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Assessment of U.S. School District Policies for Pandemic Preparedness.

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Assessment of U.S. School District Policies for Pandemic Preparedness.

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Bachelor of Science

University of Minnesota, Rochester

2016

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An abstract of

A thesis submitted to the Faculty of the

Rollins School of Public Health of Emory University

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Abstract

Assessment of U.S. School District Policies for Pandemic Preparedness.

By Cassandra A. Kersten

The COVID-19 pandemic has led to school districts across the U.S. closing to slow community transmission and to prevent healthcare systems from becoming overwhelmed before a vaccine or other countermeasure is available. Utilizing data from the 2016 School Health Policies and Preparedness Study (SHPPS), we aimed to describe baseline school district preparedness for school closures and other relevant strategies. We found that many school districts do not have written policies that would facilitate the implementation of unplanned school closures. Additionally, districts which may be less likely to notice the emergency of a novel disease in their jurisdiction through reporting of reasons for absence are also less likely to have plans in place facilitating closure implementation (OR=2.74, 95% CI= 1.38, 5.47). Causing further concern, only a small percentage of districts have plans for ensuring continuity of education (43.0%) or for feeding students during unplanned closure (33.8%). If not properly mitigated, extended closures may have especially profound long-term effects on the educational and financial well-being of low-income and rural families. Results from this study can be utilized to evaluate which district policies may need to be strengthened to reduce logistical, social, and economic difficulties moving forward and for anticipated subsequent closures.

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Introduction

According to the December 2006 Pandemic and All-Hazards Preparedness Act, children are considered an at-risk population requiring special considerations in a public health emergency (1). In emergencies involving infectious diseases, children are often at higher risk since they may have difficulty communicating their symptoms, breathe in more air for their size compared with adults, and are not yet fully appreciative of infection control measures (2). Further, children might shed more influenza viral particles (3), stay infectious longer, and generally spread influenza illness to others more readily than adults, thus contributing to community spread. (4).

In the 2009 H1N1 influenza pandemic, severe outcomes were most common among children, young adults, and high-risk groups like pregnant women (5). An estimated 86,000 children were hospitalized, 60% of whom had underlying health conditions. This hospitalization rate was two to three times higher than expected among this age group in a typical influenza season (5) . Currently, in the limited data available for children during the COVID-19 pandemic, SARS-CoV-2 infection typically results in mild symptoms (6). Children have been observed to have prolonged viral shedding (7), and there also appears to be high rates of asymptomatic infection in children (6). Because of these characteristics, the efficacy of contact tracing and other public health prevention measures may be thwarted considerably by the way this virus may be rather silently affecting children (8).

In the context of protecting child health during an influenza pandemic, preemptive school closure may be one of the recommended non-pharmaceutical interventions (NPI). These closures should be implemented before many students and staff members become

ill with the aim of disrupting transmission in schools and surrounding communities by reducing close human-to-human contact. Reactive closures may also occur in seasonal and pandemic outbreaks as a consequence of widespread disease (5). A 2018 study exploring school district preparedness, response, and recovery plans by Kruger, et al, found that many school districts are underprepared for emergencies and that policies are often not in place for pandemics or infectious disease outbreaks (9).

The intended purpose of extended preemptive school closures, like many social distancing measures, is to both dampen and delay the epidemic peak by reducing the number of people infected. It also "buys time" for the production of effective countermeasures or vaccines (10) and prevents the healthcare system from becoming overwhelmed (11). Additionally, a systematic review in 2018 including 31 articles reporting a quantified effect on school closure during an influenza epidemic found that the duration of preemptive closures was correlated with further delay in the epidemic peak (12).

Despite these benefits, school closures and other community mitigation efforts are often contentious due to social and economic factors. In a survey conducted in 2017 following an 8-day closure in rural Illinois, 17% of families reported that the closure caused logistical and financial hardship, including uncertainty about closure duration, alternative childcare, and lost pay as the three most commonly reported challenges (13). In another study, conducted in Colorado following a reactive 4.5-day closure in 2013 due to 40% absenteeism from influenza-like-illnesses (ILIs), 20% of households reported challenges due to the closure (14). Top concerns were lost pay, uncertainty about the duration, and concerns about the loss of free meals provided by school. This study also

assessed the perceived difficulty of a 1-month closure, among which 29% believed it would impose a minor to major problem and 9% were unsure whether it would cause a problem (14).

