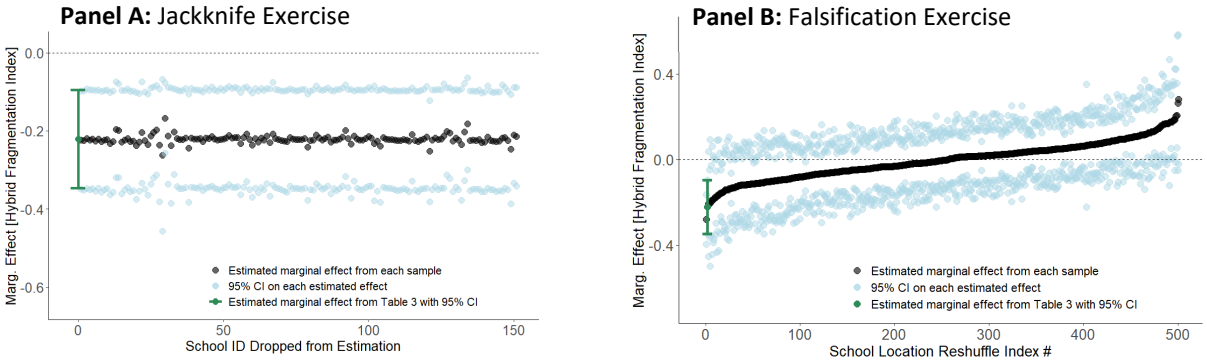
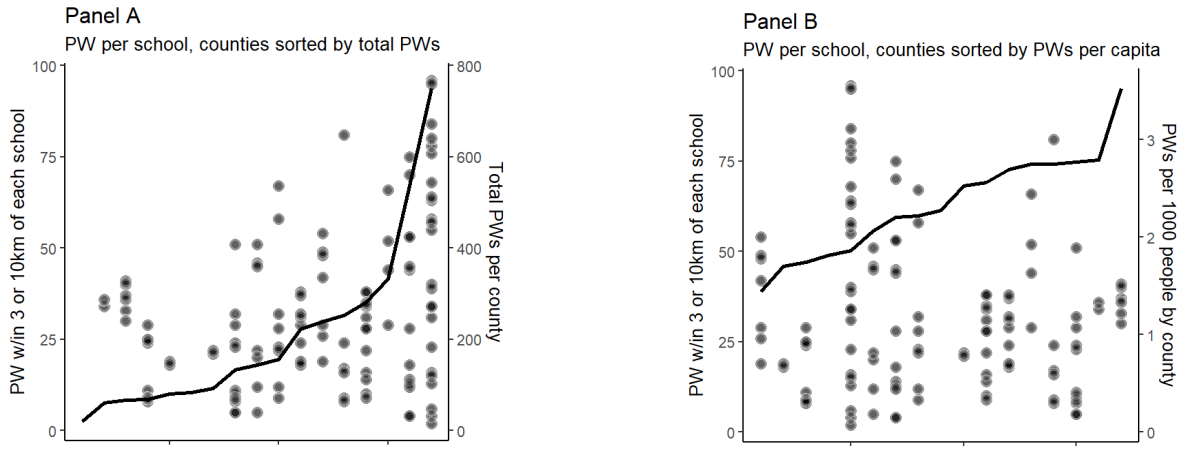
Appendix Figure A1. Jackknife and falsification exercises: hybrid fragmentation index (lone schools)



