Exploring the Geography of College Opportunity

Data and Methodology

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Data

Our analysis builds on the work we completed in an earlier brief (Rosenboom and Blagg 2018). Much of this section relies on a similar methodology and provides more details on the alternate definitions of access to physical education. Our study uses data from five sources (table 1). Many of the variables are straightforward, but a couple require additional definition.

The maximum advertised upload and download speeds are based on what individual providers offer in a census block. These values come from the Form 477 that providers file with the Federal Communications Commission (FCC) twice a year. Additionally, centroids are the center of the block group area, weighted by population, which we downloaded from the Missouri Census Data Center.

Methodology

First, we collapsed all the FCC data from providers at the census block level to the census block group level, taking the highest of the maximum advertised upload and download speeds for consumers. Because educational attainment and other American Community Survey variables are not available at the census block level, we aggregated data to the census block group level. With these data now at the block group level, we merged them with other block group–level population data from the Integrated Public Use Microdata Series and the Missouri Census Data Center’s centroids.

In the Integrated Postsecondary Education Data System (IPEDS) data for 2014, we determined which institutions are both public and “broad access,” based on the institutional control variable and the number of applicants and admissions. Broad access is defined as admitting at least 75 percent of applicants or being identified as “open-access” in IPEDS. Two-year public universities are those that
offer an associate’s degree as the highest degree, or the institution’s highest degree awarded was a bachelor’s degree or higher but less than 50 percent of the degrees awarded were below a bachelor’s degree. IPEDS also provides the longitude and latitude of the institution’s location in this year.

TABLE 1

Data Sources and Relevant Variables

<table>
<thead>
<tr>
<th>Source</th>
<th>Years</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Community Survey (via IPUMS)*</td>
<td>2011–15</td>
<td>At the census block level:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Educational attainment for the population ages 25 and older</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Median household income in the past 12 months (in 2015 inflation-adjusted dollars)</td>
</tr>
<tr>
<td>Integrated Postsecondary Education Data Systemb</td>
<td>2001–14</td>
<td>Higher education institutions:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Longitude and latitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Number of admissions and applicants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Number of two- and four-year degrees awarded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Institutional control (public, nonprofit, or private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Institutional status, which indicates whether the school was</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ consolidated with another school for reporting, among other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ indicators of status</td>
</tr>
<tr>
<td>Federal Communications Commissionc</td>
<td>2016</td>
<td>For each provider at the census block level:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Maximum advertised upload and download speeds offered to consumers and residents in the census block</td>
</tr>
<tr>
<td>Missouri Census Data Centerd</td>
<td>2010</td>
<td>At the census block group level:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Longitude and latitude of centroids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Population as the weight</td>
</tr>
<tr>
<td>US Census (via IPUMS)*</td>
<td>2010</td>
<td>At the census block group level:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Total population</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Urban and rural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Race</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Hispanic or Latino origin by race</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Age</td>
</tr>
</tbody>
</table>

Note: IPUMS = Integrated Public Use Microdata Series.

*For information about IPUMS, see the website for the National Historical Geographic Information System at https://www.nhgis.org/.


Most of the IPEDS data we used are from 2014, but we also identified 331 institutions that were consolidated for reporting reasons between 2001 and 2013. Using the same variables as we did for the 2014 data, we used the 2001 data to determine which institutions were broad-access public institutions and two-year, broad-access public institutions. IPEDS did not provide the longitude and latitude of the institutions in this year, so we geocoded the addresses using the Google Maps geocoding application programming interface. While we include these institutions that now report as one unit, not all of the
branch campuses of various institutions were reported separately to IPEDS. For example, Colorado Mountain College reports as one unit in IPEDS but has 11 campuses.

Using the longitude and latitude of the centroids (Missouri Census Data Center) and institutions (IPEDS), we linked each census block group to the nearest institutions. This allowed us to identify which census block groups are physical education deserts. Using the different definitions of physical education desert described in table 2, we identified which census block groups have broad-access public institutions within 25 miles and within 50 miles of straight-line distance.

Using the maximum advertised speeds, we defined online education deserts as those not meeting the FCC’s definition of broadband—that is, where the maximum download speed was less than 25 megabits per second or the maximum upload speed was less than 3 megabits per second (FCC 2016). With these definitions of physical and online education deserts defined, we identified which block groups met both definitions or just one.