Decisions regarding school closures are typically made by state and local officials, with guidance from CDC and other government officials as necessary (5). Currently during the COVID-19 pandemic, most school closure decisions have been made at the state level, often through Governor mandates. The CDC recommended during the 2009 H1N1 pandemic that decision-makers within communities contemplating school closures be prepared to identify and clearly communicate what they expect closing schools will accomplish and how they plan to balance additional factors (i.e. student learning, provision of safe spaces, and reducing demands on healthcare services) which may influence community acceptability and feasibility (15). For the COVID-19 pandemic, current guidance also emphasizes the importance of mitigating these community factors. This includes providing academic support, providing alternatives for school meals and other services for vulnerable children, and supporting families of healthcare workers and those for whom telework is not available (16). The disruptive nature of school closures and lack of standardized procedures for them highlights the importance of local pre-pandemic planning (5).

In 2018, CDC released an updated version of "Preparedness Capabilities: National Standards for State and Local Planning", which outlined 15 emergency preparedness and response capabilities aimed at strengthening the general public health preparedness capacity of state and local public health agencies. These capabilities were designed to help localities identify priority resources that would improve everyday

preparedness with a focus on improving general surge capacity (17). One goal includes: "Identify authorities, policies, and other factors that impact NPIs. Identify jurisdictional, legal, and regulatory authorities and policies as well as other community factors that enable or limit the ability to recommend and implement NPIs" (17). As such, school districts have been identified as a key partner in a community's ability to effectively implement emergency response techniques, such as NPIs. Since little research has explicitly explored factors associated with school closures as an NPI, this project aims to describe and evaluate baseline school district policies impacting the logistics of physically closing schools and the ability of school districts to balance additional factors related to continuity of education and nutrition services during an extended school closure in the U.S.

Methods

Subjects and Instruments

Data for this study are derived from the 2016 School Health Policies and Practices Study (SHPPS), a cross-sectional survey conducted among a stratified, random sample of 972 school districts in all 50 US states and the District of Columbia. A more detailed description of SHPPS 2016 methods is available on the CDC's website (18). The sampling frame was based on the October 2015 version of the Market Data Retrieval (MDR) database, and was stratified based on locale codes developed by NCES to classify schools based on urbanicity and selected proportionally (19). After exclusion of 15 districts deemed to be ineligible, the SHPPS survey was sent to 957 eligible school districts for completion between October 2015 and August 2016 (18).

In 2016, 5 district-level questionnaires were disseminated covering the topics of 1) Health Education, 2) Physical Education and Physical Activity, 3) Nutrition Services, 4) Health Services, and 5) Healthy and Safe School Environment. Three of the questionnaires, 1) Health Education, 2) Physical Education and Physical Activity, and 5) Healthy and Safe School Environment, were further sub-divided into modules that grouped related questions to improve reporting accuracy. Districts were asked to send each questionnaire and/or module to the most knowledgeable respondent within their district staff for each topic and responses were collected electronically (94.2%) or through the mail (5.8%). Districts and district staff indicated as the most knowledgeable respondent for each questionnaire &/or module who were non-responsive as of March 2016 were offered Amazon gift codes as an incentive to participate. Of those eligible, 740 districts (77.3%) completed at least one of the five questionnaires (18). The response

rates for the three questionnaires of interest to our study, Healthy and Safe School Environment, Nutrition Environment and Services, and Health Services and CPS Services were, respectively, 64.1%, 62.6%, and 64.1%.

Procedure

Analyses for this study utilized data collected from three of the five questionnaires: Healthy and Safe School Environment, Nutrition Environment and Services, and Health Services and CPS Services. Of the 740 districts that participated in the 2016 SHPPS survey, approximately 600 completed each of the three health-related questionnaires of interest for this analysis (Table S1). For analyses within each individual survey, all districts who responded to that survey were included. For analyses involving two surveys, only districts who responded to both surveys were included.

