Center on the Family, 2022

Measuring Access to Early Care and Education: Family-Centered Indexes

Background

Access to affordable, conveniently located, and high-quality early care and education (ECE) is essential for the long-term welfare of our children, families, and communities. Early childhood (birth through age 5) is an extraordinary period during which positive caretaking relationships and enriching daily experiences set the stage for lifelong learning, health, and well-being.[1] High-quality ECE programs support young children's physical health, cognitive, and social-emotional development and partially offset the negative impacts of poverty and other risk factors on early school success.[2] Long-term benefits have also been shown for academic achievement in the K-12 years; high school graduation and college enrollment; and adult earnings, health, and social adjustment.[3]

Reliable, affordable child care allows parents to work or attend school, thus building financial and human capital. Child care promotes gender equity by supporting women's labor force participation, better pay, and career advancement.[4] Better outcomes for children and families translate into cost savings for the communities they live in and for society as a whole. Economists estimate that each dollar spent on ECE programs yields a return to society of $2.00 to $8.60 due to increased family earnings and retirement accumulations, children's future earning potential, employer savings, and reduced need for remedial education, health care, and social services.[5]

Equitable access to ECE programs exists when all families, "with reasonable effort and affordability, can enroll their child in an arrangement that supports the child's development and meets the parents' needs (p. 5)."[6] Unfortunately, our nation has far to go to achieve this goal. Child care is a major family expense. The average tuition for one child represents 10% of the median income of two-parent households and 34% for single parents.[7] Programs intended to reduce economic inequity by providing free or low-cost ECE often have insufficient reach. Head Start and Early Head Start serve 48% and 7% of eligible children, respectively.[8] Even though one in four children of low-wage workers are eligible for federal child care subsidies, only 15% actually receive such benefits.[9] As a result, low-income and single-mother families shoulder a disproportionate cost burden to purchase care and ECE enrollment remains closely linked with family income.[10]

An insufficient supply of child care presents a challenge for the 51% of Americans who live in neighborhoods classified as child care deserts.[11] Rural and low-income urban communities are the most likely to be child care deserts, while Latinos and American Indians/Alaska Natives are the ethnic groups most likely to face an inadequate child care supply. Maternal workforce participation is lower in child care deserts, especially when the community is also low income.[12]

Not surprisingly, the COVID-19 pandemic dramatically affected our nation's ECE supply in the early part of 2020 as programs shut down or reduced capacity due to public health restrictions.[13] While the supply has recovered to some extent since the spring and summer of 2020, many providers struggle to remain open given staffing shortages, increased debt, and lower enrollment and attendance rates.[14] Unfortunately, the pandemic seems to have widened pre-existing racial and ethnic disparities in access to ECE. A recent analysis shows that Latino, Asian, and Black families experienced child care closures at higher rates than White families.[15]

Conceptualizing and Measuring ECE Access

There have been calls within the early childhood field to recognize that ECE access is a multidimensional construct that should be conceptualized and measured in a more nuanced way than has been done in the past.

Access comprises four dimensions: 1) services are available with reasonable effort; 2) are affordable; 3) support child development; and 4) meet parents' needs.[16] Current thinking is that measurement should be done at a highly localized level, since families live and conduct their daily business in a relatively small orbit and access often varies widely even within the same municipality.[17] Spatial analysis may be an especially useful tool for addressing ECE issues.[18] It has been proposed that measures should be spatially family-centered, i.e., given in a radius from a family's home, since such metrics provide an authentic estimate of resource availability from a family's perspective.[19] Spatial data also offers the advantage of visualization; mapping spatial data can be a user-friendly way to summarize and communicate geographically-based trends. Finally, to address issues of equity, access measures should be designed so it is possible to link them with data on family and/or community characteristics such as ethnicity, income, languages spoken, and disability status.

