



Child Care and Early Education Accessibility in Tucson

Making Action Possible in Southern Arizona (MAP Dashboard)
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Executive Summary

The early years of a child's life lay the foundation for future learning, development, and lifelong health. Rich, stimulating environments promote development, while early negative experiences can carry lasting deleterious effects. With the majority of parents of young children in the labor force, many families face the need to find safe, engaging care for their children outside of their homes in order to work or to continue their education. In addition, many families seek out early learning programs to help assure their preschool age children are prepared to make a strong start in school. Children who participate in high quality early learning programs tend to have better socio-emotional, cognitive, academic, and health outcomes than those who do not. Children in high quality programs repeat grades less frequently, obtain higher scores on standardized tests, experience fewer behavior problems, and are more likely to graduate from high school. The positive effect of early education is particularly pronounced for children from disadvantaged backgrounds.

Access to quality, affordable early care and education opportunities can be limited, however. Areas lacking an adequate child care supply have been termed “child care deserts,” defined as ZIP codes containing at least 30 children under age 5 that have limited or no center-based early care and education programs (i.e., there are more than three times as many children under age 5 as there are spaces in the child care settings).³³ The Center for American Progress mapped these areas in eight states across the U.S., finding that 40 percent of residents in the area studied lived in child care deserts. Even when child care and education is available, the cost can be prohibitive. If not enrolled in publicly-funded programs, which are often free or reduced cost, the annual cost of full-time center-based care for a young child in Arizona is nearly equal to the cost of a year at a public college.

This report identifies and maps child care deserts in the greater Tucson area, and describes the sociodemographic characteristics of these local areas that have limited access to child care. Given the importance of quality in early care and education settings, we additionally identify *high quality* child care and early education deserts in the region and explore the accessibility of high quality early education programs for preschool-age children, considering cost as well as location. The goal of the project was to assess the gap in early care and education providers and to identify areas that might most benefit from targeted efforts to assure young children have better access to early care and learning opportunities.

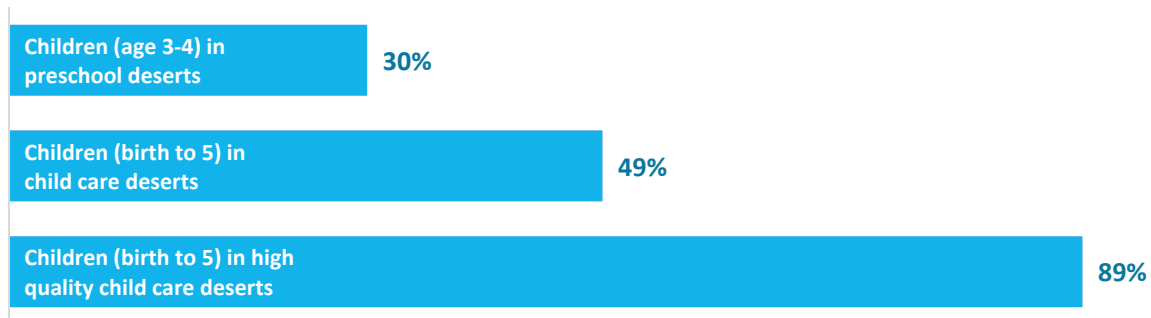
What we did

Using a variety of data sources, we identified a total of 723 child care and early education providers in the greater Tucson area. These included 185 center-based providers, 129 Head Start or public school-based providers, and 409 home-based providers with a combined estimated capacity to serve 30,102 children (some of whom are older children cared for after school). Of these, 233 providers with a capacity to serve just over 15,000 children were identified as high quality, defined for this project as providers with a quality rating from Arizona's Quality Rating and Improvement System (Quality First); nationally accredited providers; Head Start providers; and public school-based early learning programs.

Comparing the capacity of early care and education providers to the number of young children in the greater Tucson area, we found that 46 percent of local ZIP codes are child care deserts for young children ages birth to 5, and nearly half of Tucson’s population of young children (49%) live in a child care desert. Statistical comparisons of the deserts and non-deserts found that the child care deserts had a significantly greater concentration of households with young children (18%) than non-deserts (11%) and that households in deserts were significantly more likely to have a grandparent present (5%) than the households in non-deserts (2.5%).

Including home-based providers in our analysis had little effect on the results; all but one of the ZIP codes identified as a child care desert in the original analysis was so identified when home-based providers were included. However, home-based providers emerged as an important source of care for two sub-populations: Hispanic and Latino families and families in poverty. Restricting the set of providers to those who met the criteria for quality care changed the results dramatically. Under this stricter definition, 31 of the 46 ZIP codes in the area (67%) were categorized as high quality child care deserts. These deserts are home to 89 percent of young children in the greater Tucson area. Only six ZIP codes in the greater Tucson area have a sufficient number of high quality early care and education slots to serve the children living within their boundaries.

A large share of young children in the greater Tucson area live in preschool or child care deserts.



We also specifically considered the availability of high quality early education opportunities for preschool-aged children (ages 3 to 4) through both the lens of child care deserts and more nuanced considerations of access. Just over a quarter of ZIP codes (26%) in the greater Tucson area are preschool deserts, where there are more than three times as many preschool-age children as early education slots. These deserts are home to 30 percent of preschool-age children in the area. To further explore spatial accessibility to high quality early education, we used a two-step floating catchment area approach, which takes into account all of the available preschool programs within about four miles of a child’s home, whether or not they are within the child’s home ZIP code. We found that families living in census tracts in the central parts of Tucson, in Oro Valley, the Catalina Foothills, South Tucson, Vail, and Sahuarita have the greatest access to quality early education programs. Neighborhoods in the southern and western parts of Tucson appear to have an especially acute need for additional nearby early education providers.

Beyond spatial accessibility, access to transportation and the financial means to afford the cost of early care and education may influence a family's ability to access early care and education opportunities. More than a quarter of households lack an available vehicle in neighborhoods along the Oracle Road corridor south of River Rd, in South Tucson, and near 29th St and Alvernon. For families without a vehicle, lack of transportation may prevent them from accessing preschools that are only a few miles away but difficult to access by foot or by public transit. Even if a family lives near an early education provider with slots open for their child and has a means of transportation to reach that provider, the cost of enrolling a child in early education may prove too much for that family to afford. To afford full-time early care and education for a preschool-age child in Pima County (median cost: \$7,200), a family at the median income level (about \$47,000) would have to pay 15 percent of their income. This cost is even higher for single parent households. There are no-cost programs, such as Head Start, and child care subsidies or scholarships available for low-income families, but these resources are limited. The dynamics of spatial, transportation, and financial access to early care and education in the greater Tucson area likely contribute to the relatively low rate of early education enrollment; however, further research is needed to establish the degree of relation between these access dimensions and participation in early education in our area.

What our findings mean for Tucson

Clearly, there is a need for investment in quality child care and early education in the greater Tucson area. The importance of *high-quality* early care and education cannot be overstated. Support for improving quality in existing programs as well as establishing new high quality programs is particularly needed because there are nearly five times as many children ages birth to 5 as slots in high quality early care and education providers. Supports in the form of more low-cost or no-cost early care and education opportunities, transportation assistance, and child care scholarships could particularly benefit families. Furthermore, home-based early care providers are an important source of care especially for Hispanic families and families with low financial resources. The establishment and continuation of high quality home-based programs could support families in communities across Tucson, with the additional benefit of promoting small, local businesses. Ultimately, expanding the early care and education options for all families will provide children with better access to safe, quality care to support their learning and development and will offer a better chance for parents to contribute to the economy of our community.

Why Child Care and Early Education Matters

Parents’¹ decisions about when, where, and how often to place a child in the care of others are influenced by a complex network of factors: economic, social, cultural, logistical, informational, educational, and personal.¹⁻³ Though there are many influences, parental employment is a major driver of the need for child care. In 2016, nine out of ten fathers (94%) with children under 6 years were working or looking for work, as were two out of three mothers of young children (65%).⁴ With such a high proportion of parents of young children in the labor force,² decisions about child care are a critical issue for most families. Nationally, about 60 percent of children under 5, and just over half of those 5 to 8 years old, are in a regular child care arrangement.⁵ Without viable child care options, parents’ employment opportunities are limited, reducing their current and future earning power.⁶⁻⁹ Although many families rely on care by relatives, nationally, about one-third of children under 5 years and about 17 percent of children ages 5 to 8, are in some type of regular, nonrelative care.⁵

Even if child care is not needed for employment purposes, many families want to enroll their children in some form of early education prior to kindergarten. Recent evidence from Oklahoma showed that skills related to reading, writing, and math improved markedly for the 4-year-old students in their universal pre-kindergarten program.¹⁰ In the longer term, children who attend high quality early childhood programs are more likely to benefit from less grade retention, fewer behavior problems, higher scores on standardized tests, higher high school graduation rates, higher college attendance and graduation rates, higher rates of employment as adults, and improved adult health.¹¹⁻¹⁵ Many of these longer term benefits appear to be related to an increase in non-cognitive skills (e.g., motivation, persistence, social skills, and problem-solving skills).¹⁶ Because children who participate in high quality early learning programs tend to have better health, socio-emotional, and cognitive outcomes, a positive preschool experience is often seen as a cornerstone of school readiness.¹⁷ Though there are benefits to children across socio-economic strata, high quality early care and education has consistently shown the strongest positive effects for children from more disadvantaged backgrounds, meaning that quality preschool programs are also important for closing achievement gaps.¹⁸⁻²⁰

In addition to the direct benefits to children, high quality early education also benefits society as a whole. High quality programs have been connected with reductions in special education placements; increased educational achievement and employment that increases the community tax base; lower use of government support programs; reductions in crime; and better overall health of children as they mature into adults, with lower associated health care costs.^{14,21-23} Taking these benefits together, experts estimate³ that

¹ Throughout this white paper, we refer to parents as the primary caregivers for children, and most data are collected this way. However, it is important to acknowledge the high numbers of families where grandparents, guardians, or other kith and kin caregivers serve in the parental role.

² “In the labor force” includes both those who are employed and those who are seeking employment.

³ Note that the majority of research into return on investment (ROI) for early education is done on the longitudinal studies of children in intensive, high-quality programs in the 1960s and 1970s. Two of the most extensively studied programs are the Perry Preschool Project and the Abecedarian Project. The Perry Preschool Project worked with low-

quality early learning initiatives can offer a value of about \$8.60 in social benefits for every \$1 spent on programs.²²

Assessing Access to Child Care and Early Education

Despite a marked need by many families, access to quality early care and education opportunities is often limited. Many factors define whether a family can access the care they need or want. Key access indicators are geography, i.e., distance from a home or work location;²⁴ availability, i.e., the number of facilities or slots available within a certain threshold distance or geographic unit;^{24,25} and affordability of child care based on parental employment, family income, and tuition costs.^{2,26} Other dimensions of access are more difficult to measure, but still influence a family's decision or ability to enroll a child. These include eligibility for assistance programs, program operating hours and flexibility, parental awareness of the availability of early care and education programs, special needs a child may have, transportation options, and social and cultural factors related to the feasibility and desirability of out-of-home care.^{2,27}

Reflecting these issues, almost one-third (32%) of parents participating in a national survey reported struggles with finding care for their young child, with cost being the most frequently cited issue. Over two-thirds (69%) of parents reported paying for child care (e.g., rather than a grandparent or other relative or friend volunteering care), and 31 percent of those parents reported having household financial problems due to that cost.²⁸ In Pima County,⁴ for families who are unable to take advantage of free or reduced-cost publically-funded programs, the average annual cost of full-time center-based care for an infant (about \$9,360) is nearly equal to the cost of a year's tuition at the University of Arizona (about \$10,200).²⁹ The average monthly cost (\$780) is about the same as the median rent (\$800).³⁰ Even ignoring the steep costs, suitable child care is sometimes simply unavailable. Two-thirds (67%) of parents in the national survey reported limited options for child care, with nearly one in five (19%) indicating they had only one realistic care option.²⁸

In keeping with the growing focus on areas with limited availability of specific resources, such as food deserts and medically-underserved areas,^{31,32} there is a burgeoning interest in examining places lacking an adequate child care supply. A "child care desert" is defined as a ZIP code containing at least 30 children under age 5 that has limited or no center-based early care and education programs (i.e., there are more than three times as many children under age 5 as there are spaces in the child care settings).³³ The Center for American Progress mapped these areas in eight states across the U.S., finding that 42 percent of young children in the study area lived in child care deserts.³³ Here, we undertake

income African American children in Michigan and provided two years of daily class (2.5 hours/day; student-teacher ratios of about 5 or 6 to 1) and weekly home visits from teachers who have bachelor's degrees and participate in ongoing professional development. The Abecedarian Project also served a low-income, predominately African American group in North Carolina, but used a more intensive approach, caring for and educating children for at least 8 hours a day beginning in infancy and continuing for five years. Health care services were also provided on site.

⁴ Pima County numbers were drawn from the 2014 DES Child Care Market Rate Survey, and University of Arizona tuition rate for 2017, found at <http://bursar.arizona.edu/students/fees>

similar analyses to explore child care availability in the greater Tucson area. We look first at child care programs for all young children, birth to 5, and then focus on early education programs targeted to the preschool ages of 3 and 4 years.

This study has two objectives: (1) to identify and map “child care deserts” and describe local communities with limited access to child care in terms of the prevalence of young children, socioeconomic factors, and race and ethnicity; and (2) to explore the accessibility of early education programs for preschool-age children.

An Overview of Early Care and Education in the Greater Tucson Area

Families and Young Children in the Greater Tucson Area

We examine the availability and accessibility of early care and education programs in the greater Tucson area, defined for this study as the portion of Pima County east of the Tohono O’odham Nation. This area contains the cities of Tucson and South Tucson, the towns of Marana, Oro Valley, and Sahuarita, as well as 25 Census Designated Places shown on the map below. According to the 2010 Census, there are 73,755 young children ages birth to 5 living in the area, comprising eight percent of the total population of the study area (969,566). The distribution of these children across the study area is shown in Figure 2Figure 1, as are the locations of care providers. The largest concentration of young children live in the central city area of Tucson and South Tucson. Across the study area, 14 percent of households contain at least one child ages birth to 5.