Variables for analysis, including demographics and questionnaire responses, were selected in accordance with project goals from the public-use SHPPS dataset (Table S2). Data on district size was obtained from internal-use MDR datasets within the Division of Adolescent and School Health (DASH) at the Centers for Disease Control and Prevention (CDC) (18). In accordance with MDR convention, districts with <2500 students were considered to be small, districts with between 2500 and 9999 students are considered to be medium-sized, and districts with >10000 students were considered to be large districts (20). Regions were classified as following: Northeast: Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana,

Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia; West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Analyses

Analyses were conducted in SAS-callable SUDAAN to account for complex survey design weighting. Data were weighted based on selection probabilities within each of the 12 NCES locale categories and adjusted for non-response. Unweighted counts and weighted percentages for each survey are included in the supplementary material (Table S1).

Wald Chi-Squared tests were used to assess differences between stratified prevalence categories. For stratified categories indicating significant differences, pairwise comparisons were conducted using a t-test for proportions after applying a Bonferroni correction to account for multiple comparisons. Logistic regression was used in SUDAAN to calculate odds ratios. Variables included as confounders were determined via literature and field expertise.

Results

As of 2016, based on districts surveyed and weighted to be nationally representative, the vast majority of school districts in the US have a comprehensive plan to address crisis preparedness, response, and recovery (94.6%). Fewer districts have plans for implementing unplanned school closure (88.7%) or plans for responding to pandemic influenza or other infectious disease outbreaks (73.6%) (Table 1). Having a plan that included procedures for pandemic influenza or other infectious disease outbreaks varied by urbanicity and district enrollment size, with rural districts being significantly less likely to have these procedures than cities, suburbs, and towns. Similarly, large districts were significantly more likely to have these plans than small or medium districts (Table 1).

Factors influencing the ability of US school districts and associated health departments to monitor the effect of seasonal or pandemic infectious diseases also varied by both prevalence and demographic factors (Table 2). Only 33.7% of school districts have a pre-specified threshold of student and/or staff absenteeism to guide closure determinations. Having such a threshold varied by poverty level, with low poverty districts being more likely than more affluent districts to have a specified cutoff for closure. Eighty-six percent of districts reported obtaining and keeping reasons for student absences in student records, and 91.6% reported recommending the use of an electronic system for reporting student attendance. Obtaining and keeping reasons for student absences varied significantly by region, with Southern and Midwest districts being more likely to collect this information than Northeast and West districts. Recommending use of a specified electronic system for reporting student attendance was also significantly more

likely in urban and suburban districts than rural districts and in large districts and medium districts than in small districts (Table 2).

Three-quarters (75.1%) of school districts indicated that their local health department has real-time access to student attendance or absenteeism information for all schools in the district (Table 2). This did not vary significantly by any of the associated demographic factors and was not significantly associated with having district procedures for implementing unplanned school dismissal, controlling for urbanicity, poverty percentage, and district enrollment size (OR=1.01, 95% CI= 0.49, 2.09, p=0.98).

Only 53.0% of districts reported that schools in their district are required to submit information to the school district or local health department on the reasons for student absences. This varied significantly by urbanicity, with urban and suburban districts being more likely to have this policy than rural districts. This also varied by district size (Table 2). School districts within jurisdictions that do not require schools to submit reasons for student absences to the school district or local health department were 2.74 times more likely to not have procedures in place for implementing unplanned school dismissals, compared to schools located in jurisdictions without this requirement, controlling for urbanicity, poverty percentage, and district enrollment size (OR=2.74, 95% CI= 1.38, 5.47, p=0.0042).

Some of the policies related to plans for continuity of education and nutritional services were highly prevalent, while others were not (Table 3). The majority of districts reported that schools in their district participate in the school breakfast program (91.1%) and that the district plan includes a mechanism for communicating with parents (93.6%). Only 33.8% of districts reported that their district plans include plans for feeding students

during unplanned school dismissals. This differed by urbanicity, with only 27.3% of rural districts reporting having these plans compared with 57.4% of urban districts. Further, higher poverty districts were more likely to have these plans than more affluent districts, though this disparity did not appear to vary significantly by region. District enrollment size appeared meaningful, as 61.2% of large districts, 39.8% of medium districts, and 27.5% of small districts reported having plans for feeding students. Similarly, only 43.0% of school districts had plans for ensuring continuity of education. This proportion was lowest among school districts in the Midwest (33.5%) and West (40.0%), and the Midwest was significantly lower than both the Northeast and the South (Table 3).