In this paper, we describe an innovative approach to measuring ECE access that addresses the issues outlined above. We used spatial analysis to measure multiple components of ECE access within a reasonable proximity of a family's home. These family-centered measures take into account the commuting time or distance between ECE providers and a family's home; they also adjust for the number of children living nearby and potentially competing for seats in a particular neighborhood. As a result, these measures reflect the reality of resource access from a family's perspective.

These measures also offer flexibility. We calculated access scores at the level of the residential housing, but these micro-level data can be aggregated to higher levels such as a census tract, zip code, legislative district, or county. The access scores can be used for statistical analysis and/or displayed using maps or other visualization tools.

What We Did

We used data from our home state of Hawaiʻi. Hawaiʻi is characterized by an island geography and has both a small land mass (6,422 square miles) and small population (1.4 million people) compared to most other states.

Methods

Data sources included the state child care licensing database; public school preK enrollment; American Community Survey five-year population estimates; property tax maps; a commercially-available real property dataset; geospatial road maps; and public transit routes.

We defined the universe of ECE providers as all regulated family child care homes, licensed infant-toddler and preschool centers, and public preK classrooms.[20] Provider-level data included location, provider type, capacity, age-based fees, and accreditation status.[21]

To approximate children's residential locations, we distributed the estimated number of children under age six across residential lots in proportion to the number of housing units at each lot within each census tract.[22] As a proxy for individual family income, we used the median income of families with children for the census tract in which each residence was located.

Catchment area boundaries were determined for each ECE provider. Three different catchment areas were defined by 5- and 10-mile driving distances and 30 minutes on public transportation, respectively. All residential lots inside a provider's catchment area were considered to have access to that provider.

We used a two-stage floating catchment area method to create ECE access indexes for each residential lot.[23] In Stage 1, a supply-to-demand ratio was calculated for each provider, e.g., licensed capacity divided by the number of children living within a 5-mile drive. In stage 2, lot-level access scores were based on the sum of the ratios for all accessible providers, e.g., providers within a 5-mile drive.

ECE Access Indexes

We created four access indexes.

Nearby Seats: The number of children per ECE seat near a family's home. This represents the adequacy of the supply of nearby seats. For this index, lower scores (fewer children per seat) are desirable. [24]

Affordability: The availability-weighted average cost of a nearby seat as a percentage of that area's median family income. This represents cost burden relative to family income. For this index, lower scores are desirable.

Quality: The availability-weighted likelihood that a nearby seat is in a center with a national ECE accreditation or in a public preK classroom. For this index, higher scores are desirable.

Combined Access: The average of the standardized scores on the first three indexes, reflected as needed, so higher scores represent better overall access.

Mapping Web Tool

The indexes are visualized and accessed via an interactive mapping website. When viewing each index, users can select among three different catchment areas (5-mile drive, 10-mile drive, or 30 minutes on public transit) and two viewing levels (residential lot or census tract). A provider map shows the location and information about each ECE provider.

Figure 1 (see page 4) is an example of a tract-level view showing the combined access index for all counties in the state. Tract-level data are useful for questions relating to policy, such as identifying underserved communities or tracking progress on quality improvement.

Figure 2 (see page 5) is an example of a lot-level view showing the affordability index for an approximately four square mile section of Honolulu. Lot-level maps are useful for questions about specific locations within a community. For example, where is the best street or block to locate a new ECE site in an under-served census tract?

For a detailed explanation of methods and mapping procedures, please see the technical report.