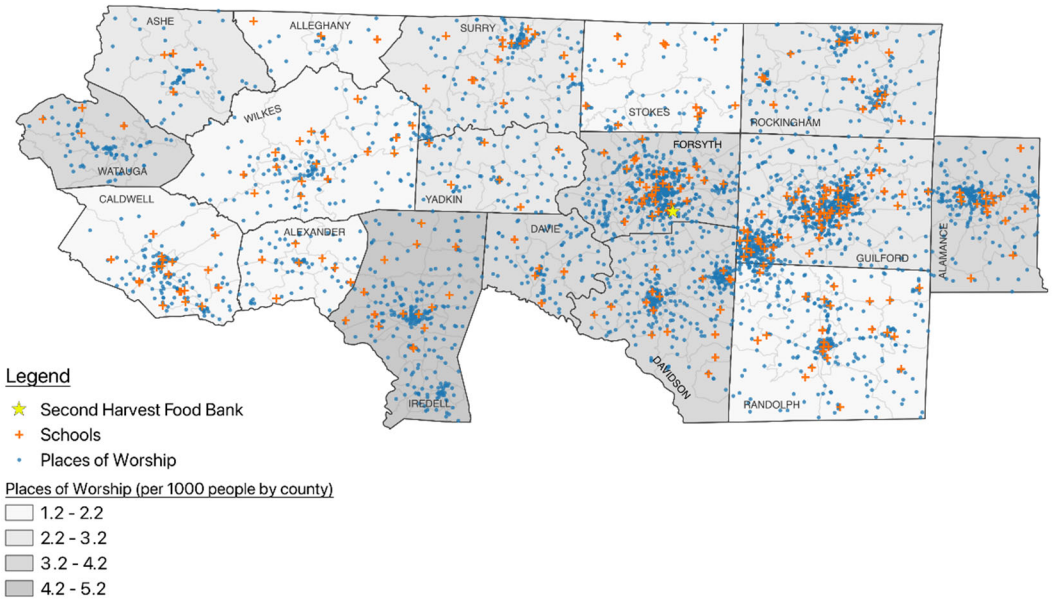
Notes: Panel A reports estimated marginal effects and 95% confidence intervals from successively excluding one school and re-estimating the main model. Panel B reports estimated marginal effects, in ascending order, and 95% confidence intervals for 500 alternative samples in which each school is assigned the characteristics and location of a randomly selected sample school. In each panel, the estimated marginal effect and 95% confidence interval from table 3 is shown for comparison. Sample consists of "lone" schools in which only one eligible school is located within the census tract.

Appendix Figure A2. Variation in places of worship within and across counties (multi schools)



Notes: Each dot represents a school, and each column represents a county. The panels plot the number of PWs for each school within each county along with a solid line that reports the total PWs (Panel A) or PW per capita (Panel B) for that county. Sample consists of "multi" schools in which more than one eligible school is located within the census tract. The plots for lone schools display similar variation.

Appendix Figure A3. Locations of places of worship and schools



Appendix Table A1: Summary statistics by lone and multi school tracts

		All	Lone School in Tract	Multi Schools in Tract
ED	Proportion ED	0.66 (0.19)	0.66 (0.19)	0.65 (0.17)
	Proportion ED > .5 [0/1]	0.75 (0.43)	0.74 (0.44)	0.76 (0.43)
School	# ED	292.37 (133.16)	291.47 (127.48)	293.46 (141.11)
	Elementary [0/1]	0.69 (0.46)	0.75 (0.44)	0.61 (0.49)
	Proportion AYP Targets Met	0.86 (0.15)	0.86 (0.15)	0.85 (0.16)
	Student-Teacher Ratio	14.25 (2.01)	14.38 (1.85)	14.09 (2.19)
	1-yr Teacher Turnover Rate	0.13 (0.06)	0.12 (0.06)	0.13 (0.07)
Community	County Unemployment Rate	12.08 (1.58)	11.97 (1.50)	12.22 (1.67)
	Tract, Med HH Income (USD, thou)	38.75 (13.06)	39.39 (14.10)	37.97 (11.66)
	Tract, Population Density	1051.8 (1209.8)	1117.2 (1332.1)	971.6 (1040.1)
	Tract, Proportion > 65yo	0.16 (0.04)	0.15 (0.04)	0.17 (0.04)
	Tract, Proportion < 18yo	0.23 (0.05)	0.24 (0.05)	0.23 (0.04)
Location	Distance to SHFB (km)	53.67 (32.67)	51.08 (32.28)	56.86 (33.00)
	Lone School in Tract [0/1]	0.55 (0.50)	-- --	-- --
Race	Tract, Proportion White	0.67 (0.27)	0.67 (0.28)	0.68 (0.25)
	Tract, Proportion Black	0.20 (0.23)	0.21 (0.23)	0.20 (0.22)
	Tract, Proportion Hispanic	0.09 (0.08)	0.09 (0.08)	0.08 (0.08)
	Tract, Proportion Other or Multi Race	0.04 (0.04)	0.04 (0.04)	0.04 (0.03)
	Hybrid Fragmentation Index	0.45 (0.21)	0.45 (0.22)	0.46 (0.21)
	# Places of Worship w/in 3 or 10 km (urban/rural)	36.16 (28.76)	39.71 (33.25)	31.81 (21.38)
	Observations	274	151	123