Discussion

This study was conducted to provide novel information on baseline pandemic preparedness in U.S school districts prior to the COVID-19 pandemic, considering both policies that may impact the logistics of physically closing schools and policies that may impact the ability of school districts to balance additional factors affecting students and families related to continuity of education and nutrition services. Our study found that while nearly all school districts (94.6%) had comprehensive emergency plans in 2016, fewer had procedures for implementing unplanned school closures (88.7%) or plans for responding to pandemic influenza or other infectious disease outbreaks (73.6%). More operationally, but perhaps more importantly to children and families, even fewer districts had plans in place for continuity of education (43.0%) or feeding students during unplanned closure (33.8%). These policies tended to vary highly by demographic factors, which can be used to pinpoint the characteristics of districts needing the most immediate attention during crises.

When considering school closures on account of infectious diseases, monitoring reasons for staff and student absenteeism can provide extremely important data. With only 53.0% of districts requiring schools to submit reasons for student absences to the district or local health department, many districts may miss novel syndromic signals and early diagnoses that could be of importance to initiating preemptive closures. Additionally, only 33.7% of school districts report requiring schools to close when the percentage of students or staff absent reaches a specified threshold.

Interestingly, though early epidemiology of COVID-19 has found high rates of asymptomatic infection in children (6), children have not yet been indicated as substantial

contributors to community transmission. As such, it remains unclear whether robust systems aimed at capturing reasons for school absenteeism would have made a difference for the timing of the first wave of preemptive closures in the U.S. or not.

Not requiring schools to submit reasons for student absences to the district or local health department was also significantly associated with not having district procedures for unplanned school closures. This correlation suggests that the districts least likely to notice the emergence of a new disease or re-emergency of COVID-19 are also less likely to have plans in place that would facilitate the implementation of an unplanned closure in their district. While, at the time of writing, the majority of school districts are currently closed across the U.S. due to strong recommendations from state authorities, this finding remains important due to the potential for more district-initiated closures when schools attempt to re-open in Fall 2020. Future closures may need to happen due to localized community spread and additional waves in the US, as is currently predicted in China (21). Additionally, it is unlikely that a vaccine will be available for wide distribution in less than 12 months, with many experts expecting it to be longer (22).

In the case of extended closures and implementation of a myriad of social distancing measures, many families may experience financial hardship due to income disruption. This will increase the importance of school-provided breakfasts and lunches during unplanned school closures, which few districts in the US (33.8%) appeared to have clear guidance on prior to COVID-19. With over 95% of schools participating in reduce lunch programs and over 30 million students daily receiving food through the National School Lunch Program (NSLP) (23), subsidized school meal programs are the second-largest anti-hunger initiative in the United States behind the Supplemental

Nutrition Assistance Program (SNAP) (24). As such, the loss of free meals has been stated by parents as a top concern during a school closure (14), and has been a priority for many schools that have closed due to COVID-19. During COVID-19, all 50 states have received waivers from USDA to feed in non-congregate settings (25), though mechanisms used to provide meals to children have ranged from providing meals at pick-up spots to utilizing existing bus routes (26).

While a higher proportion of high-poverty districts have plans for feeding children during unplanned closures (46.2%) than low-poverty districts, this still indicates that over half of high-need areas do not have these plans in place and may be particularly vulnerable during COVID-19. Additionally, rural districts were the least likely to have plans for feeding students during closure (27.3%), which may be compounded by difficulties in finding and paying for transportation to distribution sites. Non-urban districts and districts with a high percentage of students in poverty might consider implementing plans to provide these meals directly to students rather than requiring students to come to school buildings; one current method being providing meals to students via bus routes (26). This mechanism also helps maintain social distancing within the community by not having families crowd distribution sites.