Figure 1: Combined access index, tract-level view

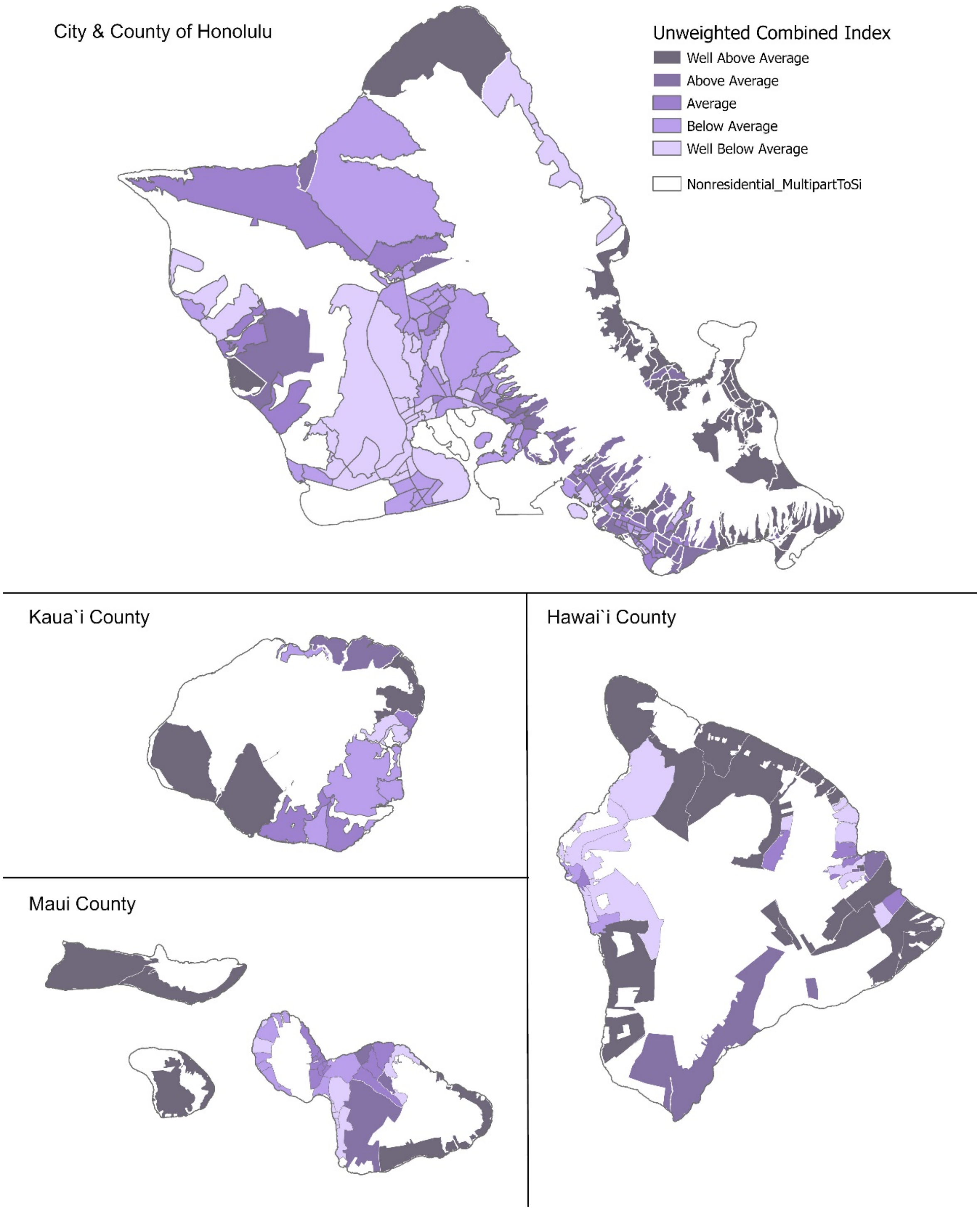
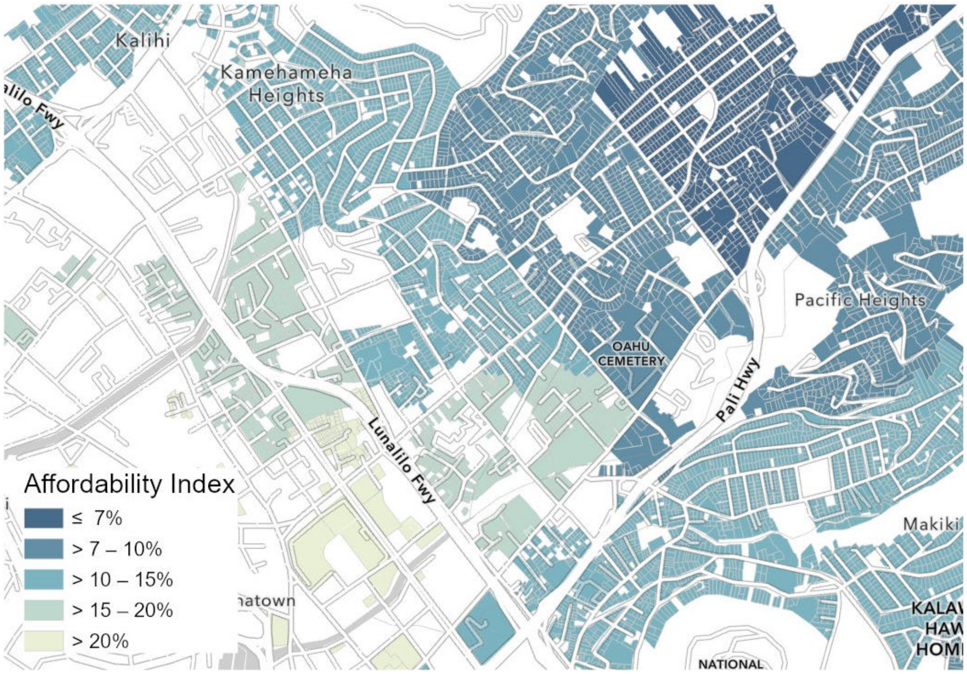