More than one in four families with a child under the age of 5 in the greater Tucson area have a household income at or below the federal poverty level (see Figure 2.). Over half (51%) of families with young children are considered low income, with a household income at or below 185 percent of the federal poverty level. Most families in the area with children of any age (77%) have one or two children. Of the population of all ages, 54 percent are non-Hispanic White, 36 percent are Hispanic or Latino, and three percent are American Indian. However, of young children ages birth to 4, 51 percent are Hispanic or Latino and 36 percent are non-Hispanic White, a flip of the racial and ethnic make-up of the overall population. For the population ages 16 to 64, 59 percent report participating in the labor force, and 43 percent report working full-time. About two-thirds of young children live in a family where all their parents are in the labor force (either living with two parents where both work or are looking for work; or with one parent who is), suggesting a need for child care for at least 47,000 young children in the area.

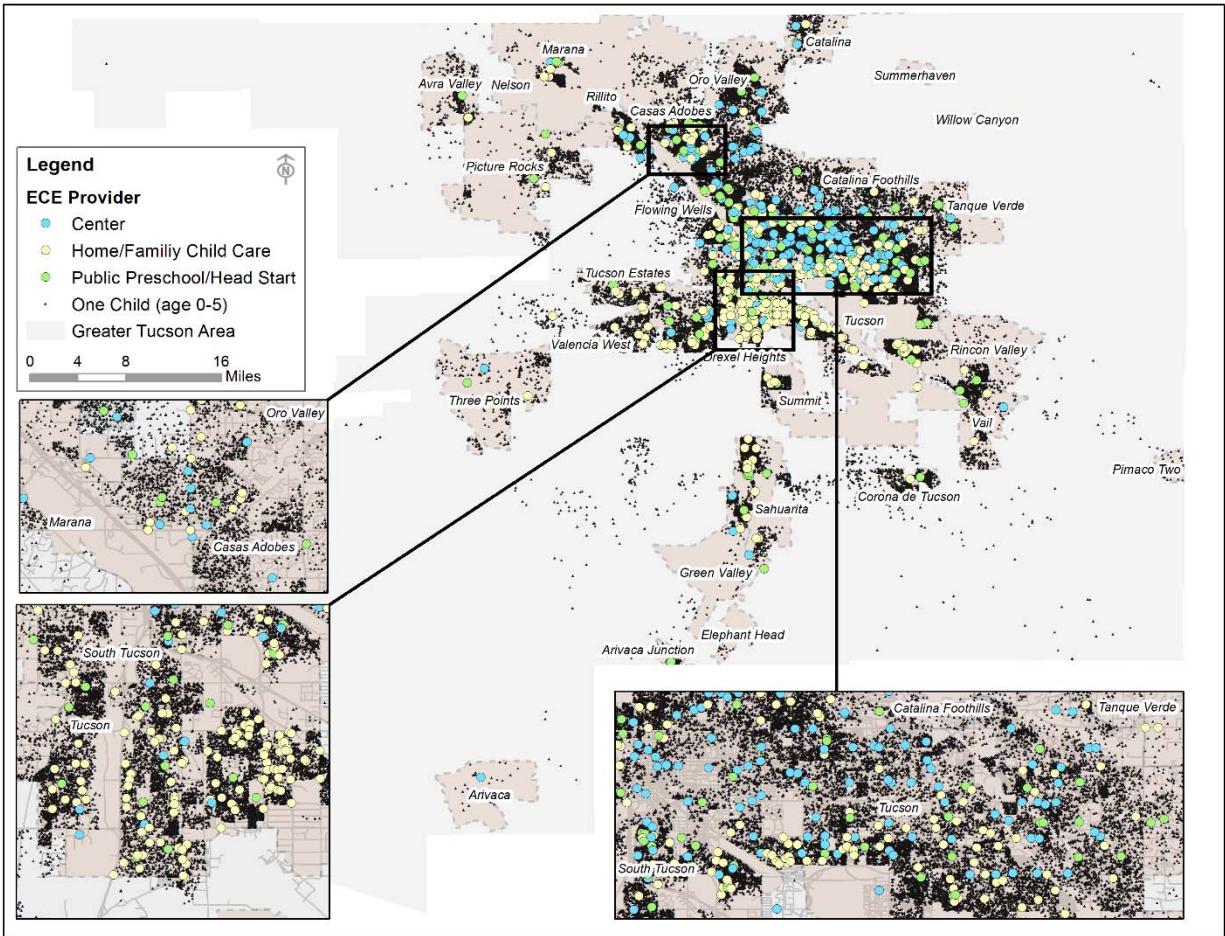
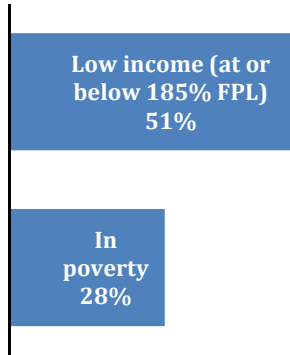
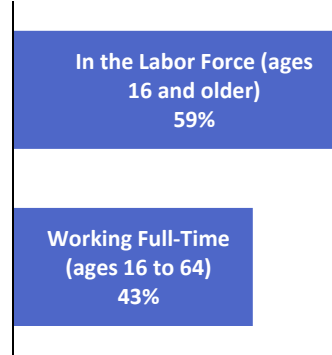


Figure 1. Distribution of young children and ECE providers in the greater Tucson area

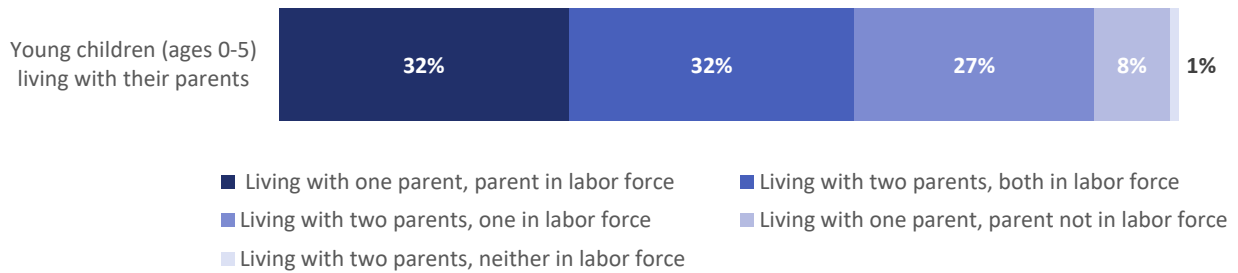
In the greater Tucson area, one in four families with young children (ages 0-4) lives in poverty, and half of all families with young children are low-income.



Nearly 60% of the population age 16 and older are working or looking for work, but not as many work full time.



Nearly two-thirds of young children in the greater Tucson area live in a family where all of their parents are in the labor force.



Over half of all young children in the greater Tucson area are Hispanic or Latino.

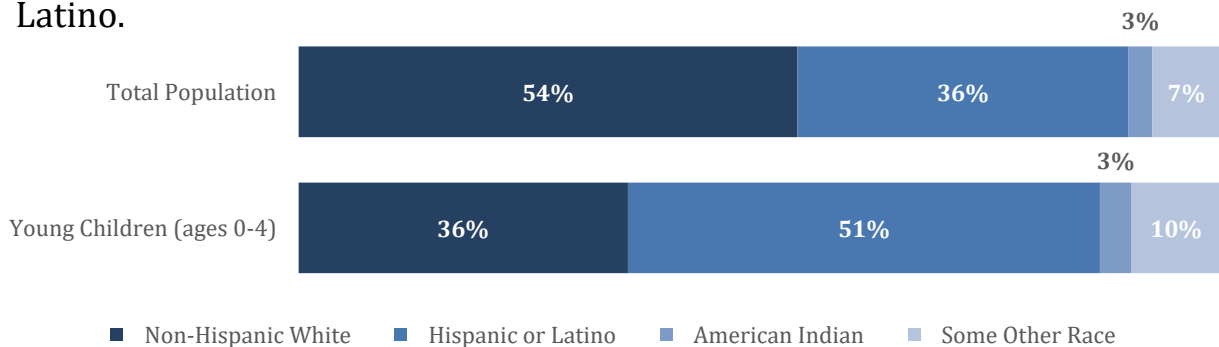


Figure 2. Key sociodemographic characteristics of young children and their families in the greater Tucson area from the 2011-2015 American Community Survey

Center-Based Early Care and Education Providers in Pima County

The most recent, comprehensive snapshot of the operating characteristics of child care providers across the state is provided by the 2014 DES Child Care Market Rate Survey. Although the data from that survey describe a somewhat different catchment than the current study (Pima County vs. greater Tucson area), the results are useful for providing an overview of child care in the area, since over 95 percent of the centers (n=299) and homes (n=479) surveyed do fall in the current study area. The greatest number of center-based providers surveyed (n=93, 31%) are licensed to provide care for 51 to 60 children, although nine percent (n=28) of facilities can serve over 200 children.³⁴ While over three-quarters (78%) of centers offer full-time care for preschool-aged children (defined as at least 6 hours a day), fewer than a third of the centers in the county (31%, n=92) offer full-time care for infants (Figure 3.).³⁴ About two-thirds of centers (68%) offer families with multiple children enrolled a tuition discount for the second child.

For parents needing care outside of the standard business day, center-based options are extremely limited: Two percent (n=7) of centers offer late-night care,⁵ one percent (n=3) offer all-night care,⁶ four percent (n=12) offer care on the weekend, and eight percent (n=24) offer care for longer than 12 hours a day. In the greater Tucson area, 288 center-based early care and education providers (103 of which were public school-based) that were not Head Start centers are included in our analyses.

⁵ Care between 6:30pm and 12am.

⁶ Care between 12am and 6am.

Fewer than a third of child care centers take infants, and half accept toddlers.

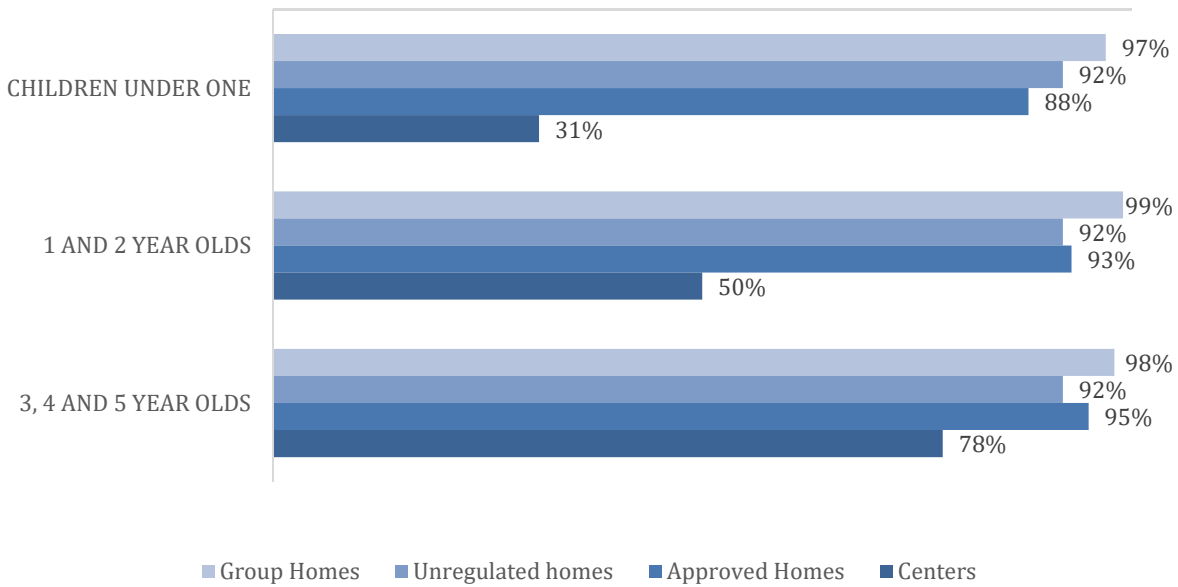


Figure 3. Availability of infant care by child care modality

Home-Based Early Care and Education Providers in Pima County

About 80 percent (n=384) of the home-based providers surveyed in Pima County are “approved homes,” (AH) eligible to serve up to four children in addition to the provider’s own children, and 20 percent (n=92) are “group homes” (GH) which can serve up to 10 outside children. There are 13 additional providers who have registered with CCR&R but are otherwise unregulated. Compared to centers, home-based providers are much more likely to provide full-time infant care (88% AH, 97% GH). Not only are they more likely to provide such care, but they tend to do it at a lower cost (Figure 4.). Homes are nearly as likely as centers to offer a discount for multiple children; 58 percent of group homes, 63 percent of approved homes, and 68 percent of centers provided discounts for multiple children. In addition to providing the more elusive infant care, home-based providers are also much more likely to offer parents child care during non-traditional business hours (Figure 5.). Among approved homes, over half (52%, n=198) of providers offer late night care, one-third (33%, n=128) offer all night care, 60 percent (n=230) offer weekend care, and 41 percent (n= 156) offer extended care. Among group homes, 61 percent (n=58) of providers offer late night care, over half (51%, n=49) offer all night care, 57 percent (n=55) offer weekend care, and 42 percent (n= 40) offer extended care. Our analyses use 408 home-based ECE providers identified in the greater Tucson area.

Infant care and center-based care cost more than other modes of child care.