Regarding continuity of education, only 43.0% of districts in the US had established procedures for ensuring the continuity of education before COVID-19. This is concerning because districts without these plans likely had significant difficulty making the transition to online learning and supporting student learning during extended closure. Furthermore, high-poverty students may also have difficulty accessing technology to work on online assignments, particularly when libraries and other community learning

spaces are also closed due to stay-at-home orders (27). These procedures are also less common in rural areas, which may also be associated with difficulty accessing online materials if internet is slow or unavailable. Some interesting solutions to combat these problems have been providing laptops to or sending packets home with rural or low-income students (28) (29), utilizing school buses to provide WiFi (30), and providing hotspots or free internet to students (29).

Limitations

There are a few limitations of this study. First and foremost, districts may have updated their policies since this survey was conducted in 2016 before the 2019-2020 school year when the COVID-19 pandemic began in the United States. However, since 2016 was the last time the SHPPS survey was assessed nationally, the data used for this analysis is the best, albeit somewhat dated, national-level data available on school readiness. According to SHPPS data, 90.9% of districts report requiring the periodic review and revision of emergency response plans (95% CI= 88.1, 93.0). However, the frequency with which this is required was not specified and likely varied by district. Additionally, while districts were encouraged to have the individuals most knowledgeable about each questionnaire topic complete the survey, we do not know the extent to which those completing the questionnaires answered appropriately on all metrics. We also do not know the utility of the plans that school districts reported having in place or if they were changed during the pandemic to better fit the current situation.

Future Directions

Further research needs to be conducted to determine if district plans were effective when utilized in context of the COVID-19 pandemic. This information would

also be useful in developing and providing guidance on best practices to mitigate unintended effects associated with school closures during future emergencies.

Conclusions and Implications

If these findings from data collected in 2016 data still hold in the 2019-2020 academic year, then many school districts across the U.S. were underprepared for the school closures that ensued early in the U.S. response to the COVID-19 pandemic, both in terms of logistical factors and factors related to continuity of education and nutrition services. The large number of districts without established plans for these aspects may have had greater difficulty in implementing the mandated school closures, and they may continue to experience difficulties as closures are further extended and considered for the Fall semesters as well. These closures may have especially pronounced effects on the educational and financial well-being of low-income and rural families.

We anticipate that school districts having explicit policies related to logistics and established plans for continuity of education and nutrition services may have been more likely to mitigate the unintended effects of COVID-19 related school closures in the United States for staff, students, and families. Results from this study can help identify districts at higher risk for not having these policies in place, thus helping to target school-level assistance to where it is needed most. Updating these emergency plans for school districts would be important to mitigate the effects of a potential second wave of COVID-19 or other future pandemics.

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Tables

Table 1. Distribution of plans related to school district closures among U.S. school districts in 2016

District Characteristics	Does the district have a comprehensive plan to address crisis preparedness, response, and recovery? % (95% CI)	District procedures for implementing unplanned school dismissal or school closure? % (95% CI)	District plan includes procedures for responding to pandemic influenza (flu) or other infectious disease outbreaks? % (95% CI)
No. of observations	567	567	559
Percentage of districts	94.6 (92.3 - 96.2)	88.7 (85.5 - 91.3)	73.6 (69.7 - 77.2)
Urbanicity			
City	96.3 (77.6 - 99.5)	94.1 (78.1 - 98.6)	90.4 (73.5 - 96.9)
Suburb	99.1 (93.8 - 99.9)	91.1 (83.6 - 95.4)	82.1 (73.5 - 88.4)
Town	96.4 (89.2 - 98.9)	88.4 (78.9 - 94.0)	80.0 (69.7 - 87.4)
Rural	91.9 (88.1 - 94.6)	87.2 (82.8 - 90.7)	66.2 (60.7 - 71.3)
P-value	0.002**	0.425	<0.001**
District Poverty (%)			
0-5.9	93.9 (78.1 - 98.5)	90.3 (73.6 - 96.9)	69.3 (51.1 - 82.9)
6-15.9	96.3 (92.0 - 98.3)	89.3 (83.5 - 93.2)	72.8 (66.1 - 78.6)
16-30.9	93.2 (89.1 - 95.8)	87.9 (82.9 - 91.6)	73.1 (66.9 - 78.5)
31+	95.0 (86.6 - 98.3)	89.2 (78.4 - 94.9)	79.6 (68.4 - 87.6)
P-value	0.58	0.962	0.607
US Census Region			
Northeast	95.6 (90.4 - 98.0)	91.9 (85.5 - 95.7)	77.5 (69.0 - 84.2)
Midwest	96.3 (93.1 - 98.1)	89.8 (84.9 - 93.3)	70.1 (63.5 - 75.9)
South	95.4 (90.6 - 97.8)	93.0 (87.6 - 96.1)	77.6 (70.2 - 83.7)
West	89.1 (79.5 - 94.5)	77.8 (66.5 - 86.1)	71.4 (59.6 - 80.8)
P-value	0.336	0.049*	0.304
Dist Enroll Size			
Small (<2500)	93.3 (90.1 - 95.5)	88.0 (84.0 - 91.1)	70.3 (65.4 - 74.8)
Med (2500-9999)	97.2 (92.6 - 99.0)	89.6 (82.7 - 93.9)	76.6 (68.5 - 83.2)
Large (>10000)	97.5 (83.8 - 99.7)	92.0 (76.3 - 97.6)	93.0 (80.7 - 97.7)
P-value	0.096	0.699	<0.001**