Figure 2: Affordability index, lot-level view



What We Are Learning From the Hawaiʻi Data

We are now starting to explore and analyze the data and share findings with stakeholders. Some initial results are given below.

***Our ECE supply is insufficient and expensive, but quality is a bright spot*.** Statewide index scores were computed as the average residential lot score weighted by the estimated number of children living at each lot. For the state as a whole, using a 5-mile catchment area:

- There were 3.5 children per nearby ECE seat.
- On average, a nearby seat cost 10% of the median area family income
- 40% of nearby seats were in accredited programs or public preK classrooms.

We also defined a threshold for each index, i.e., a dividing line to delineate adequate vs. inadequate access. Policymakers and stakeholders may find thresholds to be more meaningful than the somewhat abstract index scores. We used three as a threshold for nearby seats, based on the literature that defines a child care desert as an area with three or more children per available seat.[25] We set the affordability threshold at .07, based on the federal definition of affordable care as costing no more than 7% of family income for all children combined.[26] There is no widely accepted threshold for adequate access to high quality seats. We set .50 as the quality threshold, i.e., 50% or more of nearby seats are of high quality.

Based on these thresholds:

- 63% of young children lived in areas with an insufficient supply of nearby seats, aka child care deserts. An additional 4% had no providers within 5 miles of their home.
- Only 14% of children had nearby access to affordable ECE.
- 22% lived in areas where 50% or more of nearby seats are high quality.

There were also differences across the four counties. For example, Kauaʻi County had the most affordable seats. And while almost all children in the urban population center of Honolulu County had access to at least one ECE provider, 40% of children in Hawaiʻi County had no providers within a 30-minute public transit ride.

Access depends on where you live. Aggregation at the state or county level can conceal important local variation at the community level. A map of the combined access index for each census tract in the state is shown in Figure 1. This visualization makes it easy to see which communities have higher vs. lower access.

Figure 2 shows variation on the affordability index at the lot level. Within a roughly 2-mile radius, affordability ranged from less than 7% of family income to over 20%. Even taking into account the presence of nearby no-cost Head Start and public preK classrooms, ECE was not affordable for families living in the apartment buildings and homes shown in the two lightest shades.