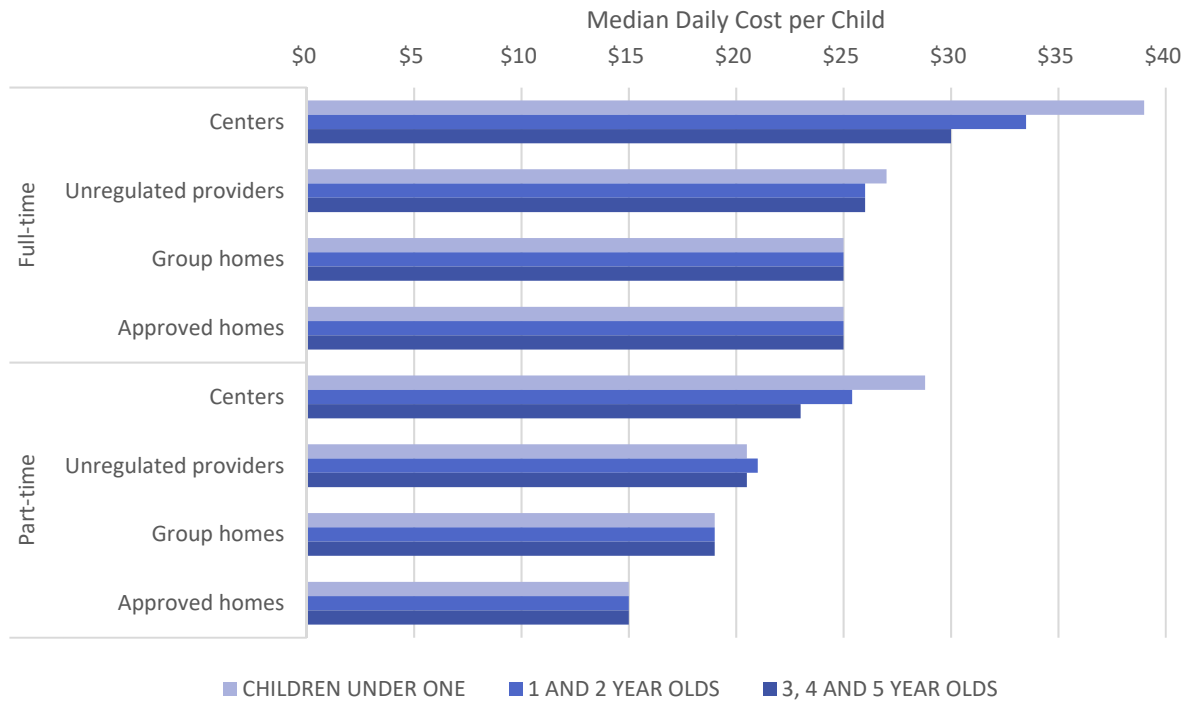


Figure 4. Cost of care by child care modality

Centers provide the least flexible arrangements.

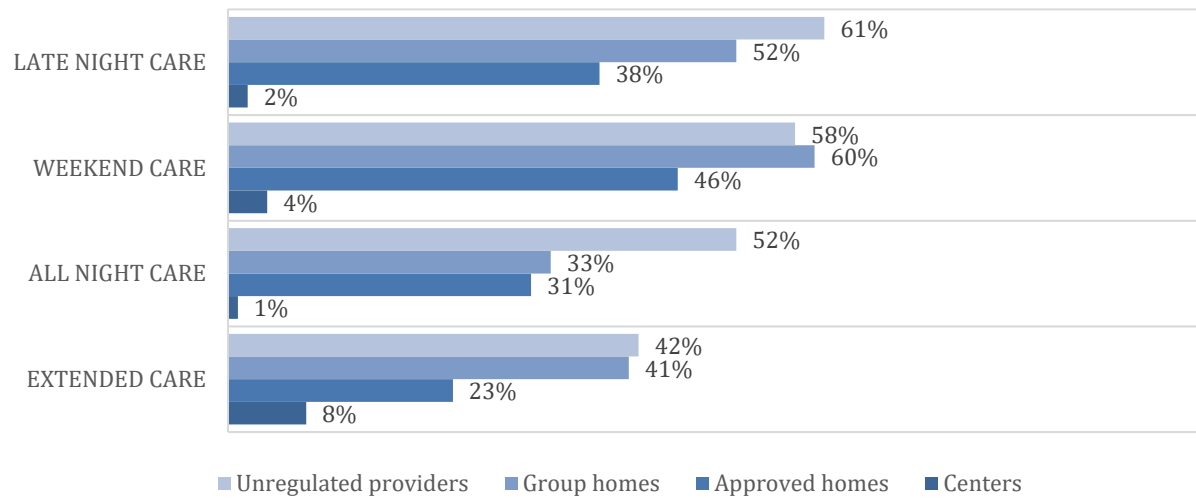


Figure 5. Availability of flexible care by child care modality

Head Start Programs

Head Start is a federal education program for children ages 3 and 4 in low-income families, administered through grants to local agencies. In order to qualify for Head Start, families must have incomes lower than the federal poverty guidelines;⁷ for a family of three in 2017, this includes incomes of less than \$20,420. Children from families whose incomes are above the poverty guidelines, but below 130% of the poverty line under certain conditions may also be eligible to participate.³⁵ In the Tucson area, Child Parent Centers (CPC) runs the Head Start and Early Head Start Programs. Head Start traditionally is a part-day program, operating for four hours a day, four days a week. However, recognizing the need for full-time child care in addition to early education, CPC does operate 5-day-a-week, full-day programs as well. Early Head Start (EHS) programs include home visiting and classroom programs; EHS serves children from 0-2. CPC notes that transportation is available at some, but not all, programs. All Head Start and EHS programs are offered to families free-of-charge. In the 2015-2016 school year, there were 2,054 children enrolled in 27 CPC Head Start centers and home-based programs in Pima County. The majority of children (77%) were enrolled in center-based programs. Of the children enrolled in Head Start, most (87%) met income eligibility requirements, about 6 percent were over-income but enrolled, and the remaining seven percent met other eligibility criteria.⁸ All but one of the Pima County CPC Head Start centers are located within the greater Tucson area.⁹ Federal regulations require that all Head Start programs meet the *Head Start Program Performance Standards* (HPPS). These standards include requirements that program use research-based early childhood curricula and create a learning environment that promotes development consistent with the *Head Start Early Learning Outcomes Framework: Ages Birth to Five*. Programs are required to conduct ongoing self-assessments of the program's progress in meeting goals in the domains of responding to community needs, provision of services, achieving school readiness aligned with state early learning standards, and maintaining effective health and safety practices.³⁶

District-Based Preschool Programs

Across the U.S. as a whole, nearly a third (32%) of 4-year-olds and about five percent of 3-year-olds are enrolled in state-funded preschool programs.³⁷ In Arizona, only four percent of 4-year-olds and two percent of 3-year-olds are served by public preschools, putting Arizona 37th among the states and D.C. in the number of 4-year-olds being served by state-funded preschool programs. Students with special needs are typically eligible to attend district-based preschools free-of-charge. Considering preschool, special education, and Head Start programs jointly, an estimated 21 percent of 4-year-olds are enrolled across Arizona. We identified 103 school-based programs in the greater Tucson area, with an estimated capacity to serve 6,415 children.

⁷ For more information see: <https://aspe.hhs.gov/poverty-guidelines>

⁸ Children meeting other criteria for Head Start include children in families receiving public assistance, foster children, and homeless children.

⁹ The other Pima County CPC Head Start is located in the town of Ajo.

Although many Tucson-area districts offer preschool programs, most of these meet for fairly limited hours. For example, in the largest district, Tucson Unified School District (TUSD), preschool for children ages 3-4 meets four days a week for 2.5 hours a day.³⁸ Given that these programs are supported by Title 1 funds,¹⁰ priority is given to students from low-income families. These funds allow the program to be offered free-of-charge. Through Preschool Development Grant (PDG) funds, TUSD also runs one full-day program (8am -2pm) that is exclusively for low-income children. TUSD does offer fee-based programs at two sites that provide full-time, 5-day-a-week, year-round child care and accept children under age 3, including infants. Other districts' offerings vary from models similar to TUSD's part-day preschool to 5-day-a-week full time preschool programs, available for a fee. Programs offered through local school districts are licensed through the Arizona Department of Health Services (ADHS) and can elect to participate in Quality First or follow other quality guidelines. TUSD, for example, notes that its programs follow the National Association for the Education of Young Children (NAEYC) guidelines. The Arizona Department of Education (ADE) also provides a set of Early Learning Standards,¹¹ a framework for the education of children ages 3 to 5. District-based preschools, along with private preschool programs, use this framework for guidance about the competencies to foster among young children. These standards cover socio-emotional skills; approaches to learning; language and literacy; mathematics; science; social studies; physical development, health, and safety; and fine arts.

Cost of Early Care and Education in the Greater Tucson Area

The DES Child Care Market Rate Survey collects data on the median cost of care in a number of early care and education settings across the state of Arizona. In 2014 in Pima County, the median daily cost of full-time care in a center-based setting was \$39.00 for one infant (less than a year old), \$33.50 for one toddler (1 or 2 years old), and \$30.00 for one preschool-aged child (between 3 and 5 years old). Comparing these costs to the annual median income of families in the Tucson area illustrates the cost burden of early care and education, particularly for single-parent families (Figure 6.; Figure 7.).

¹⁰ Title I, Part A (Title I) of the Elementary and Secondary Education Act (ESEA) provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families.

¹¹ For more information see: <https://cms.azed.gov/home/GetDocumentFile?id=58795495aadebe0c98a804fc>

The median family income of single female-led households with children is only a third of that for married couples.



Figure 6. Median family income by household type in the Tucson Urban Area

Assuming that a year of full-time early care or education entails 240 days of care, we calculated the median cost of care as a percentage of median family income. Infant care is typically more expensive than care for older children, given the higher ratio of staff to children required for licensing.¹²

The relative cost of care is the most affordable for preschool-age children, costing between 10 to 31 percent of a family’s income. However, the cost of care as a share of income for nearly all families in Tucson exceeds the recommendation by the U.S. Department of Health and Human Services that families spend no more than ten percent of their income on child care.³⁹ For a single female-led family at the median income level, full-time early care or education for a preschool-age child would cost nearly a third of her income. Given that many families have two or more young children needing care at once, the overall cost burden of child care can escalate dramatically.

¹² For example, for infants, state licensing requires one adult to five children, or two adults to 11 children. For children age 4, a single adult can handle three times as many children. For more information: <http://www.arizonachildcare.org/childcare-indicators.html>

The average family in Tucson must spend more than 10 percent of their income for full-time early care or education.

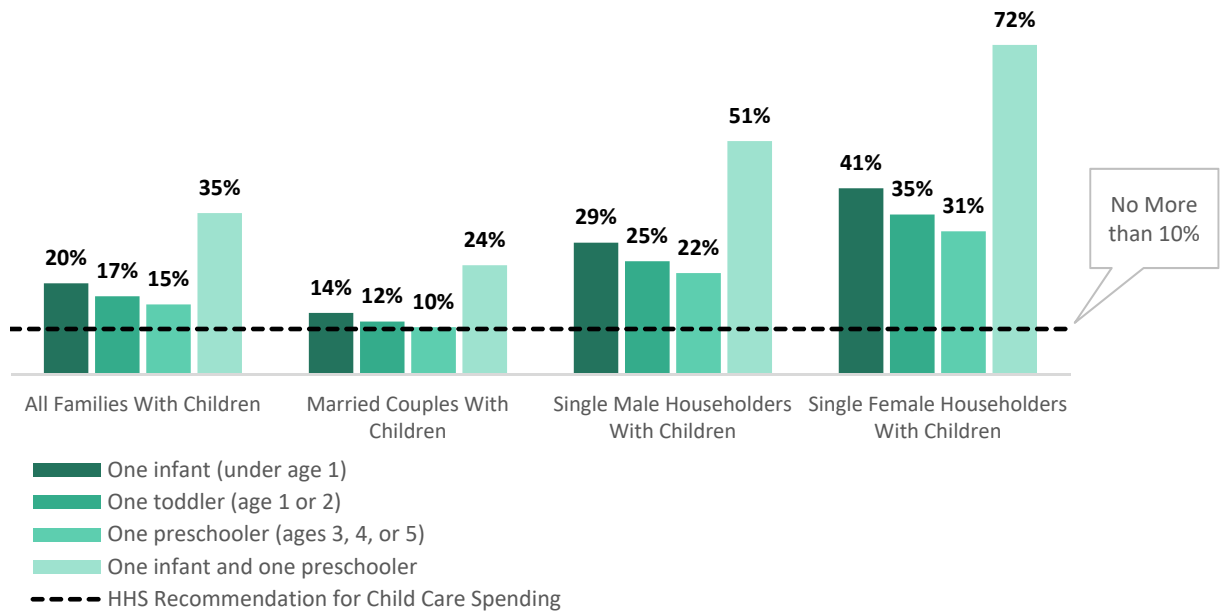


Figure 7. Median cost of care relative to median family income in the Tucson Urban Area.

Defining Quality Care for This Study

States began to develop and implement quality rating and improvement systems (QRIS) for early care and education programs in the late 1990s. Arizona’s QRIS is Quality First, a program of First Things First. Quality First staff use a trio of tools to assess adult-child interactions, learning environments, and staff qualifications and then rate each provider using a star system, where a score of three or more stars on the 5-star scale indicates a quality program. Participating programs receive coaching and funding to support the continued improvement of their programming and may also have the opportunity to offer low-income families Quality First Scholarships to their program. Family and center-based providers, as well as public schools and Head Start organizations are all eligible to participate in Quality First. Depending on the rating, programs are reassessed every one to two years.

In addition to this state rating system, several national organizations offer accreditation, which is also considered indicative of adherence to robust quality standards. As with Quality First, seeking accreditation is voluntary and can be resource-intensive. Thirty percent of early care and education programs identified in this study participate in Quality First. In the Tucson area 44 are nationally accredited: 15 programs are accredited by National Association for the Education of Young Children (NAEYC); 19 are accredited by Association for Early Learning Leaders; six are accredited through National Early Childhood Program Accreditation (NECPA), and four programs are accredited through the

National Association for Family Child Care (NAFCC).¹³ The majority (82%) of nationally accredited programs in the greater Tucson area also participate in Quality First. Programs that do not participate in any of these rating or accreditation systems may still be licensed or certified through the Arizona Department of Health Services (ADHS) or the Arizona Department of Economic Security (DES). All centers must be licensed through ADHS, except those on military bases and tribal lands¹⁴.

For the purpose of these analyses, we include those with a Quality First rating of three stars or above in our definition of high quality early care and education providers, to match Quality First's definitions of quality; 135 providers met this definition. However, participation in Quality First is voluntary, and the program is resource-limited; not all providers who would like to participate are able to and there is typically a waiting list to enter the system. There may be high quality programs available that are not identified through Quality First. We therefore also include Head Start centers, nationally-accredited programs, and public school-based early learning programs in our definition of high quality early care and education providers because of the requirement that these programs follow evidence-based early learning standards.¹⁵ By these definitions, we identified 98 additional providers, for a total of 233 high quality early care and education providers in the greater Tucson area with a combined licensed capacity to serve 15,038 children.