Note: Percentages are weighted, unadjusted estimates

* Statistically significant ($p<0.05$).

**Statistically significant ($p<0.01$).

Table 2. Factors influencing the ability of U.S. school districts and associated health departments to monitor the effect of seasonal or pandemic infectious diseases in 2016

District Characteristics	Are schools in your district required to close or dismiss all students when the percentage of absent students or staff reaches a specified level? % (95% CI)	Has your district adopted a policy stating that schools will obtain and keep the reasons for absence in any type of student record? % (95% CI)	Does your district recommend that schools use a specified electronic system for reporting student attendance or absenteeism information? % (95% CI)	Does your district or local health department have real-time access to student attendance or absenteeism information for all schools in the district? % (95% CI)	Are schools in your district required to submit information to the school district or local health department on the reasons for student absences? % (95% CI)
No. of observations	532	592	572	570	562
District Percentage	33.7 (29.6 - 38.0)	86.1 (82.8 - 88.8)	91.6 (88.8 - 93.8)	75.1 (71.2 - 78.7)	53.0 (48.7 - 57.3)
Urbanicity					
City	30.4 (16.5 - 49.1)	88.3 (73.6 - 95.4)	97.9 (87.3 - 99.7)	83.2 (64.2 - 93.2)	68.1 (49.8 - 82.1)
Suburb	26.2 (18.2 - 36.0)	86.9 (79.4 - 92.0)	95.9 (90.5 - 98.3)	74.4 (65.4 - 81.7)	64.4 (54.4 - 73.2)
Town	32.8 (23.4 - 43.7)	83.0 (73.5 - 89.6)	90.6 (80.9 - 95.6)	70.7 (60.3 - 79.2)	54.8 (44.0 - 65.1)
Rural	37.6 (32.1 - 43.4)	86.6 (82.1 - 90.1)	89.3 (85.2 - 92.4)	76.2 (70.9 - 80.7)	45.8 (40.2 - 51.6)
P-value	0.196	0.835	0.009**	0.513	0.002**
District Poverty (%)					
0-5.9	94.5 (85.3 - 98.1)	77.5 (61.1 - 88.3)	92.4 (78.3 - 97.6)	82.9 (66.2 - 92.3)	56.2 (39.1 - 71.9)
6-15.9	26.6 (20.7 - 33.5)	83.6 (77.7 - 88.3)	90.7 (85.8 - 94.0)	76.8 (70.2 - 82.2)	49.9 (42.8 - 56.9)
16-30.9	41.5 (34.8 - 48.4)	88.8 (83.7 - 92.4)	91.5 (86.7 - 94.7)	72.9 (66.5 - 78.5)	55.0 (48.2 - 61.7)
31+	32.7 (22.5 - 44.9)	91.9 (82.4 - 96.4)	94.5 (85.3 - 98.1)	75.4 (64.2 - 84.0)	57.2 (45.2 - 68.4)
P-value	0.013*	0.107	0.75	0.549	0.639
US Census Region					
Northeast	26.2 (18.8 - 35.2)	79.5 (71.5 - 85.7)	91.8 (84.0 - 96.0)	81.0 (73.0 - 87.0)	52.8 (43.8 - 61.6)
Midwest	36.4 (29.7 - 43.5)	88.9 (83.8 - 92.6)	89.0 (84.0 - 92.6)	75.6 (69.0 - 81.1)	56.9 (49.8 - 63.7)
South	39.0 (31.4 - 47.1)	92.3 (87.1 - 95.5)	93.9 (89.0 - 96.7)	69.1 (61.4 - 75.9)	50.3 (42.4 - 58.1)
West	29.8 (19.6 - 42.6)	80.1 (68.6 - 88.1)	93.6 (84.1 - 97.6)	75.1 (63.0 - 84.2)	49.1 (36.9 - 61.4)
P-value	0.12	0.007**	0.361	0.156	0.57
Dist Enroll Size					
Small (<2500)	37.2 (32.0 - 42.6)	85.5 (81.3 - 88.9)	89.0 (85.1 - 91.9)	73.4 (68.5 - 77.8)	49.3 (43.9 - 54.6)
Med (2500-9999)	26.8 (19.4 - 35.7)	86.6 (79.7 - 91.4)	95.9 (90.0 - 98.4)	78.5 (70.5 - 84.7)	62.7 (54.1 - 70.6)
Large (>10000)	28.1 (16.9 - 43.0)	88.5 (76.9 - 94.7)	98.6 (91.7 - 99.8)	77.7 (62.3 - 88.1)	52.2 (37.4 - 66.6)
P-value	0.081	0.813	<0.001**	0.472	0.034*

