


# An Analysis of K-12 School Reopening and Its' Impact on Teachers

Journal of Primary Care & Community Health  
Volume 11: 1–8  
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DOI: 10.1177/2150132720967503  
journals.sagepub.com/home/jpc  


Juli Anna Lambert<sup>1</sup>, Kim Trott<sup>2</sup>,  
and Reginald F. Baugh<sup>3</sup>

## Abstract

Teachers are vulnerable non-essential workers that continue to have significant misgivings about in-person school reopening. Dialogue around pandemic management has relatively neglected these concerns so far. This perspective offers a broad framework for risk assessment related to COVID-19 and in-person instruction. The accumulated general body of knowledge related to COVID-19 is particularized to the special dynamics of education. We highlight the impact of historic investments and underinvestment in education on the viability of adapting best practices to mitigate risk. Gaps in public health planning to supply educators with needed personal protective equipment and vaccination are explored. The challenges for low-income and minority-predominant districts receive special attention. We place these problems within the broader context of socioeconomic disparities and the societal consequences of the pandemic. The local level of community transmission, resources, and circumstances should dictate reopening dates. Without effective infection control, teachers are justified to fear infection. The transparency and scientific rigor that would allow teachers to assess their personal health risk and characterize the process for decision-making has been largely absent.

## Keywords

reopening public schools, K-12 teachers, COVID-19, K-12 education

Dates received: 1 September 2020; accepted: 23 October 2020

## Introduction

The nation has been rightly obsessed with the question of restarting in-person learning in public schools. America's recovery is dependent on successful re-opening. Though the academic year is already beginning, many questions about the risks COVID-19 poses in this environment remain unanswered. Dr. Anthony Fauci, the top U.S. infectious diseases expert, has opined that going back to school will be an experiment<sup>1</sup> suggesting the outcome is unknowable. In this perspective, we will try to answer the question "under what conditions should I advise a K-12 teacher to go back to work." The current administration has come out strongly in favor of schools restarting in-person learning.<sup>2,3</sup> Two principle rationales have been advanced: the children need it to happen, and opening facilitates parents' return to work. Two key stakeholders are unconvinced: parents and teachers.

Recent opinion polling found that the majority of (60%) K-12 students' parents thought their schools should be primarily remote.<sup>4</sup> More than 3-quarters of surveyed teachers in recent polling are worried about risking their health.<sup>5</sup> Black and Hispanic Americans, who are more likely to

know someone who has died from COVID-19, express much more concern about contracting the coronavirus personally and are currently less likely than whites to say they will be vaccinated.<sup>6</sup> To assuage these doubts or address their merit requires an understanding of likely infectious risks. Two significant issues in this regard are the role of vaccination and the relevance of the international experience with school re-opening.

Throughout the pandemic, the broad policy response has prioritized economic interests like bar re-opening over optimizing conditions for in-person learning. In lieu of this, President Trump and others have positioned having a vaccine

<sup>1</sup>Loma Linda University Medical Center, Loma Linda, CA, USA

<sup>2</sup>University of Toledo Physicians, LLC, Toledo, OH, USA

<sup>3</sup>University of Toledo College of Medicine and Life Sciences, Toledo, OH, USA

### Corresponding Author:

Reginald F. Baugh, Department of Surgery, University of Toledo College of Medicine and Life Sciences, 2120 Dowling Hall, MS 1905, 3000 Arlington Ave, Toledo, OH 43623, USA.

Email: reginald.baugh@utoledo.edu



as the key to every teacher returning to the classroom.<sup>7</sup> Although some have spoken in favor of teachers being prioritized for vaccination,<sup>8,9</sup> pandemic planning by the CDC and public reporting<sup>10,11</sup> suggest that teachers are not at the front of the line. Without early access, the efficacy of this solution will therefore depend on widespread adoption. But there may be only 10 to 15 million doses available at the time of approval, which would cover around 3% to 5% of the U.S. population<sup>12</sup> not enough doses to cover the number of first responders and healthcare workers.<sup>13,14</sup> There are currently no pediatric vaccine trials in the US at all.<sup>15</sup> The robust vaccine supply needed will not be available until late spring by even President Trump's estimation<sup>16</sup>; Dr. Fauci opines the end of 2021.<sup>17</sup> Furthermore, only about half of Americans are planning to get vaccinated. The numbers are even lower and falling<sup>18</sup> among many high-risk groups.<sup>19</sup>

The level of community transmission and local circumstances will dictate re-opening dates.<sup>20</sup> While other countries have re-opened schools without triggering outbreaks, applying those observations to the U.S. is likely misguided. Re-opening schools with the U.S.'s high levels of community transmission, inadequate testing, and limited contact tracing capacity,<sup>21</sup> has never been attempted and is the opposite of what has been associated with success.<sup>22</sup> Teachers and the physicians that advise them will need to consider their demographic risk, local in-school healthcare resources, viral transmissibility, and factor the socioeconomic consequences of not teaching during the ongoing crisis to ensure their safety.

