Research Article

Using Social Media to Promote School Nutrition Programs During the COVID-19 Pandemic

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ABSTRACT

BACKGROUND: Millions of school-aged children receive free or reduced-price lunches through the United States Department of Agriculture’s (USDA) National School Lunch Program; that service was disrupted when public schools closed at the beginning of the coronavirus pandemic. Prior to the pandemic, this program received little attention on school districts’ social media accounts.

METHODS: We collected Twitter data from 70 Ohio public school districts to construct a measure of attention paid toward school nutrition programs from 2008 to 2021. We also collected district-level data to analyze the relationship between district characteristics and mentions of school nutrition programs.

RESULTS: We show that attention to school nutrition programs significantly increased during the pandemic. School districts with a greater student population density and greater geographic area were more likely to tweet about these programs.

CONCLUSIONS: School districts can, and should, use social media to inform residents about school nutrition programs and food security programs more generally. Social media provides a low-cost way to lessen the administrative burden for families trying to access these programs.

Keywords: health communication; health policy; nutrition and diet.

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An estimated 1 in 6 Americans experienced food insecurity during the height of the coronavirus pandemic. Record unemployment, combined with the disruption of daily activities such as school and other community activities, left millions of people struggling to meet their basic needs. With the pandemic, the reality of food insecurity became more acute for children eligible for free or reduced-price lunches through the USDA National School Lunch Program (NSLP), as state and local officials began closing schools in response to the public health crisis.

On March 12, 2020, Ohio Governor Mike DeWine announced that all Ohio K-12 schools would be closed from March 16 through April 3, although schools remained closed through the rest of the academic year. The governor’s press release stated, “the Ohio Department of Education will develop guidance for K-12 schools to ensure the continuity of important student services, including a strategy for providing meals.”1 While the state developed a strategy to continue meal delivery, local school districts were responsible for communicating with parents and guardians.2

We use Twitter data to analyze how Ohio local school districts communicated with the public about school nutrition programs given the sudden changes to school schedules and the discretion afforded to local districts. Food security was a low priority for local school districts on Twitter prior to the pandemic, but the topic became more prevalent on Twitter when schools closed, and districts needed to communicate about program changes. Moreover, we find that both

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geographically large districts and districts with higher student population density are more likely to tweet about school nutrition programs.

School Nutrition During the COVID-19 Pandemic

Since the NSLP began in 1946, the program has consistently received federal funding, and continues to grow.\(^3\) In 2019, the NSLP served nearly 30 million children each day.\(^4\) Many students who receive free or reduced-price lunches through NSLP also receive a subsidized breakfast through the School Breakfast Program (SBP).\(^5\) Participation in these federal programs is associated with decreased food insecurity\(^6,7\) and decreased risk of obesity.\(^7\) Furthermore, participation in school lunch programs is associated with increased educational attainment.\(^8-10\)

Attention to school nutrition as it relates to food insecurity mirrors the level of need within the country. Federal, state, and local policymakers all responded to increasing need during the coronavirus pandemic. Under the Families First Coronavirus Response Act, Congress expanded funding for a variety of nutrition assistance programs\(^11\) and the US Department of Agriculture was given authority to issue waivers pertaining to NSLP.\(^12\) Among the most significant waivers affecting the NSLP were those pertaining to non-congregate feeding and meal pick-up. According to the National School Lunch Act, child nutrition programs must be “served in a congregate setting” and “be consumed by participants on site.”\(^13\) Congregate feeding was impossible while schools were closed due to COVID and remained infeasible as schools reopened and followed social distancing guidelines, so USDA Food and Nutrition Services (FNS) waived these requirements. Similarly, FNS recognized that while schools were closed, “continuing to require children to come to the meal site to pick up meals may not be practical” and thus instituted a waiver allowing parents and guardians to pick up meals on behalf of students.\(^14\) Moreover, under the meal pick-up waiver, school authorities could “offer grab-and-go style meals, deliver meals, [and] distribute meals for multiple days.”\(^11\)(p172)

