

# Factors Associated with Initial Public School Reopening Plans During the US COVID-19 Pandemic: a Retrospective Study



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## INTRODUCTION

Because of the novel coronavirus disease 2019 (COVID-19), all 50 states closed public schools by April 2020 for the remainder of the academic year to mitigate COVID-19 transmission. School reopening decisions for the 2020–2021 academic year were delegated to states and local districts. Reopening options include full on-site learning, hybrid approaches with mixed remote and in-person learning, and remote-only learning.<sup>1</sup> Lacking robust evidence, decision-makers weighed the risks of exposing students and staff to COVID-19 with the benefits of in-person school, including superior academic outcomes and the provision of essential services, such as nutrition and childcare.<sup>2, 3</sup>

Identifying factors that influenced school reopening decisions early in the academic year will allow policymakers and communities to understand the extent to which community COVID-19 prevalence and other characteristics informed reopening strategies. Officials are frequently re-evaluating strategies and incorporating evidence as knowledge increases about the virus and the impacts of different mitigation strategies. The North Carolina (NC) Governor announced on July 14, 2020, that districts could select between modified on-site learning (hybrid) and remote learning–only options.<sup>1</sup> Using NC as a case study, we characterize the COVID-19 burden, school, and county characteristics associated with initial school district 2020–2021 reopening decisions.

## METHODS

In this retrospective study using public data, the primary outcomes are initial school district reopening decisions (hybrid versus remote) and the initial duration of remote learning (number of weeks). Districts not reporting duration ( $n = 7$ ) were excluded from the duration analysis. Predictors included county COVID-19 burden (new cases July 15 to July 31,

2020, and cumulative deaths as of July 31, 2020); school district characteristics (size, student/teacher ratio, academic performance, and proportion of students eligible for free and reduced lunch); and county-level characteristics (population, race/ethnicity, rurality) and county political preference (binary indicator for above versus below the median percent of 2016 vote for republican presidential nominee). Binary and count outcomes were modeled using logistic and Poisson distributions in Stata 16.0. The study was exempted by the Duke University Institutional Review Board.

## RESULTS

Among the 115 NC school districts, 50 (43%) initially selected hybrid learning approaches for the 2020–2021 academic year. Of the 65 (57%) selecting initial remote-only learning, 32 plan to reopen or reassess in less than 9 weeks (Tables 1 and 2).

In adjusted analysis, race and political preference were significantly associated with both the probability and duration of remote-only learning. School districts in counties with a high proportion (top quartile) of Black residents had increased odds (odds ratio [OR] = 5.3, 95% confidence interval [CI] = 1.0, 26.8) and longer duration (2.3 weeks longer CI = 1.1, 3.6) of remote learning, while Republican voting areas had decreased odds (OR = 0.2, CI = 0.1, 0.7) and shorter duration (3.8 weeks shorter, CI = –4.6, –2.9) of remote-only learning. County COVID-19 case and death rates were not significantly associated with the odds of remote-only learning. For districts starting as remote-only, higher local COVID-19 cumulative death rates were associated with longer duration, while higher 14-day case rates were associated with shorter duration of remote learning. Larger proportions of students receiving free/reduced lunch were associated with shorter remote learning duration.

## DISCUSSION

The inconsistent association of the local COVID-19 burden with school reopening plans suggests that epidemiologic data is not driving schools' decision-making. Only in mid-September were indicators and thresholds released by the Centers for Disease Control and Prevention, guidance that was lacking when most schools were making their initial reopening

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**Table 1 COVID-19, School District, and County Characteristics by Initial School Reopening Plan (as of August 12, 2020), North Carolina**

