reduce the potential for airborne transmission of the virus. These precautions include increasing ventilation with outdoor air and air filtration as part of a larger strategy that includes social distancing, wearing cloth face coverings or masks, surface cleaning and disinfecting, handwashing, and other precautions (EPA, “Ventilation and Coronavirus”).

Below are specific considerations and actions to improve ventilation as part of COVID-19 mitigation strategies. For each action, we also suggest language *in italics* for bargaining, other labor-management engagements, and school board resolutions or policies.

- 1) Use collective bargaining or other forms of labor-management engagement where bargaining over indoor air quality is not possible. Use existing or repurposed committees, or create new ones.**

A joint labor-management indoor air quality committee will be created at the district level and in every building. The committee will facilitate, monitor, research, and recommend solutions to indoor air quality issues and concerns. Employee concerns will be tracked as reported on physical hazard notification forms and employee logs, leading to investigation and resolution. Independent testing groups shall be jointly selected by the Association and the district. The district will remediate indoor air quality issues in conjunction with the joint indoor air quality committee.

The [name of committee] shall also be responsible for indoor air quality. Among other necessary work, it shall facilitate, monitor, research, and recommend solutions to indoor air quality issues and concerns. Employee concerns will be tracked by the committee as reported on physical hazard notification forms and employee logs, leading to investigation and resolution. Independent testing groups shall be jointly selected by the Association and the district. The district will remediate indoor air quality issues in conjunction with the joint labor-management indoor air quality committee.

- 2) Obtain existing reports or analyses of heating, ventilation, and air conditioning (HVAC) systems to develop a baseline on ventilation issues. If they don't already exist, push for them to be completed.**

The [district/school] shall conduct an audit of indoor air quality by [add date] and provide the results to the Association as soon as they are available.

The [district/school] shall provide to the Association copies of all new HVAC system reports and reports from the prior two years.

The [district/school] shall ensure that trained professionals conduct regular [monthly, for example] air quality inspections in all buildings and rooms, including air change rate, humidity, and temperature, as well as negative pressure in health rooms, isolation rooms, and bathrooms.

- 3) Conduct building walkthroughs and talk with colleagues about ventilation problems.** The EPA recognizes this as an important step for improving IAQ (EPA, “Background Information for Walkthrough).” The goal of a building walkthrough and talking to colleagues is to talk about, see, smell, hear, or feel indications that the HVAC system is not functioning properly or that other ventilation problems are occurring.

In coordination with the Association, the [district/school] shall conduct a building walkthrough prior to the resumption of in-person instruction to identify ventilation problems and potential solutions. When in-person instruction resumes, walkthroughs shall take place [monthly]. All walkthroughs shall include Association representatives, administrators, and HVAC/ventilation experts.

- 4) Integrate awareness of racial and social inequities into indoor air quality solutions.** Without an intentional focus on understanding how race and other social factors play into exacerbating IAQ problems in public schools, we could see a continuation of negative outcomes in school districts that primarily serve students of color (NASEM, “Reopening K-12 Schools”).

The [district/school] and Association shall conduct an impact assessment to determine how and where racial and social inequities affect indoor air quality in the district, and they shall provide expedited solutions to address such inequities in the development of any indoor air quality initiative. Building-by-building assessments of demographics and ventilation shall be part of this process.

- 5) Ensure that air changes happen frequently enough.** Air changes per hour (ACH) refers to how many times the air volume in a space is replaced with filtered or outdoor air. It is important that indoor spaces meet at least minimal ACH goals (ASHRAE, “Re-Opening Our Schools”) and that sufficient fresh air is provided (EPA, “Heating, Ventilation and Air-Conditioning Systems”).

The [district/school] shall ensure that classrooms have six air changes per hour and a minimum of 15 cubic feet per minute per person of fresh air, or, if higher, the targets set by state or local requirements.