Mapping Child Care Deserts in the Greater Tucson Area

Access to child care is a crucial component of a parent's ability to participate in the labor force or continue their education. In an optimal situation, child care is conveniently located to home and work or school, offers a sufficient duration of care, is affordable, and is proactive about promoting a child's health and development. As many parents know, this holy grail of day care rarely exists. When families cannot secure convenient, affordable, quality care, parents may choose or be forced to remove themselves from the labor force in order to care for children full-time. This has implications for family economic stability and particularly affects the professional trajectories of mothers.⁴⁰ A first step in addressing the need for child care is understanding which geographical areas may be underserved when it comes to child care facilities, i.e., where the child care deserts are.

Methods

We sought to replicate the analysis undertaken by Malik and colleagues³³ to identify and map child care deserts in the greater Tucson area at the ZIP code level. ZIP codes are considered child care deserts if there are more than 30 children under the age of 5 and

¹³ A number of centers also reported accreditation through the National School Age Care Alliance; however, this accrediting organization provides standards for children ages 5 to 14, so we did not consider this accreditation toward our definition of quality early care and education.

¹⁴ Centers on tribal lands are not included in this analysis.

¹⁵ There is some overlap in the indicators. Of the 45 public school-based programs participating in Quality First, 84 percent hold a 3 to 5 star rating, 13 percent have a 2 star rating, and 2 percent are not yet publicly rate. Of the 36 nationally-accredited programs participating in Quality First, 81 percent hold a 3 to 5 star rating, 8 percent have a 2 star rating, and 11 percent are not yet publicly rated. The one Head Start program participating in Quality First currently holds a 3 to 5 star rating.

either no centers or so few centers that the ratio of children to child care slots is greater than or equal to three. We conducted two determinations of child care deserts in the greater Tucson area. The first closely follows the approach taken by Malik and colleagues and only considers the slots available in center-based early care and education providers. Available slots were defined based on the maximum licensed capacity of centers. However, as more than half of the registered early care and education providers in the greater Tucson area are home-based care providers, we also wanted to account for the effect of these providers on the availability of care. Therefore, we ran a second child care desert analysis using the slots available at any early care and education provider, regardless of whether the provider was home- or center-based.

For comparability to other analyses of child care deserts, we initially followed exactly the methods used by Malik et al. and considered only children ages birth to 4. However, for our most substantial analyses of child care deserts considering only center-based providers and then all providers, we include children ages birth to 5 instead of only those under age 5. We do this because, in Arizona, a substantial proportion of 5-year-olds are not eligible for kindergarten depending on when their birthday falls in relation to the cut-off date. According to the Arizona Education Code 15-821 (C), children enrolling in kindergarten must reach the age of 5 before September 1st of the school year;¹⁶ thus as many as a third of 5-year-olds may not be eligible for kindergarten in a given year. Additionally, according to state statute (ARS § 15-901(2)(a)(i)), school districts in Arizona are funded for only half-day kindergarten. Although some districts in the greater Tucson area provide free, full-day kindergarten, not all do. Given these factors, there are a substantial number of 5-year-olds in early care and education programs, and we felt it was appropriate to account for that need.

Beyond simple availability, another important dimension of early care and education is the quality of care provided. Therefore, we also examined the availability of high quality early care and education through the lens of child care deserts. For this analysis, we only considered slots available in high quality early care and education settings, which we defined as Quality First participants with ratings of 3 or more stars, school-based preschools, and Head Start programs, because these programs follow established early education standards (see *Defining Quality Care for This Study*). We mapped the ratio of young children ages birth to 5 to available high quality slots and identified high quality early care and education deserts using the metric of those ZIP codes with more than 30 young children and no high quality early care and education providers or more than three times as many young children as high quality slots.

Results Considering All Providers

When we replicated the child care desert analysis undertaken by Malik and colleagues (looking only at children ages 0-4) in the greater Tucson area, 18 of the 46 total ZIP codes (40%) were identified as child care deserts. These 18 ZIP codes are home to 47 percent of

¹⁶ The Arizona Education Code allows schools to set their own admission policies regarding early admission exceptions for kindergarten students that reach age 5 by January 1 of the school year. District policies regarding early admission in the greater Tucson area vary.

the children ages birth to 4 in the greater Tucson area. Considering children birth to 5 and the availability of center-based care, nearly half (46%, n=21) of the 46 ZIP codes in the greater Tucson area are child care deserts (Figure 8). Only one of these ZIP codes is considered a desert due to a complete lack of center-based early care and education providers. In the other 20 ZIP codes, there were more than three times the number of children ages birth to 5 as there were slots in center-based care. Nine ZIP codes were not considered child care deserts because they contain fewer than 30 children ages birth to 5. Child care deserts are located within the northwestern and southern portions of the study area along with a pocket along the east side of the city of Tucson (Figure 9.). The majority of the suburban and rural ZIP codes on the outskirts of Tucson are either child care deserts or areas with few young children, with the notable exception of Vail, where there are a large number of families with young children and the school district provides early childhood programs at nearly all elementary schools.

Nearly half of ZIP codes in the Greater Tucson Area are child care deserts

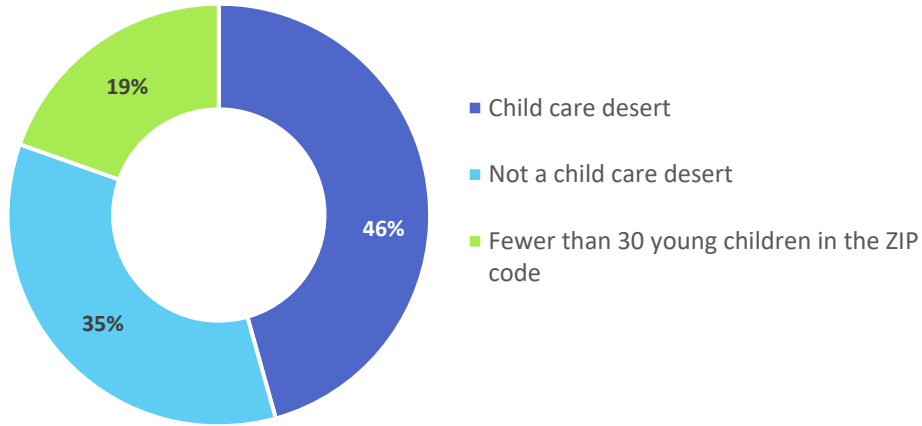


Figure 8. Percent of ZIP codes that are child care deserts

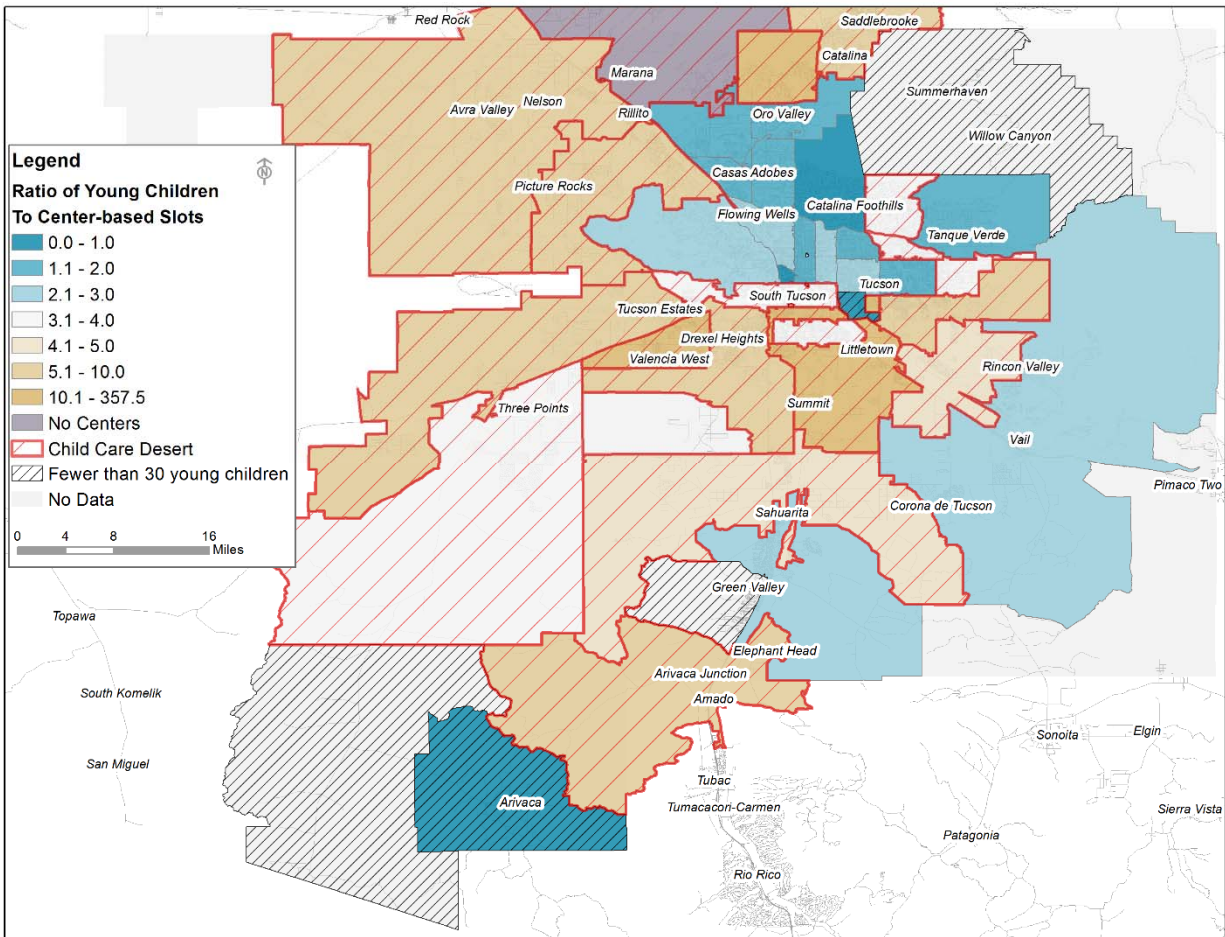
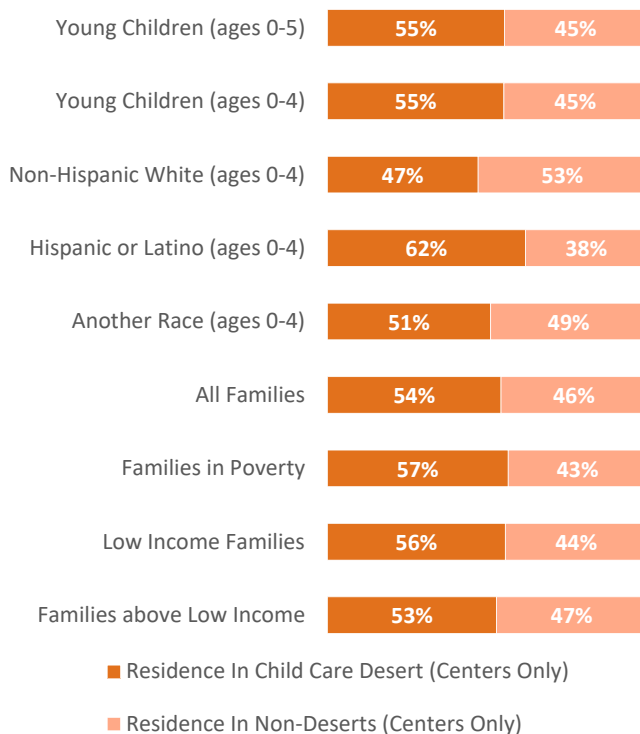


Figure 9. Map of child care deserts

Using the population of children ages 0-5 as the definition of demand, and first considering only center-based providers, over half of young children in the greater Tucson area live in a child care desert, whether we consider children ages birth to 5 or birth to 4 (Figure 10).¹⁷ A greater proportion of Hispanic or Latino young children (62%) live in (center-based) child care deserts than their White counterparts (47%). A slightly higher share of families with young children in poverty (57%) also live in these deserts compared to all families with young children (54%).

About half of all young children live in child care deserts.



Even when home-based providers are considered.

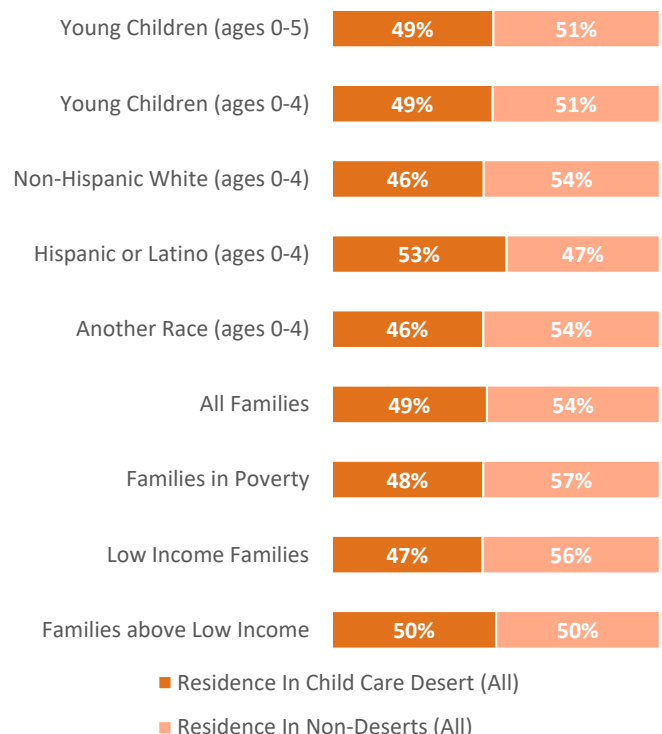


Figure 10. Share of children and families living in child care deserts vs. non-deserts

Although the analyses we were seeking to replicate only used center-based providers, we know that there are many home-based providers in the Tucson area. When we expanded our definition of early care and education providers to also include registered

¹⁷ We show statistics for children ages birth to 5 and birth to 4 due to the variation in data availability by age group from the 2010 Census and 2011-2015 American Community Survey. Data on family poverty and child race and ethnicity is available for the birth to 4 age group, not the birth to 5 age group. However, data on parent labor force participation is available for the birth to 5 age group, not the birth to 4 age group. We show both age groups to show that the distribution between deserts and non-deserts is relatively equal for both.

or regulated home-based providers, the number of child care deserts in the greater Tucson area only decreased slightly, from 21 to 20. This is likely because of the difference in licensed capacity between center-based and home-based providers. It takes about 16 home-based providers to provide the same capacity as one center-based provider. While the average licensed capacity of a center-based provider in the greater Tucson area was 97 children, the average licensed capacity of home-based providers was six children. The one ZIP code that shifted from a desert to non-desert was the 85713 ZCTA, which contains the city of South Tucson.