Note: Percentages are weighted, unadjusted estimates

* Statistically significant ($p<0.05$).

**Statistically significant ($p<0.01$).

Table 3. Differences in policies for continuity of education and nutritional services by school district characteristics in 2016

District Characteristics	District level plan for feeding students during unplanned school dismissal/closure? % (95% CI)	District plan includes procedures for ensuring the continuity of education? % (95% CI)	Do any schools in your district participate in the school breakfast program? % (95% CI)	Does the district plan include a mechanism for communicating with parents? % (95% CI)
No. of observations	526	554	596	565
Percentage of districts	33.8 (29.7 - 38.2)	43.0 (38.8 - 47.4)	91.1 (88.3 - 93.3)	93.6 (91.1 - 95.4)
Urbanicity				
City	57.4 (39.7 - 73.4)	48.2 (31.7 - 65.0)	100	94.1 (78.1 - 98.6)
Suburb	38.5 (28.9 - 49.1)	49.9 (40.2 - 59.7)	85.4 (76.9 - 91.1)	99.1 (93.7 - 99.9)
Town	39.1 (28.9 - 50.4)	44.2 (33.6 - 55.5)	97.9 (91.7 - 99.5)	95.1 (87.4 - 98.2)
Rural	27.3 (22.4 - 32.7)	39.2 (33.9 - 44.8)	90.2 (86.3 - 93.1)	90.8 (86.8 - 93.6)
P-value	0.003**	0.251	<0.001**	<0.001**
District Poverty (%)				
0-5.9	21.8 (9.9 - 41.4)	55.3 (37.9 - 71.5)	66.7 (48.1 - 81.2)	93.9 (78.1 - 98.5)
6-15.9	36.5 (29.5 - 44.2)	40.6 (33.6 - 48.1)	88.3 (83.0 - 92.1)	95.8 (91.5 - 98.0)
16-30.9	29.8 (23.9 - 36.5)	41.1 (34.8 - 47.7)	95.7 (91.5 - 97.9)	91.9 (87.5 - 94.8)
31+	46.2 (35.2 - 57.6)	47.3 (36.0 - 58.9)	96.6 (91.3 - 98.7)	93.1 (84.6 - 97.0)
P-value	0.039*	0.395	<0.001**	0.415
US Census Region				
Northeast	34.0 (25.6 - 43.4)	52.0 (42.6 - 61.3)	86.1 (78.5 - 91.4)	95.5 (90.3 - 98.0)
Midwest	31.4 (24.8 - 38.9)	33.5 (27.3 - 40.3)	90.9 (86.0 - 94.2)	95.1 (91.6 - 97.2)
South	38.8 (31.0 - 47.3)	52.2 (44.0 - 60.3)	96.6 (92.6 - 98.5)	94.2 (89.2 - 97.0)
West	31.5 (21.6 - 43.4)	40.0 (28.8 - 52.3)	89.9 (80.2 - 95.2)	87.8 (78.0 - 93.6)
P-value	0.573	0.001**	0.006**	0.329
Dist Enroll Size				
Small (<2500)	27.5 (22.9 - 32.8)	41.7 (36.7 - 46.9)	89.8 (86.1 - 92.6)	92.4 (89.1 - 94.7)
Med (2500-9999)	39.8 (31.4 - 48.9)	40.6 (32.0 - 49.8)	92.6 (86.4 - 96.1)	96.2 (90.9 - 98.5)
Large (>10000)	61.2 (44.7 - 75.4)	62.1 (45.4 - 76.3)	96.9 (81.2 - 99.6)	95.9 (84.3 - 99.0)
P-value	<0.001**	0.073	0.113	0.194