	Hybrid learning (N = 50), mean (SD)	Remote learning: < 9 weeks (N = 32), mean (SD)	Remote learning: ≥ 9 weeks (N = 33), mean (SD)
County COVID-19 burden			
Incident cases per 100,000	286.7 (155.0)	291.5(112.1)	270.3 (121.1)
Cumulative deaths per 100,000	15.3 (16.6)	20.1(14.6)	24.7 (21.8)
School district characteristics			
Size, % (n)			
Small (< 5000 students)	48.0 (24)	31.3 (10)	48.5 (16)
Medium (5000–15,000 students)	22.0 (11)	28.1 (9)	27.3 (9)
Large (> 15,000 students)	30.0 (15)	40.6 (13)	24.2 (8)
Student/teacher ratio	14.7 (1.2)	15.3 (1.2)	14.4 (1.1)
Met academic standards, % (n)	98.0 (49)	93.8 (30)	84.8 (28)
Proportion of students eligible for free/reduced lunch	0.65 (0.18)	0.72 (0.21)	0.71 (0.24)
County characteristics			
Population in 1000s	79.4 (69.3)	157.4 (250.6)	97.2 (118.5)
Race/ethnicity			
Black population	0.13 (0.11)	0.20 (0.14)	0.30 (0.20)
Hispanic population	0.06 (0.03)	0.08 (0.04)	0.06 (0.03)
Rural, % (n)	56.0 (28)	43.8 (14)	54.5 (18)
Republican voting preference, % (n)	65.3 (33)	59.3 (19)	45.8 (15)

SD standard deviation

As of the start of the 2020–2021 school year, North Carolina state policy did not allow public schools to reopen with fulltime in-person instruction for all students (plan A), but did allow public schools to open under plans using a hybrid of in-person and remote learning to increase social distancing (plan B) or remote-only instruction (plan C). Data sources included the New York Times COVID-19 database, National Center for Education Statistics, North Carolina Department of Public Instruction; Area Health Resource File; and the National Public Radio records (voting preference)

decisions.<sup>4</sup> Additionally, administrators considered parent and staff perspectives as well as economic impacts, which may have outweighed the potential COVID-19 risks of in-person learning. In the absence of standardized reopening criteria, political preferences appeared to be a factor driving school decision-making in NC. While a single state analysis may limit generalizability, all but four states allowed school districts and local health authorities the flexibility to choose between remote-only and some form of on-site learning.<sup>5</sup>

In-person learning offers benefits for both children and families, including academic and social emotional well-being. The sociodemographic factors, such as Black race and free lunch eligibility, associated with remote learning choices raise further concerns about worsening already substantial academic inequities or exacerbating the disproportionate burden of

**Table 2 COVID-19, School District, and County Characteristics Associated with Initial School Reopening Plan (as of August 12, 2020), North Carolina**

	Odds of remote learning	Duration of remote learning
	Odds ratio (CI)	Change in weeks (CI)
County COVID-19 burden		
Incident cases per 1000 residents	0.7 (0.5, 1.1)	† − 0.5 (− 0.9, − 0.1)
Cumulative deaths per 1000 residents	7.7 (0.3, 176.6)	‡3.6 (1.6, 5.5)
School district characteristics		
Size		
Small (< 5000 students)	Ref	Ref
Medium (5000–15,000 students)	1.4 (0.4, 4.4)	− 0.4 (− 1.3, 0.6)
Large (> 15,000 students)	1.0 (0.3, 3.5)	− 0.4 (− 1.5, 0.7)
Student/teacher ratio	1.2 (0.4, 3.5)	− 0.0 (− 1.1, 1.1)
Met academic standards	0.3 (0.0, 4.8)	− 1.7 (− 3.6, 0.2)
Free/reduced lunch eligibility (proportion)	0.6 (0.0, 9.1)	† − 4.1 (− 6.6, − 1.6)
County characteristics		
Top quartile Black population	*5.3 (1.0, 26.8)	‡2.3 (1.1, 3.6)
Top quartile Hispanic population	1.6 (0.5, 4.8)	0.1 (− 0.8, 1.1)
Rural	0.5 (0.2, 1.5)	− 0.6 (− 1.6, 0.3)
Top quartile Republican vote	†0.2 (0.1, 0.7)	‡ − 3.8 (− 4.6, − 2.9)

\*p < .05; †p < .01; ‡p < .001

COVID-19 impacts on Black and Latinx communities.<sup>6</sup> Safeguarding the well-being of children, school staff, and communities equitably requires clear guidance and evidence-based decisions by schools.

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**Author Contributions** Brystana Kaufman made substantial contribution(s) to the conception and design, acquisition of data, and analysis and interpretation of data; and drafting the article and revising it critically for important intellectual content; and final approval of the version to be published, and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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#### Compliance with Ethical Standards:

**Conflict of Interest:** The authors declare that they do not have a conflict of interest. Charlene Wong began contract work with the North Carolina Department of Health and Human Services after the primary work on this study was completed.

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