## Teachers and COVID-19

Teachers are a vulnerable and affected population when considering school re-opening efforts. Last year there were 3.7 million K-12 teachers.<sup>23</sup> Over half (50.6%) are estimated to have definite or possible risk factors for severe COVID-19 illness.<sup>24</sup> Those with exposure to Black children and those from low-income households are at especially high risk. Twenty percent of the K-12 workforce is of color<sup>25</sup>; this group is more likely to contract COVID-19,<sup>26</sup> and when infected, have higher mortality rates<sup>27</sup> than non-Hispanic Whites. Moreover, at least 18% of all public and private school teachers, 27% of school principals, and 25% of school nurses are older than age 55.<sup>28,29</sup> About 4.4 million other school personnel,<sup>24</sup> including paraprofessionals, school bus drivers, school administrators, and custodians, are of a similar age range. Over 90% of deaths in the United States due to COVID-19 are over 50, according to the CDC. For Americans 50 to 64 years, COVID hospitalizations are 1.5 times the average rate, second only to those over 65. For each of these high risk groups, risk is not only personal, but shared by their whole household. A multi-state survey performed during the spring closures for COVID-19 found 40% of

teachers had children or dependent adults at home that required significant care.<sup>30</sup>

Even before the pandemic, a teacher shortage was large, growing, and generally underestimated. The pandemic may be encouraging educators to vote with their feet. One third of teachers report they are somewhat or very likely to leave their job this year—compared with just 8% in a typical year.<sup>31</sup> Worsening the situation, teacher layoffs are expected to begin in the early winter due to budget shortfalls.<sup>32</sup> To accommodate the existing shortages, 31 states have lowered standards for teachers to become certified.<sup>32</sup> When indicators of teacher quality are considered, the shortage is even worse in districts servicing minoritized populations.<sup>33</sup>

The issue of whether COVID-19 will be considered a compensable occupational disease is relevant for 1 in 5 U.S. workers,<sup>34</sup> including teachers. Disappointingly, although occupational claims can be brought, the more prevalent the virus the weaker the argument becomes for any occupational claims made by non-healthcare workers. Unlike healthcare workers, police, firefighters, or even daycare workers in 21 states,<sup>35</sup> teachers are not legally considered essential workers. Presumably, then, teachers will not receive priority access to testing or PPE. In a letter to U.S. Health and Human Services, multiple prominent medical associations warned that the lack of capacity for COVID-19 testing with a reasonable turnaround time would likely last into the foreseeable future.<sup>36</sup> So not only are teachers, the backbone of society's education and ultimately the country's success, unable to file for workmen's compensation should they get sick, they also have limited access to testing and PPE.

## Medical Acumen for Schools

The advantages of more significant onsite medical resources for schools during a pandemic are self-evident. The CDC has recently articulated the diversity of medical conditions within our schools,<sup>2</sup> from ventilators to insulin pumps to the current elevated levels of child abuse. Currently, only about 40% of all U.S. schools have a full-time nurse; 35% have a part-time nurse, and 25% have no nurse at all.<sup>37</sup> Often, they cover hundreds or thousands of students in multiple buildings, exceeding the recommendations of the American Academy of Pediatrics for even healthy, low-need student populations.<sup>38</sup> Many students will be facing increased social, emotional, and mental health challenges brought on by the COVID-19 pandemic. A school nurse may assuage their concerns or appropriately refer them. The presence of a coordinated health program led by school nurses contributes to identifying illness and management of COVID-19, thereby facilitating the overall health and safety of students, teachers, and staff during the pandemic.