Overall, when home-based providers are included, just under half (49%) of young children live in a child care desert, compared to 55 percent when we considered only centers. Home-based providers emerged as an important source of care for two sub-populations: Hispanic or Latino families and families in poverty. When including home-based providers, a higher proportion of Hispanic or Latino young children (53%) still live in child care deserts compared to non-Hispanic White children (46%); however, the disparity is less stark, dropping from a 15 percentage point gap to a seven point gap. Including home based providers also alleviates the gap between the proportion of families with young children in poverty living in child care deserts (48%) and all families with young children (49%).

We compared child care deserts and non-deserts (using both center-based, and center + home based definitions) on a selected set of sociodemographic and family structure variables using a one-way MANOVA.¹⁸ Due to the difference of only one ZIP code between them, the comparisons were highly similar; for ease of interpretation, only results for the center-based analysis are shown in Table 1. In both cases, there was a statistically significant multivariate main effect of child care deserts on the variables shown there (see Table 1). The large effect size (partial eta squared= .544), suggests that, taken as a whole, this set of interrelated variables are meaningfully related to the child care desert designation. Post hoc tests showed that child care deserts had a reliably higher mean percentage of households with young children (18% vs 11%, $p=0.022$), and higher mean percentage of households with a grandparent present (5.0% vs 2.5%, $p=0.002$) (Table 1); that is, child care deserts were more likely to have households with grandparents and households with young children. Although child care deserts also had a higher mean percentage of Hispanic or Latino population (37% vs 27%, $p=0.15$), a lower parental labor force participation rate (58% vs 62%, $p=0.17$), and a lower mean density of young children (100 vs 183 per square mile, $p=0.11$), the univariate differences were not statistically significant when considered separately. Including family poverty and family structure variables improved model fit, but there was no significant difference in the poverty rates (23 v. 24%, $p=0.717$) or rates of children in two-parent families (66 vs 64%, $p=0.748$) between deserts and non-deserts.

¹⁸ Of the 46 ZIP codes in the study area, nine were excluded from analysis due to very low population counts that led to American Community Survey estimates with very high margins of error, and one was excluded due to high outlier values on multiple variables.

| | | VALUE | F* | HYPOTHESIS DF | ERROR DF | SIG. | PARTIAL ETA SQUARED | OBSERVED POWER** |
|--|------------------|-------|-------|------------------|-------------|-------|---------------------------|---------------------|
| CHILD CARE DESERT (CENTERS ONLY) | Wilks' Lambda | 0.456 | 4.023 | 8 | 27 | 0.003 | 0.544 | 0.964 |
| CHILD CARE DESERT (ALL PROVIDERS) | Wilks' Lambda | 0.496 | 3.432 | 8 | 27 | 0.008 | 0.504 | 0.928 |

NOTES: *EXACT STATISTIC ** COMPUTED USING ALPHA = .05

Table 1. MANOVA results of child care desert to non-desert comparison on key sociodemographic variables

Results Considering Only High Quality Providers

About half of young children in the study area live in neighborhoods with availability of some form of early care or education. When we limit the number of slots to only those considered high quality— Head Start centers, school-based preschool programs, nationally-accredited programs, or providers with a 3-star or higher Qualify First rating—the picture changes dramatically. Using the high-quality definition, 31 out of 46 ZIP codes in the greater Tucson area have more than three times as many children as they do high quality early care and education slots, meaning that two thirds of ZIP codes (67%) are high-quality child care deserts. Only six ZIP codes included in the analysis have a sufficient number of high quality early care and education slots for the children located there. The 85701 ZIP code, located in downtown Tucson, contains only a few hundred children, two high quality centers and no high quality home-based providers, while the ZIP codes of 85719, 85737, and 85712 in central Tucson are home to large populations of young children but also contain multiple highly-rated ECE centers and homes with high licensed capacity numbers. The community of Vail is home to many young children as well as many school-based preschool and early learning programs. The town of Arivaca in southern Pima County, though it has fewer than 30 young children, has a highly-rated center with the capacity to serve all children residing in the area.

Given the population in the high quality deserts, nearly nine out of 10 young children in the greater Tucson area (89%) live in ZIP codes where there are more than three times as many children as high quality early care and education slots (Figure 11). There are eight ZIP codes in the study area with no high quality providers, but only one of these zip codes, near Marana, is home to more than 30 children. In 13 ZIP codes, on the west, south, and east sides of the city of Tucson, the ratio of young children to high quality slots exceeds 10:1. These results suggest that although there is an overall need for early care providers in much of the greater Tucson area, there is a particularly striking lack of high quality providers.

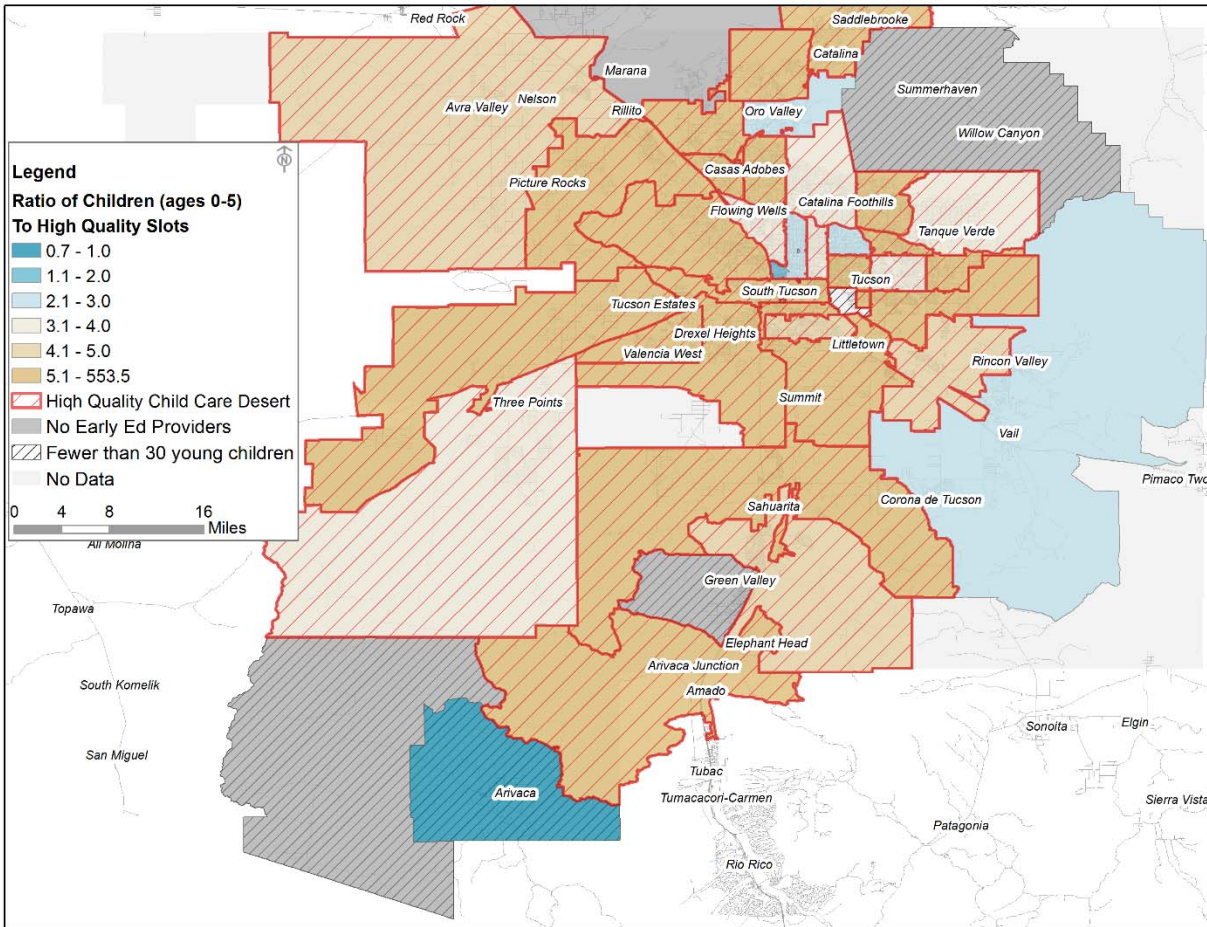


Figure 11. Map of high quality ECE deserts

Discussion

The results of these desert analyses suggest that half of young children in the greater Tucson area live in an area with low availability of any early care and education providers. These results are consistent with the finding by Malik and colleagues that across eight other states in the U.S. nearly half (48%) of all ZIP codes were child care deserts.³³ Given that there are approximately 75,000 children in the region, 47,000 of them with all parents in the labor force, there are not sufficient early care and education slots to serve the young children residing in the greater Tucson area. If all 30,102 slots available through licensed and registered providers were designated only for young children¹⁹ and filled, there would still be over 43,000 young children without an available slot in a formal early care and education provider. Even if we assume that all 5-year-olds could enroll in full-day kindergarten, there would still be over 31,000 children under the age of 5 without an

¹⁹ This is likely not the case as many centers serve both young children and school-age children.

available slot. The availability of high quality providers is even more limited; there are only about 15,000 slots in high quality programs. In other words, there is approximately one high quality slot for every five young children in the greater Tucson area. Mapping child care deserts in the greater Tucson area identifies areas with particularly severe mismatches between the number of young children and availability of early care and education slots. This mismatch is not evenly distributed; rather it is more acutely concentrated in certain areas of the region, particularly in the southern and western portions of the city.

Many of the child care desert ZIP codes lie in the areas just outside the central city of Tucson, suggesting that child care is less available in more suburban-to-rural areas where the population is less concentrated. This mirrors findings by Malik and colleagues that rural ZIP codes are more likely to be child care deserts than their suburban or urban counterparts.³³ Centers may find it more advantageous to locate in densely populated areas of the city with more concentrated populations of young children. Centers may also tend to be located in the commercial and business-dense areas since families may gravitate toward child care that is convenient to their workplaces. Although more densely populated areas are less likely to be child care deserts, child care shortages in highly populated areas have a disproportionate effect on high numbers of children.

Second, many of the desert ZIP codes are located in areas where there are higher concentrations of Hispanic or Latino families. This, combined with the higher prevalence of multigenerational households in the child care deserts found in our analysis, suggests that sociocultural factors may be related to the presence of child care deserts. Nationwide, a lower percentage of Latino young children are in non-relative early childhood care and education programs (24%, compared to 40% of White children birth to 4)⁴¹ and many studies find that that Latino families are less likely to use center-based care, particularly where the home language is Spanish.^{1,42} Part of this may be accounted for by the presence of multigenerational families, with grandparents more likely to be in the home, as was also found to be more prevalent in child care deserts in the Tucson area. It is not clear, however, whether a preference for, and access to, kinship and other non-formal care lowers demand for center-based care in these areas, or whether the lack of available center-based care that meets their needs leads families to seek other solutions.

Restricting the analysis to include only identified high quality early care and education providers highlights a paucity of such slots in the greater Tucson area. In addition to the implications for parents in finding providers that they feel safe entrusting with their child's well-being and development, this also has implications for which providers parents may be able to afford. The Quality First Scholarship program makes more scholarships available to programs with higher Quality First quality ratings, so if an area has few high quality programs, access may be further hampered for families needing financial support. On the other hand, for families who face financial challenges but do not meet income requirements for assistance programs, the presence of only high quality programs, which typically have higher operating costs, may drive the cost of care up to an untenable point.

Limitations

The concept of child care deserts provides a simple metric for evaluating the availability of early care and education providers. However, this analysis is limited in its ability to capture the accessibility of these providers. As discussed above, there are multiple dimensions of access to consider when addressing the accessibility of opportunities for early care and education, including spatial accessibility, temporal accessibility, cost, public awareness, and social and cultural factors. The child care desert designation takes a narrow approach to accessibility: providers are only considered accessible to those living in the ZIP code within which the provider is located. This approach is highly susceptible to scale effects—the results of this analysis are likely to change depending on the size and shape of the geographic unit used.⁴³ Additionally, this approach does not reflect everyday mobility within the study area. For example, if a family lived just down the street from a child care provider but happened to straddle a ZIP code boundary, in these analyses, that family would not be considered as having access to that center. Findings from the most recent national survey of families using child care suggest that on average families travel 4.6 miles to access child care for children under the age of three and 3.9 miles for child care for children ages 3 to 5. Travelling such distances in the central city of Tucson would involve crossing the boundaries of two to three ZIP codes, meaning that families in Tucson are likely to access child care opportunities in ZIP codes beyond the ZIP code in which they live. In our next analysis, we take into account this mobility in our assessment of the accessibility of preschool opportunities in the greater Tucson area.

Early Education (Preschool) Access and Enrollment

Wide availability of quality child care for children across the early years (birth to 5) is important to enable parents to be employed and to attend school and training. Our previous analyses looked across all ages to examine the availability of early care and education across early childhood. As children approach school age, high quality early educational experiences (preschool) can help 3 and 4 year olds prepare them for kindergarten and beyond. Here, we focus on opportunities available to children in that age range specifically.