Note: Percentages are weighted, unadjusted estimates
* Statistically significant (p<0.05).
**Statistically significant (p<0.01).

Supplementary Tables

Table S1. Weighted characteristics of participating school districts by component questionnaire in SHPPS 2016

District Characteristics	Healthy and Safe School Environment (*n*=613) No. (%)	Nutrition Environment and Services (*n*=599) No. (%)	Health Services and CPS Services (*n*=613) No. (%)
Metro Status			
City	47 (5.6)	47 (5.6)	49 (5.6)
Suburb	124 (23.3)	113 (23.3)	123 (23.3)
Town	91 (18.5)	95 (18.5)	98 (18.5)
Rural	351 (52.6)	344 (52.6)	343 (52.6)
Missing	0	0	0
Census Region			
Northeast	136 (21.4)	132 (21.4)	137 (21.4)
Midwest	226 (36.2)	216 (36.2)	223 (36.2)
South	171 (23.7)	173 (23.7)	178 (23.7)
West	80 (18.7)	78 (18.7)	75 (18.7)
Missing	0	0	0
District Poverty			
0-5.9(%)	37 (6.2)	32 (6.4)	38 (6.4)
6-15.9(%)	216 (36.2)	211 (38.6)	220 (38.6)
16-30.9(%)	262 (43.7)	251 (41.4)	255 (41.4)
31+(%)	91 (18.7)	98 (13.7)	93 (13.6)
Missing	7	7	7
District Size			
Small (<2500)	416 (67.7)	401 (66.6)	403 (65.9)
Med (2500-9999)	136 (24.1)	138 (25.2)	142 (25.3)
Large (>10000)	61 (8.1)	60 (8.2)	68 (8.8)
Missing	0	0	0

Note: Sample sizes reflect actual frequencies; percentages are weighted, unadjusted estimates

Table S2: Variables of interest, by questionnaire

Healthy and Safe School Environment (n=613)	Nutrition Environment and Services (*n*=599)	Health Services and CPS Services (*n*=613)
Does your district have a comprehensive district-level plan to address crisis preparedness, response, and recovery in the event of a natural disaster or other emergency or crisis situation?	District level plan for feeding students during unplanned school dismissal/closure?	Are schools in your district required to close or dismiss all students when the percentage of absent students or staff reaches a specified level?
Does the district plan include procedures for implementing unplanned school dismissal or school closure?	Do any schools in your district participate in the school breakfast program?	Has your district adopted a policy stating that schools will obtain and keep the reasons for absence in any type of student record?
Does the district plan include procedures for responding to pandemic influenza (flu) or other infectious disease outbreaks?		Does your district recommend that schools use a specified electronic system for reporting student attendance or absenteeism information?
Does the district plan include procedures for ensuring the continuity of education (e.g., online classes, prepackaged assignments) during unplanned school closure?		Does your district or local health department have real-time access to student attendance or absenteeism information for all schools in the district?
Does the district plan include a mechanism for communicating with parents?		Are schools in your district required to submit information to the school district or local health department on the reasons for student absences?
Does the district plan include requirements to periodically review and revise emergency response plans?		