Inequitable access occurs based on income, urbanicity, and ethnicity, but policies and strategic investments are starting to counter this. To quantify whether community characteristics are systematically associated with tract-level access, we regressed tract-level combined access scores on measures of tract-level population density, median family income, the percentage of families below poverty, and the percentage of the population from each of five major ethnic groups in the state (East Asian, White, Native Hawaiian/Part Hawaiian, Filipino, and Pacific Islander). In Hawaiʻi, the first two groups are historically privileged, while the last three groups are affected by economic and health inequities.

Results showed that combined access was better in communities with higher incomes and a larger share of Whites, East Asians, and Native Hawaiian/Part Hawaiians. Access was worse in communities with a larger Pacific Islander population. Results were similar for each individual access index, with the additional finding that densely populated communities had a better supply of nearby seats, but less affordable care.

These patterns are largely consistent with our expectations. However, if Native Hawaiians face social inequity, how have they achieved better overall ECE access? The answer may be based on philanthropic activity and state and federal policies that prioritize funding for Native Hawaiian education. Closer inspection of the state maps shows that rural, low-income, predominantly Native Hawaiian communities in Hawaiʻi and Maui counties have among the best ECE access in the state—rivaling that of some economically elite communities in urban Honolulu County. This appears to be the result of strategic placement of public preK classrooms, Head Start/Early Head Start programs, and a private program that limits enrollment to Native Hawaiian children.

Programming and Policy Applications

The indexes and mapping tool offer a new way to measure and display data on ECE access and how it varies within and across neighborhoods and communities. These multi-dimensional, family-centered indexes convey information at a fine-grained level that captures the localized nature of accessibility. The indexes and mapping tool will be useful to policymakers; agencies responsible for ECE licensing, subsidies, or system planning; and early childhood advocates.

Expected uses in Hawaiʻi

Hawaiʻi is taking steps to expand affordable, high-quality ECE. Recent state legislation (Act 46, 2020) set a goal of providing all three and four-year-olds with access to preschool by 2032. The work described in this brief is expected to play a key role in planning and monitoring progress toward the goal of universal access, starting with under-served populations. The indexes and mapping tool can also inform decisions about the best uses of funds provided to our state under the American Rescue Plan Act of 2021.

Our intended audience includes state legislators and county government; state agencies that oversee public preK and Child Care Development Fund (CCDF) activities; and early childhood coalitions. These baseline data provide a detailed, highly localized picture of ECE access not previously available in Hawaiʻi. The mapping tool can be used to identify under-served areas and inform decisions about where to locate or expand public preK and private ECE programs. We plan to compare 2019 and 2022 data to document changes in ECE access during the COVID pandemic. Subsequent data updates can be used to measure progress toward implementation benchmarks for Act 46, the CCDF state plan, and the state early childhood strategic plan

Customizing Indexes to Meet User Needs

This project was also intended to serve as a proof-of-concept and model for other states and municipalities. The methods used are flexible and can be adjusted to suit the conditions, issues, and data available in different locales.

Parameters such as catchment area and levels of aggregation are easily changed. We selected 5- and 10-mile driving distances, which are suitable for our island geography and mountainous terrain that often makes seemingly adjacent areas inaccessible. Longer distances may be better suited when focusing on rural locales or large geographic areas. Shorter distances may be useful in densely populated areas where walking to ECE sites is feasible. Levels of aggregation can also be customized. We chose to aggregate individual housing lot data at the level of the census tract. Aggregation to other higher levels could include school or legislative district, municipality, or county. If community members can identify meaningful neighborhood boundaries, aggregation could be done using areas smaller than census tracts.