Notes: Unit of observation is the school, classified by whether it is the lone school in tract. Standard deviations in parentheses.

Data Appendix

SHFB Backpack Program Data

Second Harvest Food Bank, which is affiliated with Feeding America, provided BackPack program participation data and school eligibility criteria. For each school, the data include the name of the school, the year of program initiation, and the number of participating students per year.

School Characteristics

The North Carolina Education Research Data Center (NCERDC) provides restricted-access data about North Carolina schools and students. For this study, we draw on the Public School Universe files and the School Report Card files. The Public School Universe files contain information on school characteristics and resources, including the school's name, precise location, student/teacher ratio, the proportion of students who are ED, the teacher turnover rate, and the proportion of students by race. To be consistent with the community race measures, which don't vary over time, we use the sample average values in constructing the HFI. Using time-varying school measures to create the HFI does not substantively affect the results. We use the School Report Card files to measure the degree to which a school meets adequate yearly progress (AYP) criteria.

For some schools, the latitude and longitude (LL) from the Public School Universe files in 2008 changed in subsequent years of our sample. To investigate further, we used Google Maps to identify current (2024) LL for every school in our main sample. We then compared each year's NCERDC location against the Google Maps location. This comparison reveals that, as a general pattern, the precision of the LL reported in the NCERDC data improved over time. Except for a small number of cases discussed below, we use the 2013 location in estimations. We further investigated any school that had a discrepancy in either the assigned census tract or more than 1 mile in distance between the 2024 Google Maps LL and any of the NCERDC LLs. From this investigation, we identified four instances of where school locations moved during our sample period, either temporarily to support new construction, or permanently. These schools were dropped, resulting in our sample of schools. In additional three instances, we were able to verify that the school had never moved, but that the 2012, rather than 2013, LL data most accurately reflects school's true location; we use 2012 location for these schools.

In Table 5, we provide updated (typically 2022) school values for ED% and the percent white in the school, obtained from the publicly available State of North Carolina School Report Card Data (https://www.dpi.nc.gov/data-reports/school-report-cards). Racial/ethnic shares were calculated using the DEN (abbreviation for denominator) variable in the *rcd_chronic_absent* file. This file reports the number of chronic absences in each school per racial/ethnic group and then uses DEN to calculate the rate of absences. DEN is not always reported for each subgroup when the numbers are small, which is why we emphasize percent white rather than a more detailed breakdown by race.

Community Characteristics

The 2013 American Community Survey 5-year averages (2009-2013) provide economic data aggregated to the census tract level. From this, we obtain tract-level population measures for the percent white, percent Black, percent Hispanic, percent of the population of different age groups, population density, an indicator measure for rural and urban tracts, and median household income. While the Decennial Census also includes a measure for unemployment, we instead use the county-level annual

unemployment rate, drawn from the Bureau of Labor Statistics, to better capture the dynamic effects of the Great Recession and more closely match the broader labor market facing community residents.