- 6) Flush HVAC systems by running them earlier and longer than usual.** Under pandemic conditions, experts recommend that HVAC systems run earlier and longer than usual, to more effectively remove potentially contaminated air. CDC and ASHRAE recommend starting systems two hours before the buildings they serve will be occupied and keeping them running until two hours after they have been occupied (ASHRAE, “Reopening of Schools and Universities” and CDC, “Operating schools during COVID-19”).

The [district/school] shall start HVAC systems at least two hours before and after buildings will be or are occupied.

- 7) Ensure that mechanical or other exhaust systems work effectively.** Inside air has to be effectively removed—exhausted—from the inside space. ASHRAE includes checking that exhaust systems are working as intended in its list of COVID-19-related monthly system checks and verifications list. CDC calls attention to the need to make sure that exhausting inside air is done safely (ASHRAE, “Epidemic Task Force” and CDC, “Strategies for Protecting K-12 School Staff”).

The [district/school] shall ensure on a monthly basis that all system exhaust functions are operating as intended and are not drawing potentially contaminated air from areas with an increased risk of having contaminated air, such as health offices, isolation rooms, and restrooms.

- 8) Check and adjust localized mechanical exhaust systems. Exhaust isolation rooms and nurse’s offices directly outside. Provide temporary nurse station trailers when necessary.** CDC calls for checking localized exhaust systems, like for bathrooms and health offices, and for exhaust systems to be fully functional (CDC, “Strategies for Protecting K-12 School Staff”). ASHRAE calls for high-risk areas to exhaust directly to the outside, for nurses’ offices operating in isolation mode have 100 percent outside air, and for temporary nurse station trailers when retrofits are not possible (ASHRAE, “Reopening of Schools and Universities”). The EPA notes that health officers should be located in areas in which “air removed from the health office is separated from the ventilation system to avoid affecting other occupied areas of the school” (EPA, “Health Officer and School Nurse Checklist”).

The [district/school] shall regularly inspect exhaust fans in health offices, isolation rooms, restrooms and other high-concern areas and ensure that they are functional and operating at full capacity.

The [district/school] shall ensure that isolation rooms and nurses’ offices operating in isolation mode are maintained with appropriate negative air pressure, are supplied with 100 percent outside air, and safely exhaust air directly outside the building. When such design is not achievable, the [district/school] shall supply temporary nurse station trailers that are appropriately equipped and ventilated.

- 9) Maintain negative pressure ventilation in high-risk locations.** In the context of HVAC systems and the novel coronavirus, paying attention to negative and positive air pressure is important, as a space with positive air pressure can force air from that space into surrounding spaces. In indoor spaces used to treat suspected or confirmed cases of COVID-19— isolation rooms or health offices—it is safer to have negative air pressure (ASHRAE, “Reopening of Schools and Universities”).

The [district/school] shall evaluate the air pressure in all spaces used to treat suspected or confirmed illnesses, isolation of individuals with confirmed or suspected illnesses, and restrooms. Appropriate negative air pressure shall be maintained.

- 10) Ensure appropriate separation between air intakes and exhaust outlets.** ASHRAE indicates that, generally, a minimum of 10 feet between air intakes and exhaust outlets is necessary to prevent or limit HVAC systems from pushing contaminants out but drawing them in again and recirculating them (ASHRAE, “Reopening of Schools and Universities”).

The [district/school] shall evaluate the location of all air intakes and exhaust outlets and ensure that they are spaced at least 10 feet apart.

- 11) Increase outside airflow.** As long as it can be done safely, bringing in more outside air dilutes contaminated air and decreases the likelihood that someone will breathe in an amount of the novel coronavirus sufficient to cause COVID-19. CDC, NIOSH, and ASHRAE all make this recommendation (CDC, “Strategies for Protecting K-12 School Staff” and ASHRAE, “Reopening of Schools and Universities”).