While the federal government issued waivers for several program requirements, local school districts adapted their programs to meet local needs. Some school districts used their school buses to pick up students and take them to meal distribution sites; other school districts delivered meals. Home delivery was especially common in rural areas.\(^12\) Districts also provided multiple days’ worth of food in backpacks to ensure that students had meals for the weekend.\(^11\) At the same time, many of the existing challenges in implementing school nutrition programs, including staffing issues and limited capacity,\(^15\) were magnified during the pandemic. School food authorities had to adapt to rapidly changing conditions without having additional revenue to compensate for additional labor, food, and equipment.\(^16\)

Using Social Media to Announce Program Changes

Government officials and public administrators increasingly use social media to connect with citizens. For local governments, who are most likely to interact with citizens on a day-to-day basis, social media provides a low-cost venue to provide information and engage with the community.\(^17,18\) Social media allows public administrators to treat the public as customers by providing information about how to access services.\(^19\) During the coronavirus pandemic, public health authorities used social media to update citizens about rapidly changing situations and post-prevention and safety measures.\(^20\) Social media can also serve as a source of rumors and misinformation, a trend that only increased during the pandemic.\(^21\) School districts have attempted to limit the spread of misinformation from both parents and students by posting information quickly.\(^22\)

As the NSLP is distributed within schools, parents might expect local school districts to inform them about changes to the program. Parents turn to social media for parenting advice and information, including during the pandemic.\(^23,24\) Not all school districts are equally likely to tweet about food security programs, however. School districts that frequently use Twitter may naturally turn to the platform to communicate this information. Larger municipalities may be more likely to use social media to combat information asymmetry.\(^17,18\) A study of local health departments, for example, found that departments serving larger populations were more likely to use Twitter, and tweeted more frequently.\(^25\) Similarly, metropolitan districts are more likely to be on social media than areas with smaller populations; this could be due to a relative lack of resources.\(^26\)

School districts with a greater percentage of food-insecure families prior to the pandemic may recognize that their community is more likely to need information about program changes during the pandemic. These communities were more likely to have non-white heads of household and be in rural or urban areas.\(^27\) Children eligible for free- or reduced-price lunches are likely to live in households that are eligible for SNAP (Supplemental Nutrition Assistance Program) or WIC (Supplemental Nutrition Assistance for Women, Infants, and Children) benefits. While schools are responsible for distributing the NSLP, they may also provide information about these other food security programs. School districts can lessen the administrative burden of learning about these programs if they use their Twitter accounts to communicate about all food security programs.\(^28\)
Table 1. Mentions of School Nutrition Keywords in Absolute Numbers and as a Percentage of All Tweets

|                  | Meals (n, %) | Lunch (n, %) | Breakfast (n, %) | Pickup (n, %) |
|------------------|--------------|--------------|------------------|--------------|
| Pre-March 2020   | 107 (0.10)   | 841 (0.53)   | 345 (0.25)       | 173 (0.14)   |
| March 2020 and after | 349 (1.10)   | 423 (1.13)   | 168 (0.47)       | 322 (1.06)   |
| Total            | 456          | 1264         | 513              | 495          |

METHODS

Data Source

Ohio has 614 independent school districts. Using a random number generator within the statistical programming language R, we drew a random sample of 100 school districts and searched for them on Twitter. This sample was not significantly different from the total population of Ohio school districts with respect to average enrollment, median household income, percentage of students living in poverty, or percentage of non-white students. Out of the 100, 70 school districts have a Twitter account. This level of social media activity is similar to what is reported by other researchers examining the use of social media by local governments. After identifying the school districts’ Twitter accounts, we collected their 3250 most recent tweets—the maximum available for download under the Twitter API. The tweets date from November 2008 to June 2021. Across the 70 districts, this amounted to 121,460 tweets. We aggregated tweets to the district-month level, for a final sample of 5731 observations.

