Mapping the Gap™ in West Virginia

Technical and Methodological Documentation – v2.0.3, February 2023

Supply and Demand Data

In the West Virginia Mapping the Gap™ ECE Access map dashboard, Child Care Aware® of America and TEAM for West Virginia Children with the support of Alliance for Early Success wanted to explore the relationship between supply and demand and explore where, if any, gaps between the two were geographically across the state. To do this, it was imperative to have reliable data sources with counts of the number of children that are in need of care (demand) and the number of available child care spots (supply).

Demand

True demand is terrifically and notoriously difficult to quantify. The true "demand" for child care may depend on a full range of family situations, parent or guardians' employment status and schedule, cost of care, services provided, and quality of care. There is no single source of truth to quantify this complex metric, so ECE researchers must rely on proxies to approximate the number of children in need (i.e., "demanding") of child care.

To approximate demand, we used the industry standard: the US Census' American Community Survey Table B23008. This table contains data on children under 18 by their parents' employment status.[1] The assumption here is that if all the parents of the household are employed, they are otherwise occupied with those duties and cannot provide care themselves for their children. Thus, the children are in need of child care.

We used the latest figures at the time of initial analysis: the 2021 ACS 5-year estimates. We collected this data at the block group unit of analysis, the most geographically precise level at which the census offers this data. We sourced the block groups' geographies from the US Census' TIGER line files and joined the relevant demographic data to their geographies.

Supply

To approximate supply, we worked with the West Virginia Association for Young Children to connect with the West Virginia state DHHR's Division of Early Care & Education to obtain data on licensed providers that are currently open. The initial supply dashboard data reflects licensed providers open on 4 January 2023. This data included providers' type of care, licensed capacity, and address.

Note that we did not use provider data from any other states in this analysis. In reality, West Virginia families may utilize child care located in other states if they live in a border community like Bluefield, Wheeling, Huntington, or Marlowe. A more thorough analysis of the ECE landscape of West Virginia would include supply *and* demand from all neighboring states.

[1] To get total number, we add together the data in columns labeled "Living with two parents: both parents in labor force" (B23008_004), "Living with one parent: living with father: in labor force" (B23008_010), and "Living with one parent: living with mother: in labor force" (B23008_013).

Type of Care

To match the demand data we obtained above, we only used the providers listed as types of Child Care Centers, Family Child Care Providers, or Head Start Programs. School Age Programs, while critically important for serving older children, were not included to match the age parameters of our demand data. Summer Programs do not provide consistent, yearlong care and thus cannot be included in a standard supply metric.[2]

Licensed Capacity

While we recognize that licensed capacity does not always accurately reflect the number of children enrolled at any time in ECE programs, we use this as a proxy for a more accurate measure such as desired capacity.

Address

We used the listed physical location address to geocode each provider, the result of which produced latitude and longitude coordinates. This allows us to represent each provider on the map.[3]

Mapping the Gap™ Methodology

Essentially, our methodology[4] is an attempt to model human dynamics. In other words, we are trying to realistically approximate how parents and guardians find and access for their children's care. While this is difficult because it is so multifaceted, a key factor of our analysis is whether children live in urban or rural areas. Urbanity is a key factor in determining how long parents will drive to place their children in care.

Urbanity Designation

The US Census' Decennial Census designates areas as urban and rural in its H2 Table at the block unit of analysis, a more precise area than block groups. At the time of this analysis, the 2020 H2 table had not been released. Therefore, we rely upon the 2010 numbers to approximate urban versus rural areas.

To aggregate from blocks to block groups, the ideal method would rely upon blocks' status as perfect subsets of block groups, meaning that a block group's blocks neatly fit into the block group (just as counties neatly fit into states). Because the borders of these two geographies changed with the advent

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[2] In the dashboard, you can use the table of contents icon on the map to toggle between providers used in the model (e.g., Infant, Toddler, and Pre-K providers; the default) and all providers that include School Age and Summer Programs. The widgets also can be toggled to reflect statistics for either grouping. Gap metrics only use the Infant, Toddler, and Pre-K provider statistics.

[3] In the dashboard, to protect provider privacy, we have limited the zoom level at which you can explore provider locations.

[4] This is CCAoA's second edition of our Mapping the Gap™ Analysis. While our past work on supply and demand (see Dobbins et al. 2016, version 1 of Mapping the Gap™: CCAoA 2018) was a valuable starting point for Child Care Resource and Referral Agencies (CCR&Rs) and state agencies understanding the dynamics of supply and demand in their states broadly, we have upgraded to the industry standard that recognizes the arbitrary nature of statistical and administrative units of analysis' borders (Sandstrom et al. 2018, Malik et al. 2018, Davis et al. 2019, Smith et al. 2020, Azuma et al. 2020, Fantuzzo et al. 2021, Early Learning Indiana 2022). We have moved and continue to move in a direction that, while still imperfect, more accurately models lived human dynamics.

of the 2020 census, the 2010 blocks do not fit neatly into the 2020 block groups at which the demand figures are reported. So, we took the within-polygon centroid of each 2020 block group and determined what 2010 block it fell within. The status of that block determined whether the 2020 demand block group was urban or rural.