Without school nurses, teachers become the community health workers providing the identification, treatment, and

follow-up of COVID in our classrooms. And as such, they will face an unknown prevalence of COVID-19 among their students. Children make up more than 7% of all coronavirus cases in the U.S. and the number and rate of child cases have been steadily increasing from March to August.<sup>39</sup> Children of all ages are susceptible to COVID-19, and can spread the disease with mild or no symptoms.<sup>40</sup> Though they are likely to be infected outside of school,<sup>41</sup> they are expected to play an important role in school transmission.<sup>42–44</sup> However, international experience suggests students are not as likely to transmit the virus to other students compared to their household contacts (principally adults).<sup>45–47</sup> Obviously, this observation has a great deal of relevance to teachers. With community positivity rates from 5% to 15% in many areas, estimates suggest that more than 80% of Americans live in a county where at least one infected person would be expected to show up<sup>48</sup> in an average school.<sup>49</sup> Access to school-provided PPE (masks, face shields, scrubs, gloves) is warranted because it is valuable,<sup>50</sup> and under OSHA's General Duty Clause,<sup>51</sup> it is required since potential infectious exposure is currently inevitable in most locations. Employers must provide their employees with appropriate PPE. They should ensure single-use PPE is disposed of and reusable items are properly cleaned and stored.

### COVID-19 Transmission

Transmission of COVID-19 is thought to happen through respiratory droplets and droplet nuclei (dried respiratory droplets) no smaller than 1  $\mu\text{m}$ . A recent publication has allowed a better assessment of the relative risk from varying levels of occupancy and exposure time.<sup>52</sup> According to this analysis, even in a well ventilated typical classroom with face coverings being worn, the transmission risk would be medium to high.<sup>53</sup> They found an individual's susceptibility to infection, indoor airflow patterns, position relative to the infected person and that individual's infectivity are all critical variables. For example, it would ideally take about 30 to 60 minutes to clear the room<sup>54</sup> assuming there is airborne COVID-19 contamination of a classroom by a pre-symptomatic or asymptomatic individual and 4 to 12 air changes per hour.<sup>55</sup> However, classrooms are far from ideal. The room is not empty; the infected individual continues to release infective particles into the air, while poor mixing or air stagnation frequently occurs—all of which would extend viral exposure for the occupants. While increasing the number of air changes per hour (dilution ventilation) can lower the overall concentration of particles in a space, it may not be effective at lowering particle concentrations near the source of contamination, where fellow students or teachers might be expected.<sup>53</sup>

Moreover, glossing over the localized airflow variation within a space oversimplifies and serves to underestimate risk modeling.<sup>53</sup> This informs the recommendation favoring

outdoor over indoor gatherings and recent CDC guidance to improve school airflow by opening windows and doors<sup>56</sup>—measures largely impractical most of the year for most of the country. The duration of exposure is significantly influenced by airflow and room air turnover, as the concentration of suspended infectious COVID-19 air droplets tends to accumulate over time.<sup>57</sup> Either you keep people far enough apart so the droplets fall to surfaces, or you reduce the duration of exposure by reducing the concentration of the virus particles (eg, reduce the concentration of people, increase the ventilation, filter the air). The recent tragic death of Kimberly Chavez Lopez after she and 2 colleagues contracted COVID-19 while sharing a classroom for summer school highlights the importance of indoor viral concentration.<sup>58</sup> Both surviving teachers reported that they had all followed CDC guidelines and protocol.

Recently, the University of Minnesota released a simulation for quantitative risk assessment of coronavirus spread in the classroom and the impact of proper ventilation systems.<sup>59</sup> The simulations found that virus particles over time become trapped in vortices that gradually increase the virus concentration. Critically, however, these same models suggested vortex formation could be avoided through the right combination of fresh air, ventilation, and interior organization.<sup>59</sup> The American Society of Heating, Refrigerating, and Air-Conditioning Engineers posit a vital role for heating, ventilating, and air-conditioning (HVAC) systems in reducing the airborne concentration of the COVID-19 virus and thus the risk of airborne transmission.<sup>60,61</sup> However, decades of underfunding education mean nearly 40% of individual schools and over half of all school districts nationwide need to update or replace their HVAC systems or other building systems.<sup>62</sup> Districts servicing populations of color or marginalized groups will be the least likely to have the financial resources to upgrade systems. Less effective systems for clearing viral droplets from circulation translate into a greater risk of COVID-19 infection for those working in such buildings. Long needed investments resulting from decades of underfunding for thousands of schools to upgrade ventilation to sanitation will not occur without a significant federal bailout.<sup>59</sup> Risk stratification using control banding focuses on the likelihood and duration of exposure in the context of the source, pathway, and receptor controls, thereby offering a more nuanced approach for considering interventions.<sup>61</sup> In contrast, OSHA's 4 risk levels do not recognize the importance or interactions of contact time, airborne concentration, or proximity.<sup>63</sup>