Procedures

We coded each tweet for mentions of the following keywords: meal(s), lunch(es), breakfast(s), and pickup. We then calculated the percentage of a school district’s tweets that mentioned a keyword in a given month. These keywords were chosen to capture mentions of the NSLP and the SBP, as well as changes made to those programs because of waivers issued during the COVID-19 pandemic. Prior to March 2020, school district Twitter accounts were largely silent on the NSLP and SBP. Lunch and breakfast were frequently mentioned with respect to school lunch menus or special occasions, such as (grand)parent luncheons, welcome breakfasts, and fundraisers. Mentions of pick up prior to the pandemic referred to acquiring yearbooks, tickets to dances and sporting events, etc. Prior to the pandemic, only 6 districts tweeted about free and/or reduced-price lunches (Table 1).

We also collected data to measure resources for both residents and school districts. The percentage of households with access to high-speed internet provides a measure of residents’ access to social media. The average school expenditures per pupil capture the resources available to the school district. While it is free for school districts to join Twitter, maintaining a Twitter presence is not costless. Posting, and responding to posts, on social media requires ongoing allocation of staff time. We anticipate that overall Twitter usage will account for some of the variation in which districts tweet about food security programs. This is measured by the monthly average number of tweets sent by the account.

We also anticipate that school districts with greater need will be more likely to tweet about school nutrition programs. To measure need, we use median household income (in thousands of dollars) and the percentage of students who are classified by the Department of Education of economically disadvantaged. We also include percentage of students who are non-white. Previous research has also found that African American children are significantly more likely to participate in NSLP than other children. Finally, we include 3 measures of the size of a school district: the average enrollment, the square mileage of the school district, and student population density.

Data Analysis

We conducted a difference in means test to determine whether the number of tweets, and the percentage of tweets mentioning the keywords, changed significantly during the pandemic. To ascertain the effect of school district-level variables on Twitter content, we conducted separate multivariate analyses, using ordinary least squares regression, for each keyword (see Table 2). The analyses are limited to district-month observations from 2020 to capture specific changes brought about by the pandemic. In addition to the district-level variables described above, we controlled for a month (January is omitted as the comparison month).

RESULTS

The average number of tweets published by local school districts significantly increased during the pandemic. Prior to March 2020, schools tweeted an average of 19 times a month; after March 2020, that monthly average increased to nearly 31 tweets per month. Lunch was the most frequent food security keyword mentioned both prior to and during the pandemic. Prior to the announced school closings, 0.86% of school district tweets mentioned lunch; from March 2020 to June 2021, 1.40% of all school district tweets mentioned lunch (see Table 1 and Figure 1). The greatest increases were in mentions of meals and pick up. Mentions of meals increased by 600% and...
Table 2. Ordinary Least Squares Models — Mentions of School Nutrition Keywords (2020)