Measures of Religion

Our primary data source is the 2013 USA Institutions layer file from ESRI (Environmental Systems Research Institute); ESRI is the creator of ArcGIS products. ESRI manages a publicly-available layer package of US institutions that includes locations for places of worship. We filtered the full US institutions file on North Carolina, our counties of interest, and the identifier "places of worship" (D44 in earlier iterations of the data). ESRI data does not provide any additional information like the denomination (if not evident from the name) or size of the congregation. The ESRI data is updated annually. During the short period of our sample, we observed some annual changes in church counts; these changes more likely reflect improved measurement rather than genuine changes and, therefore, we use the last complete observation year in our dataset, 2013.

The ESRI data include buildings associated with religious congregations that are most likely not used as places of worship. We removed 76 records of locations that appear to be duplicates because they have an identical name to a place of worship located within a mile. We also removed any location whose name contained the following strings: "rev," "pastor," "parsonage," or "minister," which appear to indicate residences; "annex," "office," "facility," "pre-school," "mission home," or "mission house," which appear to indicate a secondary building often located physically near another place of worship. Finally, we removed a rehabilitation facility, a Salvation Army facility and two private businesses that were incorrectly coded as a place of worship.

Using QGIS, we calculated the straight-line distance from each place of worship to each school and used this measure to create counts of places of worship within 1, 3, 5, 10, and 20 kilometers for each school. In addition, we also count the places of worship per county. As a point of comparison at the county level, we use 2010 the Religious Congregational Membership Study (RCMS), which is collected by the Association of Statisticians of American Religious Bodies. The RCMS measures the total number of religious congregations and adherents.

Other Weekend Food Assistance Programs

To document the emergence of programs that are independent of SHFB's BackPack program and to determine how prevalent weekend feeding programs are currently in the sample schools, we reached out to numerous charitable organizations operating in Northwest North Carolina, including the United Way, the Golden LEAF foundation, FeedNC, No Children Hungry NC, the YMCA, Communities in Schools, BackPack Beginnings, the Out of the Garden Project, the Samaritan Kitchen of Wilkes County Food Pantry, churches, and LEA employees. These conversations confirmed that, during our study period, SHFB was the first and largest provider of backpack programs. They further confirmed that no comprehensive listing of NC weekend feeding programs exists and that other programs, to the extent that they existed at all, served few schools and generally far fewer than the 50 student threshold per school imposed by SHFB. Several of the organizations that now run independent programs previously operated as affiliates or community sponsors of the SHFB BackPack program. Many independent programs generously shared information about schools that they currently serve, but don't have historical information about the initiation or growth of a program at specific schools. Staff at two of these organizations, Samaritan Kitchen of Wilkes County (a SHFB affiliated food pantry) and the Out of

the Garden Project were able to share some information about the schools and number of students served per school during the end of our study period. These data don't include specific program start dates for all schools.

As a final exercise, we conducted a full census of the 156 analysis sample schools which did not have a SHFB, Out of the Garden, or Samaritan Kitchen program by 2014. Our goal was to determine whether these remaining schools had initiated any sort of backpack program since 2014, either with SHFB or independently. We first identified 10 new SHFB schools by obtaining SHFB's 2022 list of participating schools and cross-referencing this list against our analysis sample. We then appended information obtained from our contacts at charitable organizations, which shared the names of specific schools that they currently serve or know to have a backpack program. For any remaining schools one of the authors or a graduate assistant contacted each of these schools directly to confirm whether a program currently or recently existed. Except for 3 schools that had closed or been reconfigured to different grade levels, we were able to obtain a response from all contacted schools. While this method has produced a complete census of analysis sample schools, it is limited to schools with more than 40% ED in 2008 and only measures whether a program has ever existed (either during the analysis sample period or now); it does not indicate sponsor information, program size, or the initiation date by school.