To combat the transmissibility of COVID-19, universal mitigation strategies (eg, social distancing, 3-layer cloth face coverings<sup>64</sup> (not neck gaiters), hand hygiene, and use of cohorts)<sup>22,65</sup> should be deployed. Masks should always be required for both teachers and students<sup>66</sup> to lessen the transmission of the virus<sup>67</sup> and limit the severity of the condition should they contract the disease. The idea is that face coverings can

curb disease severity by reducing the inoculation load, giving the body less infectious particles to fight off. The lower the inoculation load, the milder the infection, and the greater the proportion of asymptomatic carriers. Although still incompletely proven, both observational data and animal models are supportive so far.<sup>67–69</sup>

## Socioeconomic Effects of COVID-19

The socioeconomic effects of COVID-19 on the U.S. educational system have singularly highlighted the vast divide between fully resourced schools and schools that lack adequate funding and resources. With the untimely closure of schools across the U.S. in mid-March, many districts were ill-prepared to handle the economic downfall of the pandemic while still supporting the needs of a broad student population, which includes ESL students, students with disabilities, and economically disadvantaged students. Overall, a significant decline in state and local revenue, steady erosion of state and local revenue as a percentage of personal income, and non-progressive school funding are anticipated to leave many districts, particularly high-poverty districts, more vulnerable.<sup>70</sup> A sizeable federal aid package with multiphase allocation and equitable distribution will be needed to combat this.<sup>71,72</sup>

The funding to even contemplate such strategies is lacking in all but the richest of districts. Teachers already go into their wallets, spending \$459 on average to purchase student supplies.<sup>73</sup> Now cash strapped districts are letting teachers pay for cleaning supplies for their rooms.<sup>74</sup> This kind of cost-shifting is likely to get worse as the average district must find an additional 1.8 million dollars to re-open.<sup>75</sup> Upgrading building systems could double or triple the costs and delay reopenings by several weeks. School funding mostly begins and ends with local property taxes. A school district's borders define both the school system and its local tax base. State allocations to make things equitable are just not enough to make up the gap between the advantaged and the left behind—that difference totaled 23 billion before the pandemic.<sup>76</sup> This is especially problematic since public school funding has mostly never recovered from the Great Recession's deep cuts.<sup>77</sup> Now, what was inequitable—high-poverty communities and majority-minority districts generally received fewer school dollars than more advantaged, whiter ones<sup>78</sup>—has gotten worse. On top of that, the taxes that make up states' primary sources of revenue have been hit hard by the pandemic, making the availability of state money scare. All this means that school districts paying for operations mostly from local revenue will not see as much of an immediate budget increase from the state, further exacerbating the differences between rich and poor, non-Hispanic Whites, and communities of color.

## Conclusion

Physicians and other healthcare workers have a tradition of treating the sick and healing the wounded in times of war, pestilence, and famine going back to Plato (428?-348? BCE) and Socrates (470-399 BCE).<sup>79</sup> Teachers have no such traditions. While all professionals have a moral obligation to do right and act for others' benefit,<sup>80</sup> that does not mean they should accept this risk without effective infection control. Teachers are justified to fear infection as they risk their lives in the classroom. There are limits. Limits that do not go as far as those of healthcare workers. Transparency and scientific rigor should characterize the process for deciding between what is reasonable and unreasonable. To date, neither school districts nor other decision-makers have provided that in their push to re-open. As the personal risk of re-opening varies by personal characteristics, re-opening plans should acknowledge the distinct needs of educators at high- and low-risk for disease. The decision-making body should be accountable since inherent in the decision to re-open are life or death consequences. The central question that has animated this perspective, should teachers be advised to return to work, is mostly answered in the negative at present.

## Disclaimers

The views expressed in the manuscript solely reflect the views of the authors.

## Declaration of Conflicting Interests


The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## ORCID iDs

Kim Trott  <https://orcid.org/0000-0002-9791-3775>

Reginald F. Baugh  <https://orcid.org/0000-0002-2838-3854>

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