|                          | Meal         | Lunch        | Breakfast     | Pickup       |
|--------------------------|--------------|--------------|---------------|--------------|
| Households with internet access (%) | 0.042 (0.047) | 0.066 (0.055) | −0.005 (0.035) | 0.024 (0.053) |
| Total expenditures per pupil (in $1000s) | 0.146 (0.097) | 0.040 (0.113) | −0.019 (0.071) | −0.046 (0.110) |
| Total number of tweets | −0.002 (0.003) | −0.003 (0.003) | −0.002 (0.002) | −0.001 (0.003) |
| Economically disadvantaged pupils (%) | −1.633 (1.149) | −1.020 (1.302) | −0.382 (0.821) | 0.211 (1.263) |
| Median household income (in $1000s) | −0.028 (0.015) | −0.014 (0.017) | −0.003 (0.010) | −0.008 (0.016) |
| Non-white population (%) | −0.007 (0.015) | 0.002 (0.018) | 0.000 (0.011) | −0.019 (0.017) |
| District square mileage | 0.009*** (0.003) | 0.009** (0.003) | 0.000 (0.002) | 0.003 (0.003) |
| District pupil density | 0.004*** (0.001) | 0.003* (0.001) | 0.001 (0.001) | 0.002 (0.001) |
| District total average daily enrollment | 0.073 (0.072) | 0.016 (0.084) | 0.005 (0.053) | −0.006 (0.082) |
| February                 | −0.269 (0.709) | −0.014 (0.819) | −0.002 (0.516) | −0.030 (0.795) |
| March                    | 1.837** (0.709) | 3.800*** (0.819) | 2.075*** (0.516) | 2.082** (0.795) |
| April                    | 0.812 (0.709) | 1.548 (0.819) | 0.491 (0.516) | 1.999* (0.795) |
| May                      | 0.577 (0.709) | 0.164 (0.819) | 0.189 (0.516) | 1.395 (0.795) |
| June                     | 1.655* (0.709) | 0.129 (0.819) | 0.185 (0.516) | 1.710* (0.794) |
| July                     | −0.009 (0.709) | −0.195 (0.820) | −0.030 (0.516) | 0.823 (0.795) |
| August                   | 0.339 (0.704) | 0.282 (0.813) | 0.238 (0.513) | 2.512** (0.789) |
| September                | 0.638 (0.704) | 2.483** (0.813) | 1.353** (0.513) | 0.496 (0.789) |
| October                  | 1.484* (0.704) | 1.516 (0.814) | 0.098 (0.513) | 0.943 (0.789) |
| November                 | 0.451 (0.702) | 0.156 (0.811) | 0.019 (0.511) | 0.787 (0.787) |
| December                 | 0.969 (0.702) | 0.531 (0.811) | 0.046 (0.511) | 0.958 (0.786) |
| Constant                 | −3.736 (4.122) | −5.204 (4.799) | 0.905 (3.024) | −0.919 (4.655) |

N† 806 818 818 818

* p < .05.
** p < .01.
*** p < .001.
† The “meal” model has fewer observations than the other models because an outlier was removed from the analysis. With the inclusion of the outlier, the results largely hold, except May 2020 has a statistically significant increase in the percentage of tweets mentioning the keyword.

Figure 1. School Nutrition Programs Keywords in Ohio School District Twitter Accounts, Before and During COVID-19 Pandemic

The average number of likes for tweets mentioning breakfast increased from 2.7 likes prior to March 2020 to 6.2 likes during the pandemic. The average number of retweets for breakfast and lunch tweets also increased significantly during the pandemic. These increases indicate Twitter users were seeing, and sharing, this information. Likes and retweets also increased for tweets mentioning meal and pick up, though the increases were not statistically significant.

Despite the significant increases in the percentage of tweets mentioning all 4 keywords, there are few significant relationships between the characteristics of the school district and their use of Twitter to communicate about school nutrition programs. None of the district-level variables are significant in predicting the percentage of tweets mentioning breakfast or pickup. The percentage of households with internet access is not significantly related to the frequency of tweets mentioning any of the keywords, suggesting that districts where more households have access to social media are not more likely to use social media to communicate about school nutrition programs. In all 4 models, there is a negative, though not statistically significant, relationship between the total number of tweets from the school district’s account and the percentage of tweets containing mentions of the keywords. Moreover, the expenditures per pupil are not significantly related to the frequency of keywords.
Contrary to expectations, a negative relationship between the percentage of economically disadvantaged students and the percentage of tweets mentioning meals, lunch, and breakfast. There is a negative relationship between median household income in the district and the percentage of tweets mentioning keywords, but in none of the models is that relationship statistically significant. Furthermore, there is not a significant relationship between the nonwhite population of a district and mentions of the school nutrition programs by the district on Twitter.

The average enrollment of the district is positively related to mentions of meals, lunch, and breakfast, but the relationship is not significant. An increase in pupil density is positively associated with an increase in mentions of meals and mentions of lunch, however. Mentions of meals and lunch also increase significantly as the geographic area of the school district increases.