The [district/school] shall evaluate opportunities to safely increase the flow of clean outside air to all indoor spaces and shall maximize the flow of clean outside air to such spaces to the extent that it can be done safely and effectively. Necessary adjustments to HVAC systems, consistent with system specifications, shall be made to achieve this goal.

12) Disable demand-controlled ventilation (DCV). Demand-controlled ventilation (DCV) is a feature of HVAC systems designed to adjust how much outside air is brought into an inside space depending on how many people are present. CDC and AHRAE agree that limiting outside air when occupancy is low may lead to less-safe conditions (CDC, “Operating schools during COVID-19” and ASHRAE, “Reopening of Schools and Universities.” ASHRAE, “Reopening of Schools and Universities”).

The [district or school] shall ensure that demand-controlled ventilation (DCV) is disabled.

13) Further open minimum outdoor air dampers as conditions permit. ASHRAE and CDC agree on the recommendation to open dampers to increase outside airflow (ASHRAE, “Position Document on Infectious Aerosols” and CDC, “Operating schools during COVID-19”).

The [district/school] shall ensure that outdoor dampers are opened to 100 percent as indoor and outdoor conditions permit. [District/school] shall maintain an up-to-date list of dampers that are not open to 100 percent.

14) Use fans safely to draw in fresh air from open windows and doors. Fans must be securely placed, windows and doors must be safely kept open, and, as the CDC warns, care must be taken not to allow open windows in other rooms to cause potentially contaminated air to be drawn from one person to another (CDC, “Operating Schools during COVID-19”).

Where mechanical ventilation is insufficient, the [district/school] shall provide fans and ensure they are safely installed to enhance air flow and air exhaust, and shall ensure that they do not induce contaminated air flow from one person to another.

15) Improve air filtration by using more-protective filters when possible. Filters work by allowing air to pass through while removing particles. CDC recommends: “Increase air filtration to as high as possible without significantly diminishing design” (CDC, “Strategies for Protecting K-12 School Staff”). According to ASHRAE, a filter with a MERV rating of 13 or higher is efficient at capturing viruses, although a MERV rating of 14 is preferred (ASHRAE, “Reopening of Schools and Universities”).

The [district/school] shall use MERV 13 or higher filters or the most-protective filters possible given system capacities. Filters shall be changed according to the manufacturer’s recommended schedule.

16) Make sure filters fit properly and are within their service life. If a filter doesn’t fit, air can get through the system—and into a building—without being filtered. If filters are beyond their service life—if they have not been replaced according to the manufacturer’s recommendations and are overused or damaged—they will also be less efficient (CDC, “Strategies for Protecting K-12 School Staff”).

The [district/school] shall ensure that all filters properly fit and are within their service lives.

The [district/school] shall provide necessary personal protective equipment (PPE) to staff checking and/or changing filters in HVAC or other systems and shall provide necessary equipment to safely transport and dispose of old filters.

- 17) Consider portable air cleaners with high efficiency particulate air (HEPA) filters.** CDC recommends that schools “Consider portable high-efficiency particulate air (HEPA) filtration systems to help enhance air cleaning (especially in higher risk areas such as nurse’s office)” (CDC, “Strategies for Protecting K-12 School Staff”).

The [district/school] shall provide portable high efficiency particulate air (HEPA) filtration systems where HVAC systems are unavailable or incapable of providing adequate air quality.

- 18) Consider the cost, safety, and potential benefits of ultraviolet germicidal irradiation (UVGI).** UVGI should not be considered an alternative to developing and implementing a cleaning and disinfection plan. The cost, safety, and potential benefits need to be analyzed carefully on their own and in context of opportunity costs (CDC, “Operating Schools during COVID-19”).

The [district/school] shall explore the viability of supplementing other indoor air quality measures with ultraviolet germicidal irradiation (UVGI) and shall provide a written report on the cost, safety, and potential benefits in specific locations.