Early Education Providers in the Greater Tucson Area

For our analysis of access to preschool opportunities in the greater Tucson area, we look specifically at the availability of high quality early education programs available to children 3 and 4 years old. Not only do parents report that they choose facilities based on their quality,²⁸ research has repeatedly shown that the positive impacts of preschool stem from *high quality* early education programs; poor programs can actually have detrimental impacts.^{44,45} Robust programs have been linked with more advanced academic and cognitive skills for children, particularly those from low-income families.⁴⁶ Thus, access to high quality preschool programs is considered by educators to be an important step in preparing all children for entry into formal schooling and laying the foundation for a successful academic future.

We defined high quality early education providers as Quality First providers, Head Start programs, school-based preschool, and nationally accredited programs. We chose

these categories of providers because each of these programs follows early childhood education standards that aim to increase kindergarten readiness. In the greater Tucson area, there are 233 early education providers with a combined enrollment of 11,173 and a maximum licensed capacity of 15,308.²⁰ Most early education providers are located in the central and south Tucson areas, along with small cluster of early education providers around Vail, Sahuarita, and Casas Adobes.

Measuring Access to Early Education

We first explored preschool access by extending the child care desert concept to consider early education deserts in the greater Tucson area. We calculated the ratio of preschool-age children to early education slots in a particular ZIP code by dividing the population of preschool-age children (3 and 4 years) in that ZIP code by the sum of licensed capacity of all early education providers within that ZIP code. Again, we define deserts as those ZIP codes with 30 or more preschool-age children and either no early education providers or more than three times as many children as providers.

We then took a more nuanced approach to preschool through application of a two-step floating catchment area (2SFCA) approach at the census tract level, following Fransen and colleagues.⁴⁷ The 2SFCA approach to assessing potential spatial access was first developed by Luo for use in determination of the ratio of population to health care providers.⁴⁸ A window or ‘floating catchment area’ is used to determine the population within an accessible distance of a given facility instead of using a fixed geographic unit such as a ZIP code or census tract. This approach accounts for the movement of individuals beyond the tract or ZIP code in which they live, providing a more realistic assessment of accessible facilities. It has been widely used in the health care access literature due to its ability to provide more accurate population-to-provider ratios (for more information, see Analysis Details of the Two-Step Floating Catchment Area (2SFCA) Method, on page 39). We defined the number of available early education slots using the maximum licensed capacity for early education providers as the number of available slots, which we refer to as “maximum capacity.” This provides a likely over-estimate of slot availability for preschool-aged children because most providers do not operate at full capacity, and because we were not able to identify the specific number of slots available to 3 and 4 year olds in some programs.³⁴ However, this can be considered a best-case scenario of full utilization of early education opportunities.

Patterns of Spatial Accessibility to Early Education

Of the 46 ZIP code based areas, there are 12 early education deserts in the greater Tucson area, outlined in orange in the map below (Figure 12; Figure 13). One of these deserts, in the Marana area, lacks any early education providers. In the other 11 ZIP codes (in the eastern Foothills area, east-central Tucson, Picture Rocks area, and south of Tucson), the ratio of preschool age children to available early education slots exceeds 3 to 1. According to this analysis, 30 percent of preschool-age children in the greater Tucson area live in

²⁰ This number mirrors the number of high-quality child care slots noted above since we were not able to separate out the number of slots in Quality First or nationally accredited providers reserved exclusively for preschool-aged children.

early education deserts. However, as discussed above, the desert metric is a narrow conception of access that does not take into account the fact that families may seek early education opportunities in ZIP codes beyond the one in which they live.

There are fewer preschool deserts than child care deserts

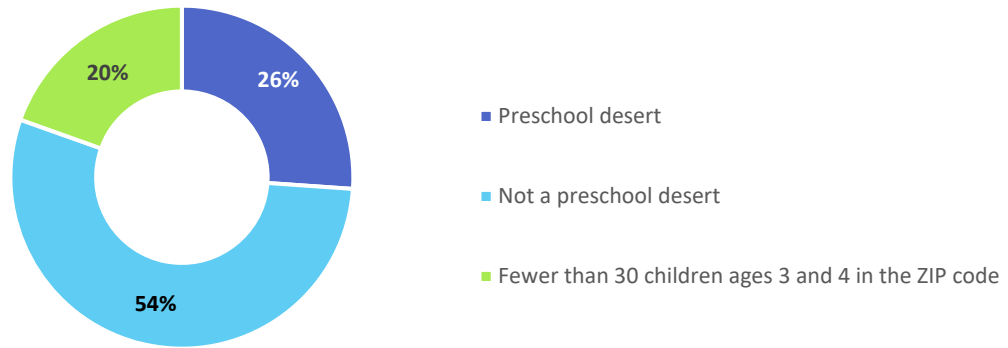


Figure 12. Percent of zip codes that are preschool deserts.

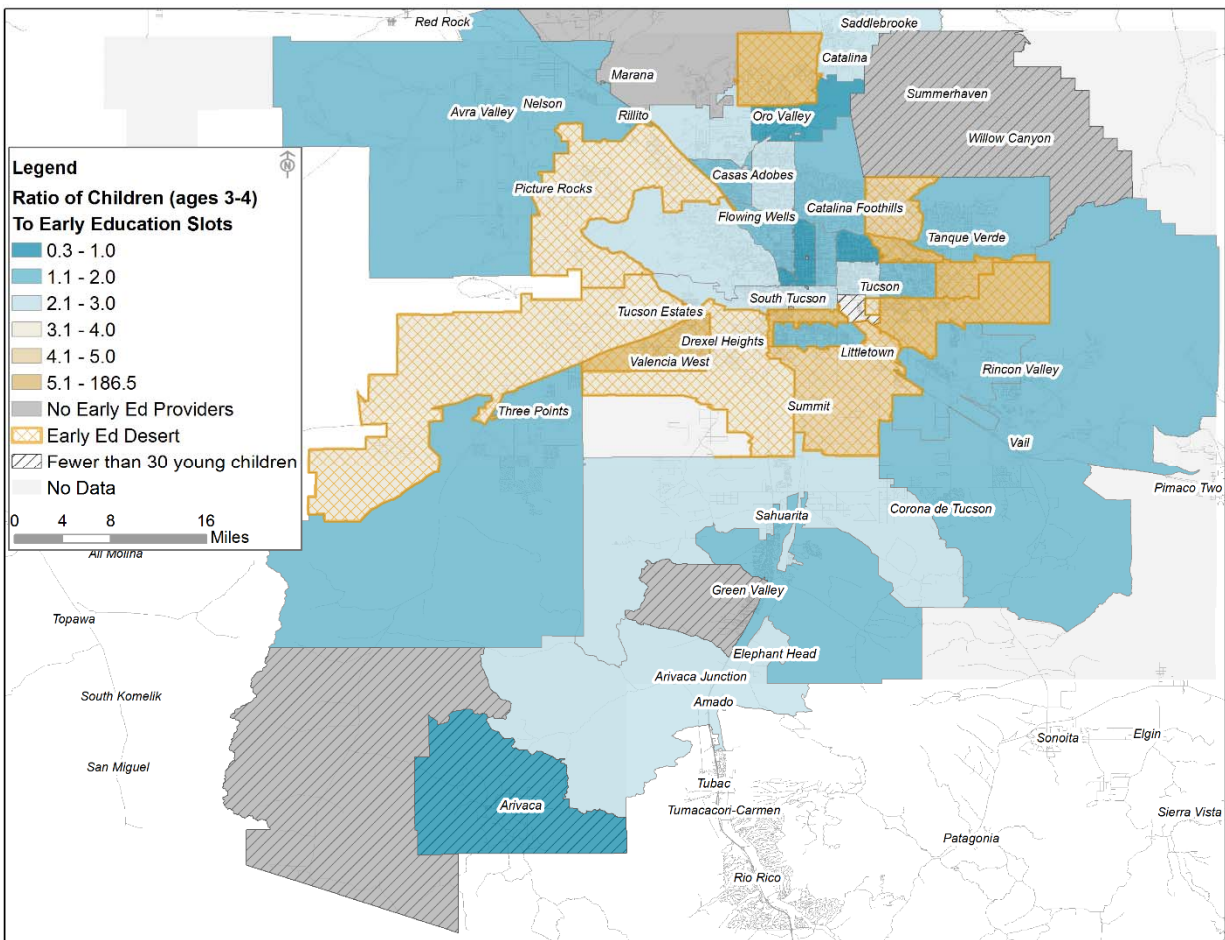


Figure 13. Map of high quality preschool deserts

When we apply the 2SFCA approach to model access at the tract level, we allow for movement within 3.9 mile driving distance of the center of the tract, the average distance a family with preschool-age children travels for early care or education arrangements.⁴⁹ Using this approach, tracts within the central city and near the communities of Oro Valley, Catalina, South Tucson, Vail, and Sahuarita have the highest access to early education opportunities in the greater Tucson area.²¹

Comparing the access map using the 2SFCA method (Figure 14) to the child care desert map above (Figure 13.), we see several key differences between these methods of assessing spatial access. There are several areas where the two maps align: in the area just south of the city of Tucson near Drexel Heights and Tucson Estates; in the neighborhoods just north of Davis-Monthan Air Force Base; in the northern areas of the study area near the town of Marana; and in the eastern portion of Catalina Foothills. These are areas where there is likely a lack of early education providers within easy driving distance. The areas of disagreement between the two maps, specifically in East Tucson, illustrate the difference made allowing for the movement of people across statistical unit boundaries. In the East ZIP codes, there may not be sufficient providers to serve the preschool-age children living within those ZIP codes. However, there is sufficient capacity in providers located near those neighborhoods to allow for good spatial access for those with transportation.

²¹ Access decreases if we consider slots based on current enrollment at providers instead of maximum capacity. The true number of slots available for children is likely between these two estimates; while some providers may be currently operating at the capacity they prefer, others may have some slots available for new children to enroll. At the tract level in the greater Tucson area, between 23.9 and 34.5 percent of preschool-age children live in areas where there are more than three times as many children as early education slots, depending on whether current enrollment or maximum capacity is used to model slot availability.

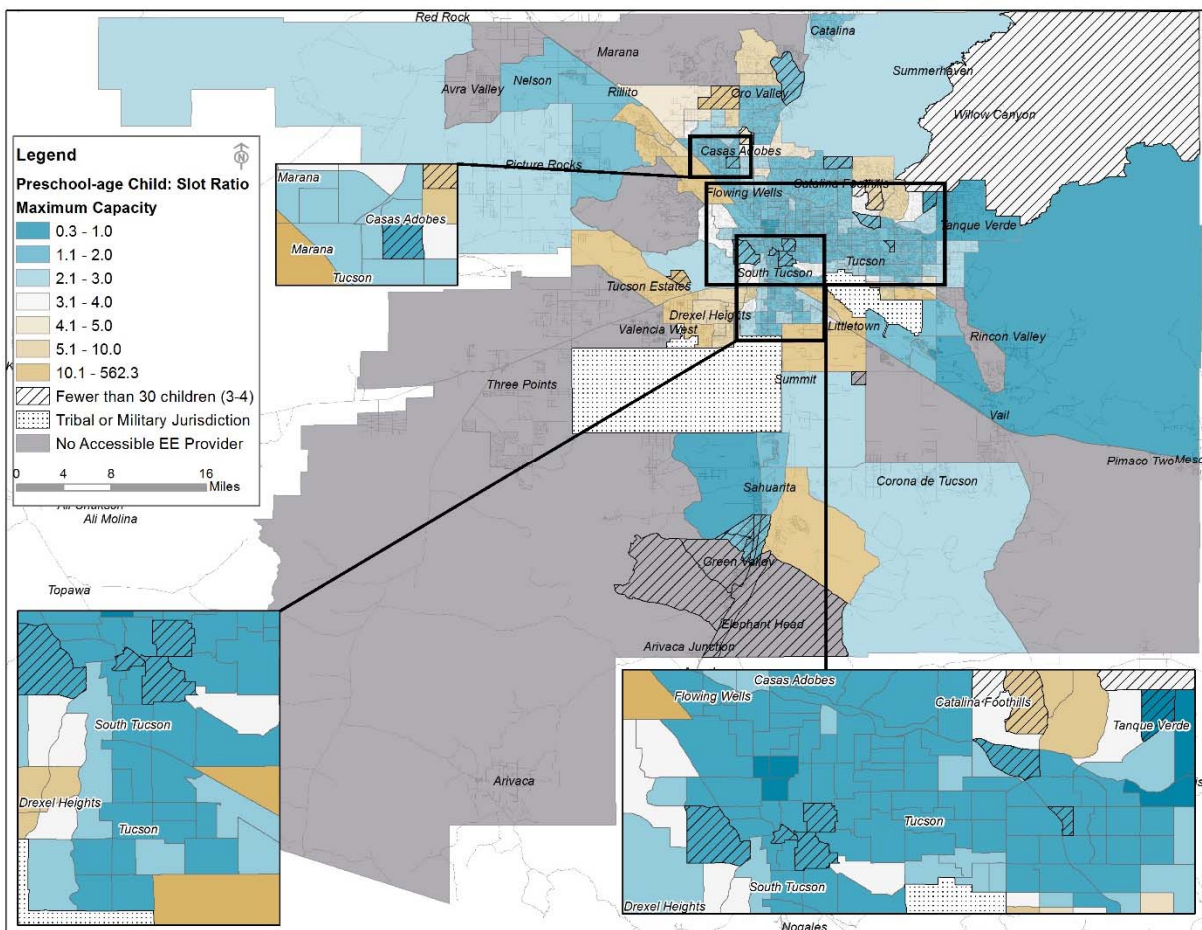


Figure 14. Map of the ratio of preschool-age children to high quality preschool slots

A few other areas of disagreement between the two maps, in the more rural tracts around Three Points, Arivaca, Arivaca Junction, and Rincon Valley, show some of the limitations of this application of the 2SFCA approach. The analysis method we applied relies on a population-weighted center of a tract to serve as the point from which distances are measured. In large, rural tracts, this measure is less accurate due to the larger sizes of the tracts and the more dispersed population. Additionally, the distance metric we used in our method may not be as applicable to more rural areas, where families may be willing to drive farther distances on a regular basis.⁵⁰ Further research to determine the appropriate distance thresholds for families in more rural areas and how to better model the distribution of demand in large, unevenly populated tracts could address these shortcomings.