There are significant increases in mentions of school nutrition programs at several points in 2020. School districts started tweeting almost immediately after Governor DeWine’s announcement; 3 school districts in the sample tweeted on Friday, March 13, 2020 about meal pickup during the school closures. By Monday, March 16, 2020, the first day of the school closures, 12 school districts tweeted about their meal distribution plans. On March 16, one suburban district tweeted:

_Students can come to any [district] school between 10:00 - 1:00 to grab a lunch today. Parents can not pick up the lunch for the students, the child must be present. It doesn’t matter which school you go to, just go to the closest school. Please help us share this message!_

There was a significant increase in mentions of the keywords during March 2020 (see Figure 2). Compared to January of 2020, in March breakfast and pickup constituted 2 percentage points more of a school district’s tweets; the increase in mentions of meals was nearly that much. Mentions of lunch increased by nearly 4 percentage points in March 2020 compared to January of that year. Throughout the remainder of the school year, districts tweeted out meal pickup times and locations, as well as changes to the programs.

Mentions of meals and pickup were also significantly higher in June 2020. As the 2019-2020 school year ended, 5 school districts tweeted about summer meal service. A densely populated district in the northern section of Columbus tweeted out weekly in June about “free grab-and-go meals for children 18 and under” available during the summer through the generosity of community organizations. Similarly, a school district in Cleveland tweeted on June 3, 2020:

_Greater Cleveland Foodbank providing summer meals to students every Weds. from 10:30am-2:00pm at the Middle School starting June 10th thru Aug. 5th. Limited to the first 200 students. Students will receive 1 breakfast, 2 lunches, and 1 backpack containing shelf-stable items._

Beyond distributing school meals, 3 districts tweeted about Pandemic EBT (P-EBT), a program that provided additional benefits to households where children were eligible for free or reduced lunch. On June 3, 2020, for example, a rural district tweeted:

_Do your child receive free or reduced-price meals at school? Due to COVID19, eligible children will get extra food benefits through the Pandemic EBT (P-EBT) program. Loaded cards will be sent home in unmarked envelopes later this month. Call [number] with any questions._

September 2020 saw another spike in tweets mentioning breakfast and lunch. As most students were not back in the classroom full-time, these tweets provided information about meal pickup for remote learners. This also coincided with the announcement of the USDA’s waiver extension. In September 2020, 6 school districts mentioned the USDA in their tweets about expanded eligibility for free meals. Nine additional districts tweeted the news that students were eligible for free meals without mentioning the USDA. On September 11, a suburban district tweeted, “ALL [district] students are now eligible for FREE breakfast and lunch!” Clicking on the link provided in the tweet took users to the school’s website, which clarified that the change was part of “a temporary program funded by the federal government.” Each time the USDA extended the waiver a similar pattern
occurred. Some schools explicitly mentioned the USDA, such as when a small-town district tweeted:

USDA announces free meals for students for the 2021-2022 school year! [District] students will be served free breakfast and free lunch each day for the 2021-2022 school year. Any questions, email [e-mail address].

Other schools simply announced the effect it would have on students and their families, as demonstrated by this tweet from a rural district:

School meals (breakfast & lunch) will be free for the 2021-2022 school year. Free summer lunch info below: [URL]

Finally, 18 school districts in our sample (25.7%) used Twitter to thank volunteers and staff for preparing and distributing meals. Early in the pandemic, an urban school district in northwest Ohio tweeted:

Since we have been out of school, we have served 11,830 meals to our students. So happy to help our families and thankful for our staff members who stepped up to assist.

Tweets referring to school employees were especially prevalent during National School Lunch Week in October 2020, when 3 districts expressed appreciation for their employees.