- 19) Ensure that environmental conditions like temperature and humidity minimize risk.** ASHRAE indicates, broadly, that it is important to ensure that indoor air temperature and humidity reduce potential for the spread of airborne pathogens, and it provides a range of generally applicable goals (ASHRAE, “Reopening of Schools and Universities”). Advocating for a single temperature or relative humidity may not make sense.

The [district/school] shall maintain temperature and humidity at recommended levels for indoor spaces (generally 68 degrees to 78 degrees Fahrenheit and relative humidity of between 40 percent and 60 percent, depending on the space).

Sources

ASHRAE, “Epidemic Task Force.” ASHRAE, “ASHRAE Epidemic Task Force: Schools & Universities,” updated October 7, 2020. https://www.ashrae.org/file_library/technical_resources/covid-19/ashrae-reopening-schools-and-universities-c19-guidance.pdf. Accessed: October 8, 2020.

ASHRAE, “Filtration and Disinfection FAQ.” ASHRAE, “Filtration and Disinfection FAQ,” <https://www.ashrae.org/technical-resources/filtration-and-disinfection-faq>. Accessed: October 5, 2020.

ASHRAE, “Position Document on Infectious Aerosols.” ASHRAE, “ASHRAE Position Document on Infectious Aerosols,” April 14, 2020, p. 2. https://www.ashrae.org/file%20library/about/position%20documents/pd_infectiousaerosols_2020.pdf. Accessed: September 24, 2020.

ASHRAE, “Reopening of Schools and Universities.” ASHRAE, “Reopening of Schools and Universities.” <https://www.ashrae.org/technical-resources/reopening-of-schools-and-universities>. Accessed: September 24, 2020.

ASHRAE, “Re-Opening Our Schools.” ASHRAE, “Re-Opening Our Schools: Activities and Recommendations.” https://www.ashrae.org/file_library/professional_development/learning_portal/instructor-led_training/online_instructor-led/final_re-opening-our-schools_activities-and-recommendations_june-2020.pdf. Accessed: October 6, 2020.

CDC, “How COVID-19 Spreads.” Centers for Disease Control and Prevention, “How COVID-19 Spreads,” updated October 5, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html>. Accessed: October 5, 2020.

CDC, “Operating Schools during COVID-19.” Centers for Disease Control and Prevention, “Operating Schools during COVID-19: CDC’s Considerations,” updated September 1, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html>. Accessed: September 24, 2020.

CDC, “Strategies for Protecting K-12 Staff.” Centers for Disease Control and Prevention, “Strategies for Protecting K-12 School Staff from COVID-19,” updated October 21, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-staff.html?deliveryName=FCP_1_USCDC_10_4-DM35971. Accessed: October 21, 2020.

EPA, “Evidence about Improved Academic Performance.” U.S. Environmental Protection Agency, “Evidence from Scientific Literature about Improved Academic Performance.” <https://www.epa.gov/iaq-schools/evidence-scientific-literature-about-improved-academic-performance>. Accessed: October 8, 2020.

EPA, “Background Information for Walkthrough.” U.S. Environmental Protection Agency, “Background Information for Walkthrough Inspection Checklist.” <https://www.epa.gov/sites/production/files/2014-11/documents/walkthruchk1stbkgd.pdf>. Accessed: October 22, 2020.

EPA, “Heating, Ventilation and Air-Conditioning Systems.” U.S. Environmental Protection Agency, “Heating, Ventilation and Air-Conditioning Systems, Part of Indoor Air Quality Design Tools for Schools.” <https://www.epa.gov/iaq-schools/heating-ventilation-and-air-conditioning-systems-part-indoor-air-quality-design-tools>. Accessed: October 6, 2020.

EPA, “Health Officer and School Nurse Checklist.” U.S. Environmental Protection Agency, “Health Officer and School Nurse Checklist from Indoor Air Quality Tools for Schools.” <https://www.epa.gov/iaq-schools/health-officer-and-school-nurse-checklist-indoor-air-quality-tools-schools>. Accessed: September 24, 2020.