**TABLE 2**

**Defining Each Specification of a Physical Education Desert**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>No nearby access to a four-year, broad-access public institution or only a single two-year institution (original definition)</td>
<td>In line with an existing definition of physical education deserts,² we define physical deserts as either having no colleges or universities within XX miles or having access to a single community college as the only broad access public institution within XX miles.</td>
</tr>
<tr>
<td>No nearby access to either a two-year or a four-year, broad-access public institution (alternate definition 1)</td>
<td>Altering the original definition, this specification allows a single community college to be the only broad-access public institution nearby. We define this type of physical education desert as having no four-year, broad-access public institutions within XX miles and having no two-year, broad-access public institutions within XX miles. If the area has one of these types of institutions nearby, it is not defined as a physical education desert. If it has neither, it is a desert.</td>
</tr>
<tr>
<td>No nearby access to a two-year, broad-access public institution (alternate definition 2)</td>
<td>Honing in on access to community colleges, we define this specification of physical education desert as having no two-year, broad-access public institutions within XX miles.</td>
</tr>
<tr>
<td>No nearby access to a four-year, broad-access public institution (alternate definition 3)</td>
<td>Looking at access to four-year institutions, we define this specification of physical education desert as having no four-year, broad-access public institutions within XX miles.</td>
</tr>
<tr>
<td>No nearby access to both a four-year and two-year, broad-access public institution (alternate definition 4)</td>
<td>As the strictest definition for access in our blog post, we define this specification of physical education desert as having no four-year, broad-access public institution within XX miles or having no two-year, broad-access public institution within XX miles. If the area has one type of institution nearby but not both, it is defined as a desert.</td>
</tr>
</tbody>
</table>

We used American Community Survey and US Census Bureau data to sum the number of people living in each education desert by age, gender, race, ethnicity, urban or rural designation, educational attainment, and unemployment. To determine the median household income of each type of education desert, we weighted the median income by the total population of each block group.

Appendix Data

We reference the share of adults living in a complete education desert in the blog post to compare our results for the different specifications with the findings from our previous work. But we also examined the share of adults living in a physical education desert, either a physical education desert or a complete education desert, to see how these results vary (figure 1).

**FIGURE 1**
Share of Adults Living in a Physical Education Desert, by Race or Ethnicity

![Bar chart showing the share of adults living in a physical education desert by race or ethnicity.](chart.png)

- **No nearby access to a four-year, broad-access public institution or only a single two-year institution (original definition)**
- **No nearby access to a two-year, broad-access public institution (alternate definition 2)**
- **No nearby access to a four-year, broad-access public institution (alternate definition 3)**

**Race or ethnicity**

- White
- Black
- Hispanic
- Asian
- American Indian or Alaska Native
- Native Hawaiian or Pacific Islander

**Source:** Urban Institute analysis of American Community Survey, Census Bureau, Integrated Postsecondary Education Data System, and Federal Communications Commission data.

**Note:** People who identified themselves as non-Hispanic white are included in the “white” category, and all people who identified themselves as Hispanic are included in the “Hispanic” category.
For this blog post, we do not provide an interactive map to take a closer look at how changing the specifications of physical education deserts alter how access looks in every community. But we selected four states and two specifications as examples (figures 2–9).
FIGURE 2
California: No Community Colleges within 25 Miles

FIGURE 3
California: No Four-Year, Broad-Access Public Institutions within 25 Miles

FIGURE 4
North Carolina: No Community Colleges within 25 Miles


FIGURE 5
North Carolina: No Four-Year, Broad-Access Public Institutions within 25 Miles

Source: Urban Institute analysis of American Community Survey, Census Bureau, Integrated Postsecondary Education Data System (IPEDS), and Federal Communications Commission data.
Note: While there are several four-year, public institutions in North Carolina, only one that reports to IPEDS is broad access, admitting 75 percent or more of its applicants.
FIGURE 6
Pennsylvania: No Community Colleges within 25 Miles

FIGURE 7
Pennsylvania: No Four-Year, Broad-Access Public Institutions within 25 Miles

FIGURE 8
Texas: No Community Colleges within 25 Miles

FIGURE 9
Texas: No Four-Year, Broad-Access Public Institutions within 25 Miles


References

About the Authors

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