DISCUSSION

Prior to the COVID-19 pandemic, Ohio school districts spent little time on social media publicizing school nutrition programs. Therefore, it is not entirely surprising that the percentage of tweets mentioning school meals, and lunches in particular, increased significantly after Ohio public schools closed in March 2020. School districts used their Twitter accounts to communicate about meal delivery or pickup—options that became available because of USDA waivers. The sharp increase in tweets about school nutrition programs shows how school districts were responding to quickly changing conditions on the ground. Moreover, school districts using Twitter to explain meal pick-up options during school closures shows schools engaging with the community as customers. At the same time, districts’ request that residents help “share the message” demonstrate schools district fostering a sense of community and partnership.

When the USDA expanded eligibility for free lunches in September 2020, schools also used their social media presence to communicate these changes. A few school districts even went beyond mentioning school nutrition programs and encouraged families to apply for further nutrition assistance, though this was not the norm. Even if the school districts were not providing meals, these tweets suggest that school officials were aware of increased food insecurity among their students.

Mentions of school nutrition programs were largely unrelated to school district characteristics. Twitter mentions of meals, however, increase significantly as the pupil density of the district increases and as the geographic size of the district increases. Within our sample, some of the districts that tweeted most frequently about school nutrition programs were in or near large cities such as Columbus and Cleveland, or were large rural districts. Suburban districts that have large populations may delegate social media duties to individual schools, or school nutrition programs may be an issue of low salience to their community. Our results largely align with previous research demonstrating that public administrators serving larger populations are more likely to use social media to share information.

While districts tweeted most about school nutrition programs at the beginning of the pandemic, they continued to update their communities about changes in program rules and eligibility, thus lessening the burden on parents who would otherwise have to find this information through another source. This is especially true in rural school districts and urban school districts—the same areas most likely to experience food insecurity.

Limitations

Several limitations of this study should be considered. First, while most schools throughout the country closed at some point because of the COVID-19 pandemic, our sample only includes schools from 1 state. Other states may have provided less discretion to local districts when it came to distributing meals during the lockdown, which in turn may have shaped the districts’ social media strategy. Similarly, some school districts may devolve social media responsibilities to individual schools. Our dataset includes school district retweets of individual school tweets, however, so this is likely not a large problem. Other school districts may be less active on Twitter and more active on other social media platforms, such as Facebook, or use email, text messaging, or phone calls to communicate changes to school nutrition programs. Future research should explore the use of these media in communicating about school nutrition programs. Finally, our algorithm for coding tweets for keywords may have missed some mentions of school nutrition programs. For example, misspellings or tweets that were only images or URLs would not have been captured in our dataset.

IMPLICATIONS FOR SCHOOL HEALTH

The lack of a significant relationship between several district-level characteristics and increased mentions
of school nutrition programs suggests that social media can be used in a wide variety of settings to increase communication between school districts and the community. The research findings do not suggest that school resources are related to tweeting about school nutrition programs, suggesting that even school districts with limited resources have a quick and inexpensive way to reach residents. Officials can use social media to announce changes to school programs and correct misinformation that may be spreading; given how many Americans use social media, school officials have a large potential audience online.32

Social media can also be used to foster a sense of community, as shown in other research.24 School officials may choose to share information about community programs when school nutrition programs are not available, as was the case in several Ohio districts. In addition to supporting families, school districts can use social media to express appreciation for school employees, who have reported feeling undervalued during the pandemic.16 Moving out of the pandemic, school officials should continue to provide information for families who are eligible for the NSLP and SBP. Schools can also use social media to raise awareness about the Community Eligibility Provision, which offers free breakfast and lunch to all students and is shown to increase participation in school nutrition programs.33 Moreover, districts can use social media to advertise food security programs that supplement child nutrition programs, including WIC and SNAP. Ensuring that families eligible for these programs are applying will in turn improve the health and welfare of students.

Human Subject Approval Statement

Miami University’s Research Ethics and Integrity Program has ruled this research exempt from IRB approval.

Conflict of Interest

The authors declare no conflict of interest.

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