Indexes can also be defined in different ways. For example, data availability left us with limited options for defining ECE program quality. Other users may have quality rating scores, classroom observation data, or staff credentials that could be used to calculate a quality access index. We included public preK and Head Start/Early Head Start programs. If the intended focus is on middle income or gap group families, it would make sense to exclude programs with means-tested eligibility. We presented an unweighted combined access index. Others might choose to weight nearby seats, affordability, and quality in ways that best match local priorities. Thresholds for defining inadequate, adequate, or excellent index scores can also be set to reflect local conditions and goals.

We did not create an index relating to the fourth access dimension of meeting families' needs. However, other users may have access to self-report data on parents' needs. Alternatively, an index could be based on program features that parents are likely to value, such as transportation, evening hours, or multilingual services. Finally, the two-stage floating catchment area method can also be used to measure access to a variety of resources and services that affect early childhood well-being, including pediatric care, parks and play space, or parent support groups.

Applications

The access indexes may be useful in addressing a variety of issues and questions. Some examples are listed below.

Access by program type or provider characteristics. It may be important to compare the accessibility of different types of programs or providers, as access to certain ECE services may be especially limited. For example, infant-toddler care is often expensive and scarce. Separate access scores could be created for services of particular interest, e.g., family child care, Early Head Start programs, public vs. private preK, providers who offer evening or weekend hours, or those who accept child care subsidies.

Workplace-centered indexes. While some families prefer to enroll their children in programs that are close to home, others may seek ECE services close to where they work. We based the indexes on where families live, while a workplace-centered index would describe conditions for families seeking care close to work. Such an index could be constructed using employer location, number of employees, and salary data. This information may be helpful to city planners or employers interested in addressing child care access as part of their employee benefit or wellness plans.

Identifying inequities. A first step toward achieving equity is to understand who has the most difficulty accessing ECE. We used census tracts as the unit of analysis for identifying under-served areas. Other techniques, such as spatial autocorrelation using lot-level data, could identify smaller clusters of homes significantly above average (hot spots) or below average (cold spots) for ECE access. We asked whether tract-level access was systematically associated with three tract-level characteristics—population density, median family income, and ethnic composition. Other socio-demographic factors could be considered, such as the percentage of immigrant families or working single parents.

Ideally, an equity analysis would be based on the location and characteristics of individual children or families. Although difficult to obtain, such data would yield more accurate results. Individual-level administrative data sets also include information about more narrowly defined groups of interest. For example, does access for families receiving child care subsidies, children with a disability, or Medicaid-enrolled children differ from the overall population?

Optimal placement of ECE facilities. Public planners and ECE providers may want to know where a new site or additional classrooms would reach the highest number of nearby children. Once a high-need census tract is identified, a private ECE provider might use the lot-level nearby seat maps and the locations of appropriately zoned business lots to suggest specific places within a community to open a new site. A person interested in starting a family child care home could use the lot-level maps to see if their neighborhood would likely generate sufficient enrollment.

Indexes can also inform planning and projections. For example, to what extent would a new housing development affect access levels? How many new seats would be needed or is the existing ECE supply sufficient? On a larger scale, regional planners could project the future capacity needed to accommodate expected population growth.

Comparing access before and after a policy change. Stakeholders need to know whether policies intended to increase access are leading to desired outcomes. The access indexes can be used to evaluate the effectiveness of new policies. For example, have quality incentives increased access to nearby high-quality seats in neighborhoods with few accredited providers? Or, have start-up and classroom expansion grants increased access to seats within a 10-mile drive for children in under-served rural counties?

Limitations

Because we did not have individual-level data, we had to estimate children's residential locations and family income. Other users may have access to administrative datasets that include child- or family-level information. We did not create an index relevant to the fourth dimension of ECE access—meeting parents' needs. The technical skills and hardware capacity needed to implement the methods described in this brief may exceed the capacity of grassroots organizations or small agencies. Equitable data access is also an issue, as data use agreements may be challenging to set up. Despite these limitations, we see much promise in spatially-based approaches to measuring ECE access. The work presented in this report provides a useful model for measurement innovations in other locales.

Endnotes

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