Overall, use of both the desert and the 2SFCA approach to measuring spatial access to early education providers in the greater Tucson area shows that while early education opportunities are highly available in some neighborhoods, such as central Tucson, Oro Valley, and Vail, there are areas where families have limited spatial access to early education providers. As many as one out of every three preschool-age children live in

neighborhoods where the ratio of children to early education slots nearby exceeds 3-to-1. This suggests that there is an acute need for early education providers in certain parts of the greater Tucson area, particularly on the southern and western sides of the city.

Additional Accessibility Considerations

In addition to the simple availability of proximal providers discussed above, families contend with factors such as transportation and cost. The following analyses apply to both child care and preschool settings.

Transportation Access

Availability of transportation is another factor that influences families' abilities to access early care and education opportunities. The analyses of spatial access above assume that families have access to a vehicle; however, five percent of households with two or more people in the greater Tucson area have no available vehicles. These families instead must rely on public transportation or seek early education opportunities that provide transportation. Although some Head Start programs provide free transportation, many other early care and education providers do not. Just over one-third (35%) of all providers registered with the Child Care Resource & Referral (CCR&R) guide provide transportation, and another five percent report being near a public transportation stop.²² However, the CCR&R reflects all early care and education providers rather than early education providers specifically. Among high quality child care and early education providers appearing in the CCR&R (i.e., 3-5 star Quality First providers), 36 percent report providing transportation. Of school-based early education programs in the CCR&R, only one out of the 69 total programs reports providing transportation. However, school-based programs do provide free transportation for preschool students with special needs.

²² Please note that the percent of child care providers near public transportation stops is based on self-reported data by providers surveyed and thus influenced by provider awareness of nearby stops.

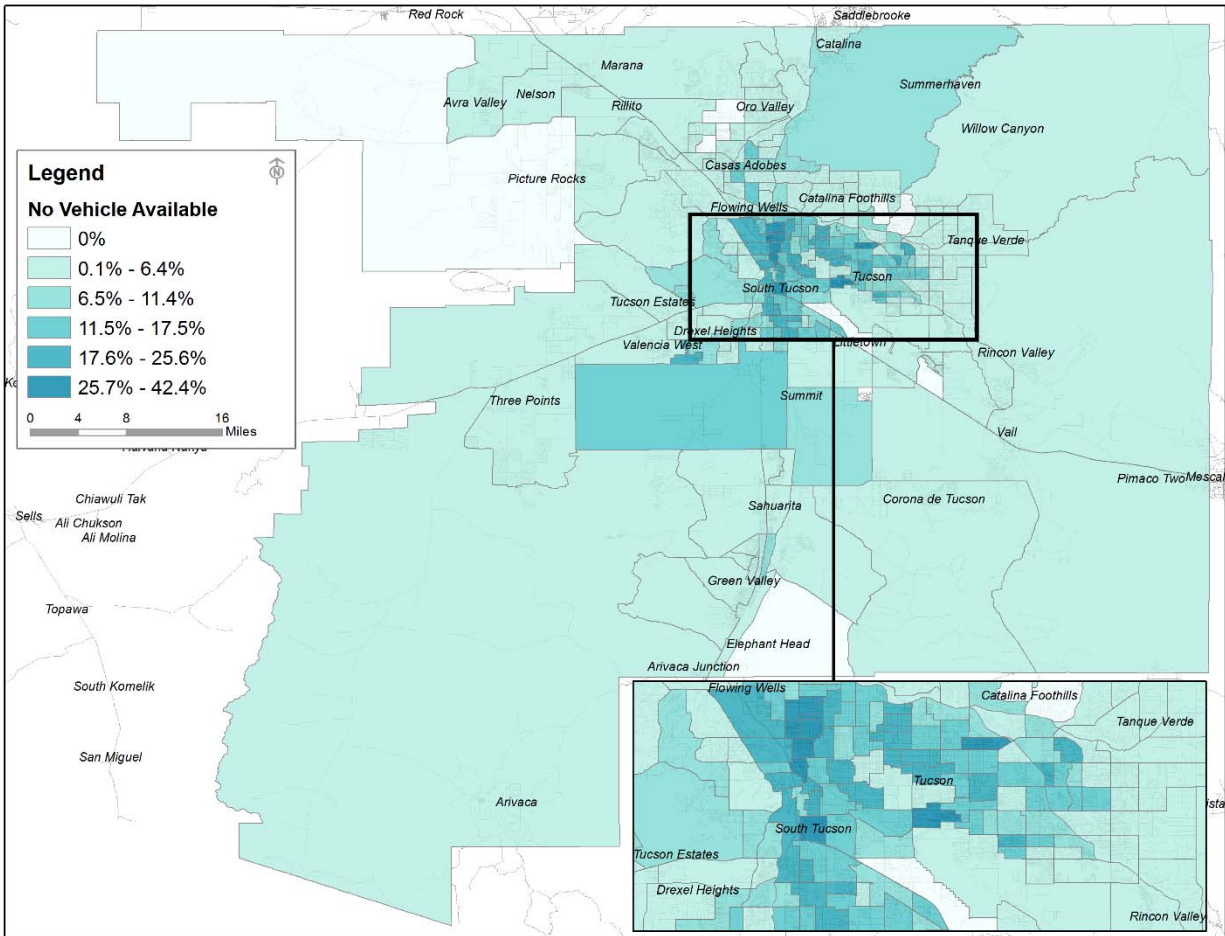


Figure 15. Map of households with no available vehicles by tract.

The need for transportation varies across the greater Tucson area (Figure 15.). While the vast majority of households on the outskirts of the study area have a vehicle, the percentage of households without a vehicle is considerably higher in the central city, particularly on the west side of the city and along the Oracle Road corridor the falls south of River Rd. Overall, six percent of preschool-age children live in tracts where more than one in four households lacks an available vehicle, and 37 percent of preschool age children live in tracts where more than one in ten households does not have access to a vehicle. Most of the tracts with high percentages of households without access to a vehicle are located in areas with relatively high spatial access to early education opportunities based on driving distances; however, travelling 3.9 miles by foot or on public transportation with small children would be much more difficult if not impossible to do in a timely manner. This suggests that even in areas of high spatial accessibility, families may need additional support accessing transportation to early education providers.

Financial Access

Cost presents another substantial barrier to accessing both child care and early education opportunities. Even if a family lives near an early education provider with slots open for

their child and has a means of transportation to reach that provider, the cost of enrolling a child in early education may prove too much for that family to afford. The cost of early education varies in the greater Tucson area. Head Start programs enroll children at no cost to families, provided that the family meets income criteria (see Head Start Programs, page 14). Some public school-based programs are also provided at no cost, especially for children with special needs; however, because public preschool is not required in the state of Arizona, many local district-based programs do charge tuition fees for children without special needs. Most Quality First providers (other than Head Start and school-based programs) charge tuition for their programs.

There are a number of scholarship and subsidy programs for both early care and education available for families who qualify. For example, providers participating in Quality First are allotted scholarship funds based on their Quality First rating. These funds may be used to cover full-time or part-time scholarships for children in families at or below 200 percent of the federal poverty level.⁵¹ The Department of Economic Security (DES) also provides child care subsidies for families with a monthly income below 165 percent of the federal poverty level or that meet special criteria, such as foster families or families receiving Temporary Assistance for Needy Families (TANF). Families receiving child care subsidies must pay a co-pay based on a sliding scale that ranges from \$1 to \$10 per child per day, depending on family income.⁵²

However, there are limited numbers of these scholarships and subsidies available. In 2015, 8,425 children from 5,947 families received DES child care subsidies; 44 percent of these children were in foster families. In that year, 1,133 children were on a waiting list for child care subsidies. These subsidies are open to children up to age 12, meaning that the number of subsidies available to preschool-age children are lower than the overall numbers of subsidies provided. Another support mechanism, the Quality First Scholarship program, underwent substantial cuts in FY2016.⁵³ As of March 2017, there were 561 full-time Quality First scholarships available at providers in the greater Tucson area, and 446 of these scholarships were available at a Quality First center or home with a rating of three to five stars. Comparing the number of scholarships to the licensed capacity of these providers shows that there are enough scholarships to serve only about seven percent of their overall capacity. Put another way, there are currently enough Quality First scholarships to provide one scholarship for every 15 slots in a center or home with a three to five star rating.

As we noted in *Cost of Early Care and Education in the Greater Tucson Area* (page 15), the U.S. Department of Health and Human Services recommends that families spend no more than ten percent of their income on child care and early education. Considering the distribution of income in the greater Tucson area, families in certain areas of the city are likely to experience a much higher cost burden (Figure 16. Map of the median annual cost of care for a child ages 3 to 5 as a percent of median family income by tract). Costs as a share of median income are much higher in central Tucson as well as in communities to the

south and west of Tucson.²³ On average, families in Marana, the Foothills area, and Vail would have to pay less than 10 percent of their income to enroll a preschool-age child in a center charging the median rate. However, families in central Tucson, South Tucson, and the Oracle corridor would have to pay between a quarter and half of their family's income to enroll in a similar center. In the greater Tucson area as a whole, three out of four preschool-age children live in tracts where the cost of center-based care for a preschool-age child exceeds 10 percent of the median family income for families with children in that area; one in four preschool-age children live in a tract where the cost exceeds 25 percent of the median income. Cost burdens are almost certainly even higher for single-parent families in these neighborhoods.²⁴

²³ The cost care was a county-level variable (i.e., is constant across all tracts), so the variation illustrated in **Figure 16. Map of the median annual cost of care for a child ages 3 to 5 as a percent of median family income by tract** reflects variation in income by tract.

²⁴ Estimates of median income for single parent families were not reliable enough to use at the tract level as the basis of cost calculations.

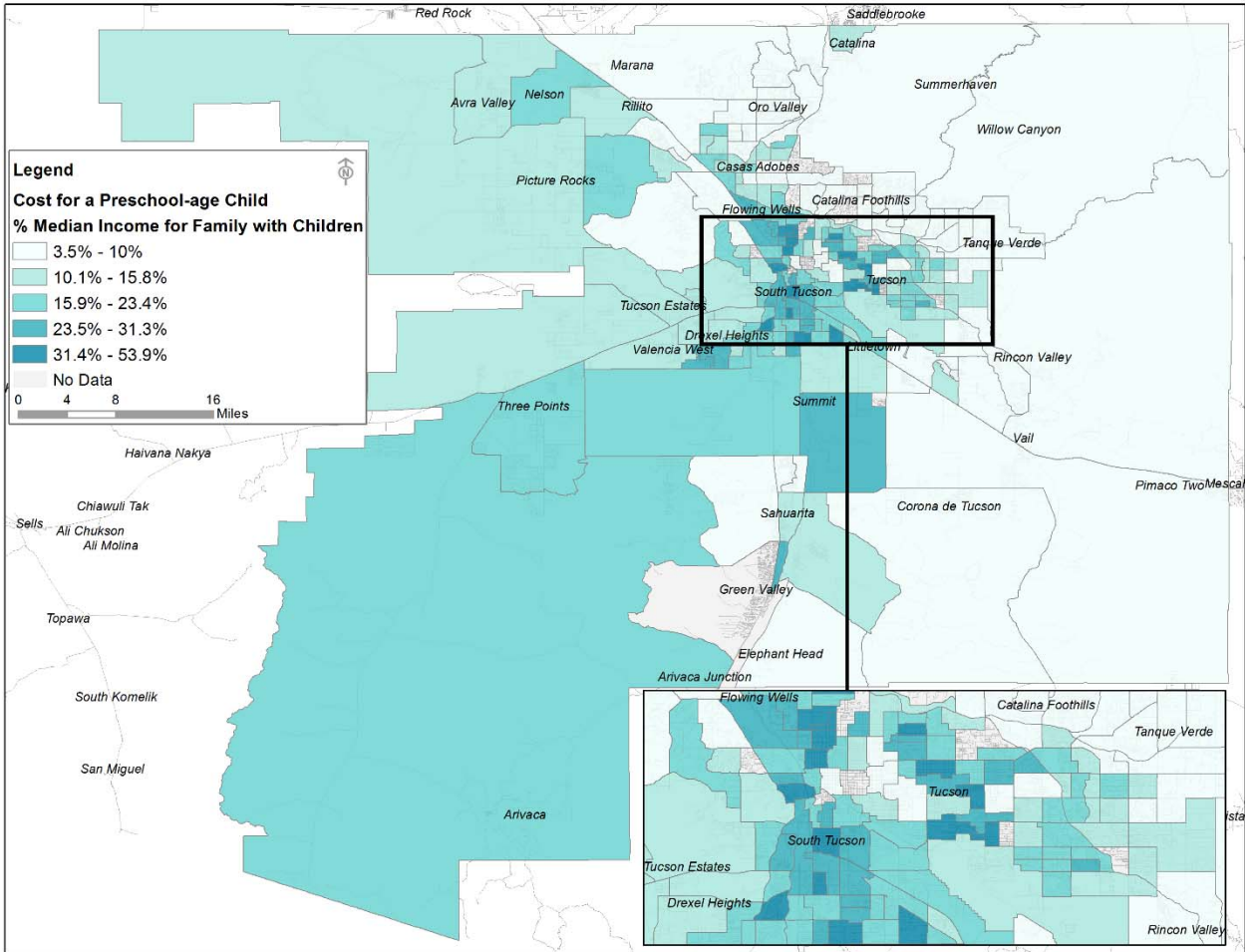


Figure 16. Map of the median annual cost of care for a child ages 3 to 5 as a percent of median family income by tract

Many of these tracts with lower median incomes correspond to those with poor access to personal vehicles, suggesting a dual burden of financial access and transportation access. Although many of these areas have high spatial access to early education opportunities, spatial access is insufficient if families cannot afford the tuition of these providers. For families in these neighborhoods, no-cost early education or cost supports for tuition are vitally important. Overlaying the locations of early education providers on the cost map shows that Head Start centers, which are most likely to be accessible in terms of both transportation and cost to these families, tend to be located in these neighborhoods where the cost burden for center-based care tuition is highest (Figure 17). However, there are not enough Head Start slots to serve all of the children living in neighborhoods with high cost burdens. In the 2015-2016 school year, there were 2,042 children enrolled in Head Start centers in the greater Tucson Area. However, there are 6,053 preschool-age children living in neighborhoods where the cost of care exceeds 25 percent of the median income for families with children. Not all of these children may qualify for Head Start, as eligibility is determined by individual family income. However, the high percentage of preschool-age children living in neighborhoods where the cost of child care is a substantial

percentage of the median family income and the limited number of no-cost early education slots and scholarships and subsidies suggest there is considerable unmet need for affordable early education in the greater Tucson area.