EPA, “Ventilation and Coronavirus (COVID-19).” U.S. Environmental Protection Agency, “Ventilation and Coronavirus (COVID-19).” <https://www.epa.gov/coronavirus/ventilation-and-coronavirus-covid-19>. Accessed: October 21, 2020.

NASEM, “Reopening K-12 Schools.” National Academies of Sciences, Engineering, and Medicine 2020. Reopening K-12 Schools During the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25858>. Accessed: October 26, 2020.

NIOSH, “Indoor Environmental Quality.” The National Institute for Occupational Safety and Health, “Indoor Environmental Quality.”
<https://www.cdc.gov/niosh/topics/indoorenv/hvac.html>

Additional resources

Racial justice in education: National Education Association, “Racial Justice in Education.” <https://neaedjustice.org/wp-content/uploads/2018/11/Racial-Justice-in-Education.pdf>. Accessed: September 23, 2020. Race Forward, “Racial Equity Impact Assessment.” https://www.raceforward.org/sites/default/files/RacialJusticeImpactAssessment_v5.pdf. Accessed: October 28, 2020.

Disparities in educational resources: EdBuild, “\$23 Billion,” February 2019. <https://edbuild.org/content/23-billion/full-report.pdf>. Accessed: September 23, 2020. National Academies of Sciences, Engineering, and Medicine 2019. Monitoring Educational Equity. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25389>. Accessed: October 26, 2020.

Database of excerpts of state laws related to indoor air quality in schools: Environmental Law Institute, “Database of State Indoor Air Quality Laws,” March 2020. https://www.eli.org/sites/default/files/docs/2020_schools_excerpt_3.3.20_bold.pdf. Accessed: October 17, 2020.

Overview of state laws related to ventilation in existing schools: Environmental Law Institute, “Building Ventilation in Existing Schools: Overview of State Laws.” https://www.eli.org/sites/default/files/docs/ventilation_tseh_5.pdf. Accessed: October 17, 2020.

Indoor air quality in schools: U.S. Environmental Protection Agency, “Creating Healthy Indoor Air Quality in Schools,” <https://www.epa.gov/iaq-schools>. Accessed: October 17, 2020. U.S. Environmental Protection Agency, “Indoor Air Quality Tools for Schools Action Kit,” <https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-action-kit>. Accessed: October 17, 2020.

Bargaining for the common good: National Education Association, “Bargaining for the Common Good.” <https://www.nea.org/your-rights-workplace/bargaining-educator-voice/bargaining-common-good>. Accessed: October 6, 2020.

Measuring and checking ventilation: U.S. Environmental Protection Agency, “Ventilation Checklist.” <https://www.epa.gov/sites/production/files/2014-08/documents/ventchk1st.pdf>. Accessed: October 9, 2020. U.S. Environmental Protection Agency, “Background Information for Ventilation Checklist.” <https://www.epa.gov/sites/production/files/2014-08/documents/ventchk1stbkgd.pdf>. Accessed: October 9, 2020. The Harvard T.H. Chan School of Public Health has also published a short document that walks through the steps for checking ventilation rates in schools. Harvard T.H. Chan School of Public Health, “5-Step Guide to Checking Ventilation Rates in Classrooms.” <https://schools.forhealth.org/wp-content/uploads/sites/19/2020/08/Harvard-Healthy-Buildings-program-How-to-assess-classroom-ventilation-08-28-2020.pdf>. Accessed: October 6, 2020.

Scientific and medical analyses: National Academies of Sciences, Engineering, and Medicine 2020. Airborne Transmission of SARS-CoV-2: Proceedings of a Workshop in Brief. Washington, D.C.: The National Academies Press, p. 60. <https://doi.org/10.17226/25958>.

Accessed: October 23, 2020. National Academies of Sciences, Engineering, and Medicine 2020. Reopening K-12 Schools During the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25858>. Accessed: October 26, 2020.