Distance threshold allocation

Relying upon data from a Bipartisan Policy Center survey (Smith et al. 2020), we set a distance threshold[5] of 3.5 miles for urban areas and 10 miles for rural areas. This means that in our model, only care settings within 3.5 miles of rural block groups and 10 miles for rural block groups are eligible to provide care to the block group's children in need of it. This is an attempt to model the real movements of parents and guardians that bring their children to early care and education settings.

After running the Mapping the Gap™ analysis (see more below) with these thresholds, we noticed discrepancies in the results where care in some settings were significantly closer to urban block groups than rural block groups, but because of the 6.5 mile discrepancy between the rural and urban thresholds, care was being allocated unevenly by favoring the rural tracts. Figure 1 shows this phenomenon.

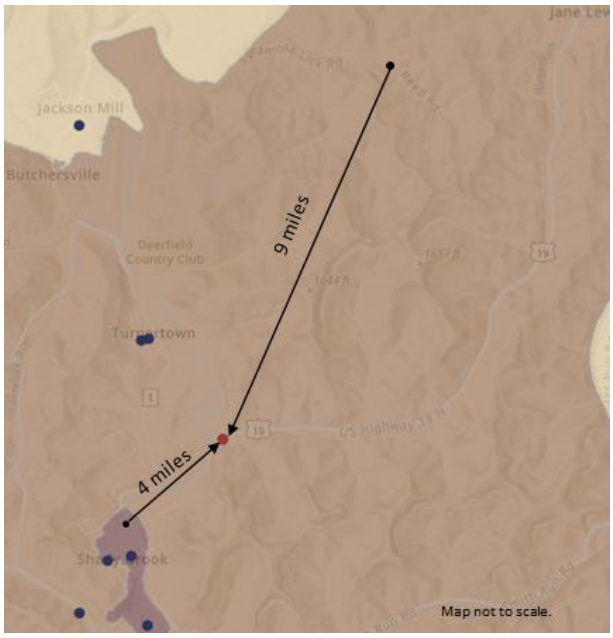

Figure 1: In the original model, the child in the maroon area (urban) cannot access care at the red provider, but the child in the brown area (rural) can despite being further away.

In the reworked model, the brown area becomes a transition zone with a threshold of 7 miles. This helps to smooth out the differences between urban and rural access.

Given the margin of error for the designation of urbanity status to begin with, we created a transition zone by buffering urban block groups by 3 miles from their edge into rural areas. We reassigned block groups' urbanity statuses with the transition zone included. The results helped to more evenly model the urban-to-rural transition with distance decay in mind to cut down on anomalies like is shown in Figure 1.

Capacity allocation: Tots to slots

While other analyses of ECE access gaps show spaces of relative access (Davis et al. 2019, Azuma et al. 2020), we maintain the traditional comparison of number of children in need vs providers' capacity. To allocate children from each block group, CCAoA constructed an iterative, looping algorithm that took into account the distance thresholds mentioned above based on the urbanity of each block group. All children potentially in need of care (represented by the block group centroid) were linked to the closet provider to them within their assigned milage threshold. If there were no providers within a child's

[5] Our model used Euclidian (i.e., "as the crow flies" or straight-line) distances instead of driving distances. We recognize that driving distance measurements would be preferable in modeling human dynamics, and we intend on measuring access to care with driving times via network analyses in the future.

distance threshold, the were not included in the loop and designated as un-placed. Block groups where this is the case are designated as having a gap.

After including all children that had a provider nearby, we then sorted, or prioritized, these children by the value of that distance; the children with the provider the smallest distance away were put at the front of the line, while children the farthest away from an eligible provider was deprioritized at the back of the line. This helps, in conjunction with the distance thresholds, to model distance decay that holds that those children are most likely to receive care to providers that are closest to them.[6] Then, after sorting, each child was allocated to their nearest provider, and then the next children "in line" were allocated. This process continues for each child grouping (here, children per block group) until either the provider is full or all the children are allocated.

After all the children have been allocated to their matched providers, we recalculate to see if there are any new gaps where children now have no providers with remaining capacity within their distance threshold. Those children are then removed from the line and designated as un-placed. Children that still have capacity in-threshold are linked to their new nearest provider, and the sorting and allocation occurs again.

This entire allocation loop occurs until there are no children left with any in-threshold capacity nearby. All the children with all household parents in the workforce across the state have either A) been placed in care or B) have no care left within a reasonable distance of them.

Gap Calculations

After the allocation step, our results showed children our model approximated that do and do not have access to care per block group. We aggregated these totals up to the county level to show the results at a meaningful geographic unit of analysis. In displaying this data, we provided two ways of viewing the results in the map. One layer (blue) shows the raw totals, or the number, of children in need of care that cannot access it. The other layer (red) shows the share, or percent, of those children. This is done by taking the remaining children at the end of the model divided by the original total number of children potentially needing care. These two views are a strength of this model: users can see either the total or relative gap across the state or toggle between these views.

[6] Again, we acknowledge that distance is not the only factor affecting care availability or choices (see "Demand" section above).