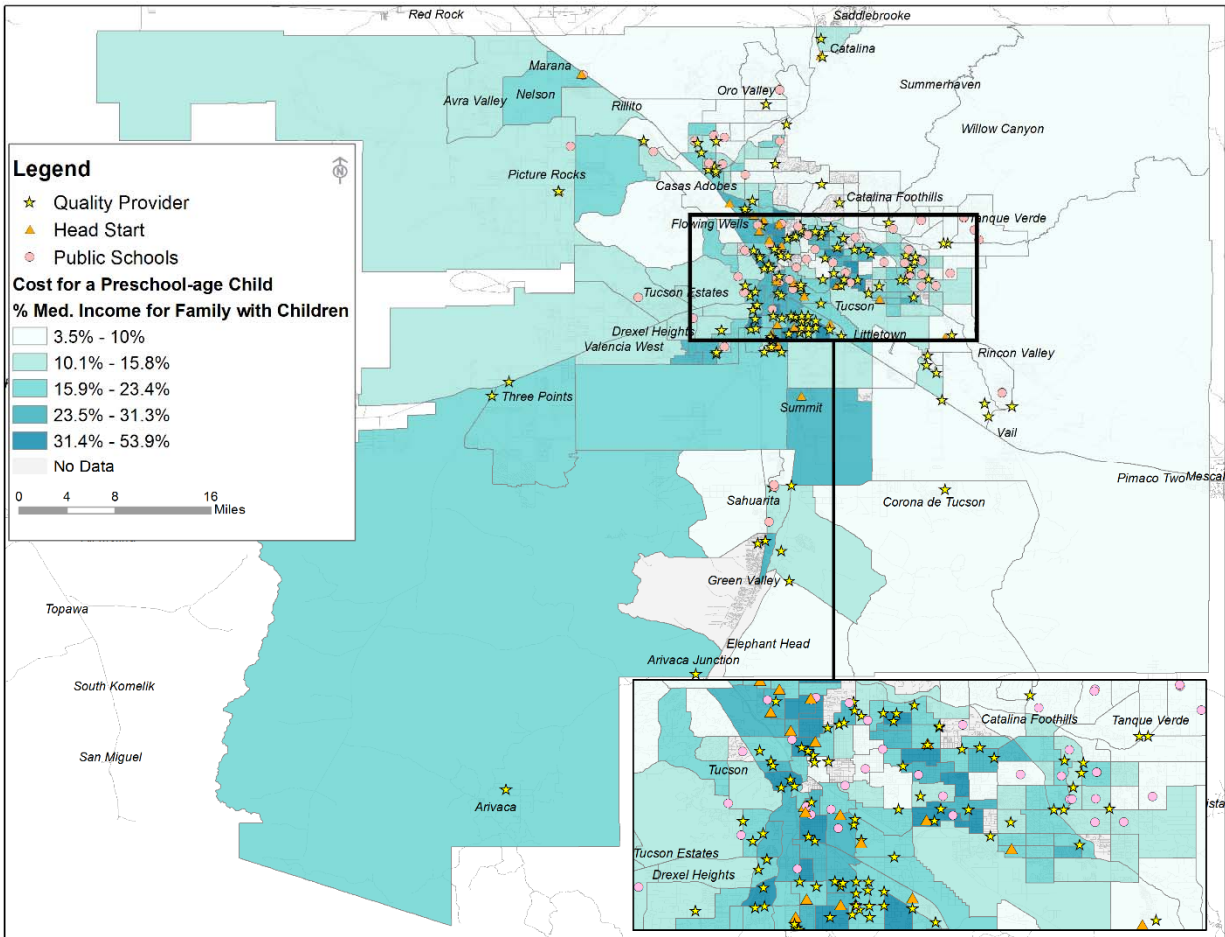


Figure 17. Map of relative cost of care for a child ages 3 to 5 by tract with an overlay of early education providers by type

Assessing the relation between early education enrollment and access

Research suggests that better spatial and financial accessibility is linked to higher enrollment in early care and education programs.^{24,25} Therefore, we would expect areas with better accessibility at the tract level to have higher enrollment in early education programs. The American Community Survey (ACS) asks about preschool or nursery school enrollment for 3- and 4-year-old children in their questionnaire. An estimated 40 percent of 3- and 4-year olds in the greater Tucson area are enrolled in early education in our study area.²⁵

²⁵ The percent of 3- and 4-year-olds enrolled in early education in the greater Tucson area (39.8%) is nearly identical to that in the Tucson Urban Area (39.6%), despite the geographic difference between our study area and the Tucson Urban Area (our study area includes more rural parts of eastern Pima County outside the city). The margins of error for enrollment estimates in the Tucson Urban Area are +/- 2.85%.

We attempted to assess the relation between early education accessibility and key family structure variables and preschool enrollment, but we found no statistically significant relations, likely because of the lack of reliability of data at the tract level (please refer to page 45, Analysis Details of the Model of Preschool Enrollment, for further details). To adequately assess the relation between these variables will require a more reliable outcome measure of early education enrollment in the Tucson area.

Exploring the distribution of early education enrollment at the ZIP code level, where estimates are more reliable, reveals that rate of enrollment in early education are highest in the ZIP codes in the Foothills area, Marana, and Oro Valley (see Figure 18).

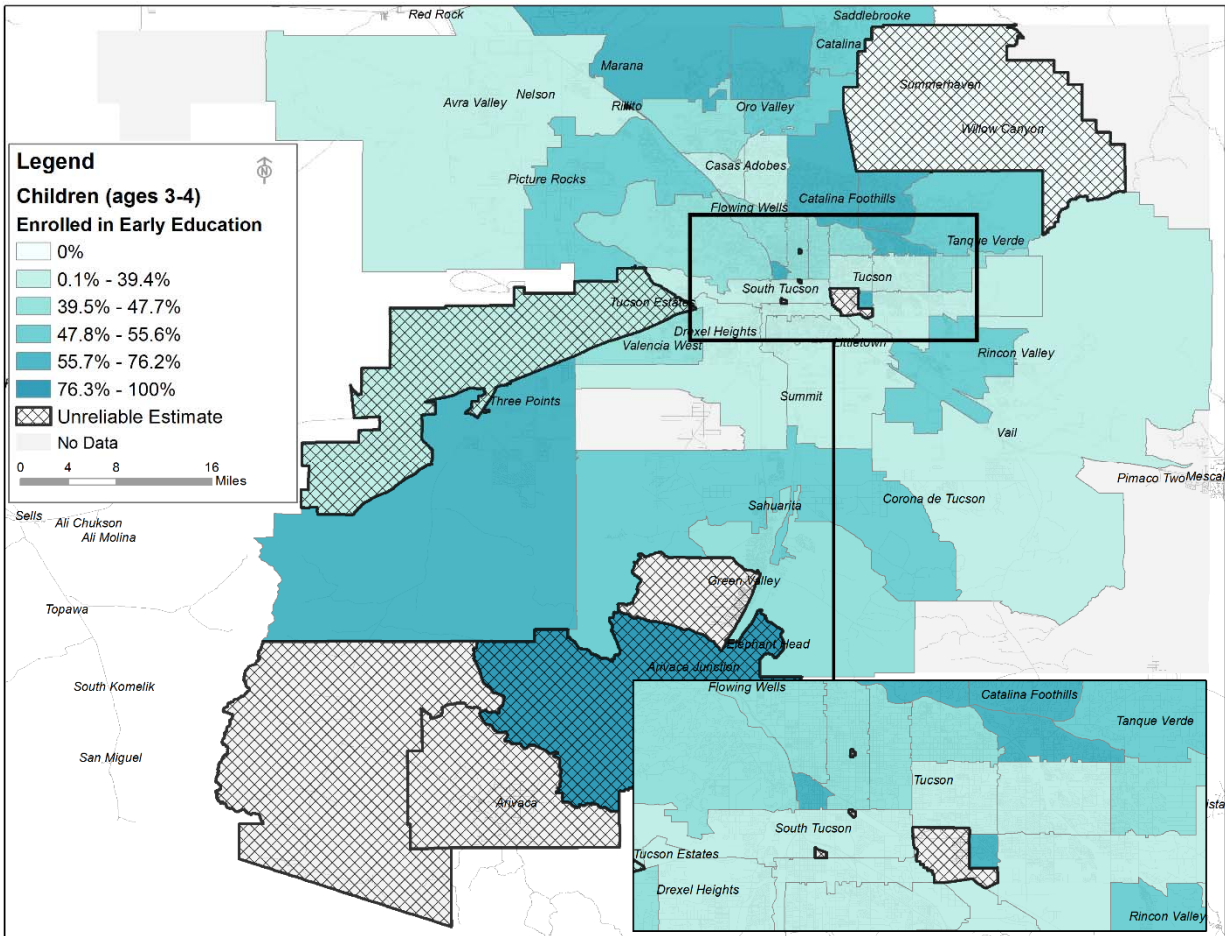


Figure 18. Map of the percent of children ages 3 to 4 enrolled in preschool or nursery school (early education) by zip code

Discussion

These analyses highlighted several findings around the availability and cost of early care and education that greatly affect Tucson-area families. One, the vast majority of young children in the greater Tucson area (89%) live in ZIP codes where there are more than three times as many children as *high quality* early care and education slots. These results

suggest that although there is an overall need for early care providers in much of the greater Tucson area, there is a particularly acute lack of high quality providers. Two, child care costs in the area far surpass recommended levels, and there is substantial variation in relative cost across the region. Costs as a share of median income are much higher in central Tucson as well as in communities to the south and west of Tucson. Although families in Marana, the Foothills area, and Vail would typically pay less than 10 percent of their income to enroll a preschool-age child in a center charging the median rate, families in central Tucson, South Tucson, and the Oracle corridor would have to pay between a quarter and half of their family's income to enroll in a similar center. About three-quarters of preschool-age children (74%) live in tracts where the cost exceeds ten percent of the median income. The cost burdens for single-parent families and families with multiple young children are substantially higher. Although financial resources exist to support families needing assistance paying for child care, these resources are limited.

The insights provided by these analyses should be interpreted with an understanding of the complexities of assessing this topic. Underscoring all of these analyses is the issue of how to estimate child care supply and demand. On the demand side, there are some parents who want and are able to remain home to care full-time for their children. There are other parents who may wish to be in the labor force but who have decided to remain at home because of finances and who, given more affordable child care, would seek care outside the home. On the supply side, these analyses did not account for nannies, relatives, unregulated care in small home settings, or other kith and kin care providers. Some parents may prefer to rely on family and friends and others may rely on an informal network of care because of the high cost of regulated care. Those with adequate economic resources may actually find that hiring a nanny is more affordable than paying for private child care for multiple children. Another issue in estimating supply is that we are unable to determine how many slots at each center may be reserved for grade-school age children. Similarly, by including preschools in our estimates of child care availability, we are over-representing the availability of programs that meet the need of parents who work full time. Many preschool programs operate for fewer hours than a traditional work day, and while some do offer extended care options, others do not. Furthermore, preschools are more likely to operate on a schedule similar to K-12 schools, meaning that summer and other breaks pose additional child care hurdles for families.

Additionally, although the predictors included here factor in to many parents' decisions about child care, human behavior is complex, and the available variables provide an incomplete picture. For example, although we assess child care deserts based on where children reside, many parents seek child care that is closer to their place of employment. This arrangement offers benefits such as allowing parents to minimize the hours (and cost) a child is in care if there are long commutes from home to work and facilitating ongoing breastfeeding for infants when the child care is extremely close to maternal employment. Our estimates of 3.9 and 4.6 mile buffers for driving are based in established estimates, but there is likely a different approach to driving distances for those living in more urban, dense areas versus more rural areas.

We were also unable to look at cost of care at a unit smaller than the county level. This is an important layer of access and we hypothesize that replicating these analyses with

the additional cost information (much like the addition of the high quality filter that we were able to apply) would yield important findings. Finally, we defined high quality early care and education by type of provider, national accreditation and Quality First participation and rating. This definition may be considered either too broad (as it includes providers assessed by varying standards) or too narrow (there may be high quality providers who do not participate in accreditation or Quality First assessments because of the time and resource burden they entail, or who may be participating but not yet rated). In summary, these analyses still represent the best-possible situation facing parents – these availability metrics do not capture whether a family will be able to afford a proximal day care, whether that provider offers adequate hours to cover a parent or guardian’s work schedule, whether there is competition for the available spaces (i.e., waitlists), whether the provider can accommodate children with special needs or those who speak a language other than English, and whether the provider offers care to a full range of ages, including infancy. With over half of employed mothers returning to the labor force before their child is one year old, the paucity of infant care is likely to be a substantial stressor.

Policy Implications

There is a need for continuing investment in child care and early education in the greater Tucson area. Looking closely at the neighborhoods identified as most in need can help suggest where efforts might be focused. Figure 19 highlights areas of the Tucson area that are ripe for support. This map uses an index of early care and education access²⁶ consisting of spatial access, transportation access, and financial access to indicate areas with the highest barriers to accessing early care and education facilities. According to the index, barriers to access early care and education opportunities may be highest for families residing in the neighborhoods in the Oracle corridor, South Tucson, and around 29th Street and Alvernon. Several forms of support could particularly benefit families in these neighborhoods. Increasing the number of low-cost or no-cost early care and education programs in these areas could improve the spatial accessibility to early care and education, while provision of more scholarships could help ensure that families have the financial means to pay for care in tuition-based programs. Improvements to the public transit system as well as strategies to provide transportation assistance for early care and education programs serving children in these areas can enable families that lack an available vehicle to access a greater number of programs.

²⁶ The index comprises three equally-weighted variables normalized to a scale between zero and one. The percent of households with no vehicles available proxies for transportation access, the 2SFCA ratio of children to all ECE slots in a 3.9-mile radius represents spatial access, and the flipped family median income give the relative cost burden of care.

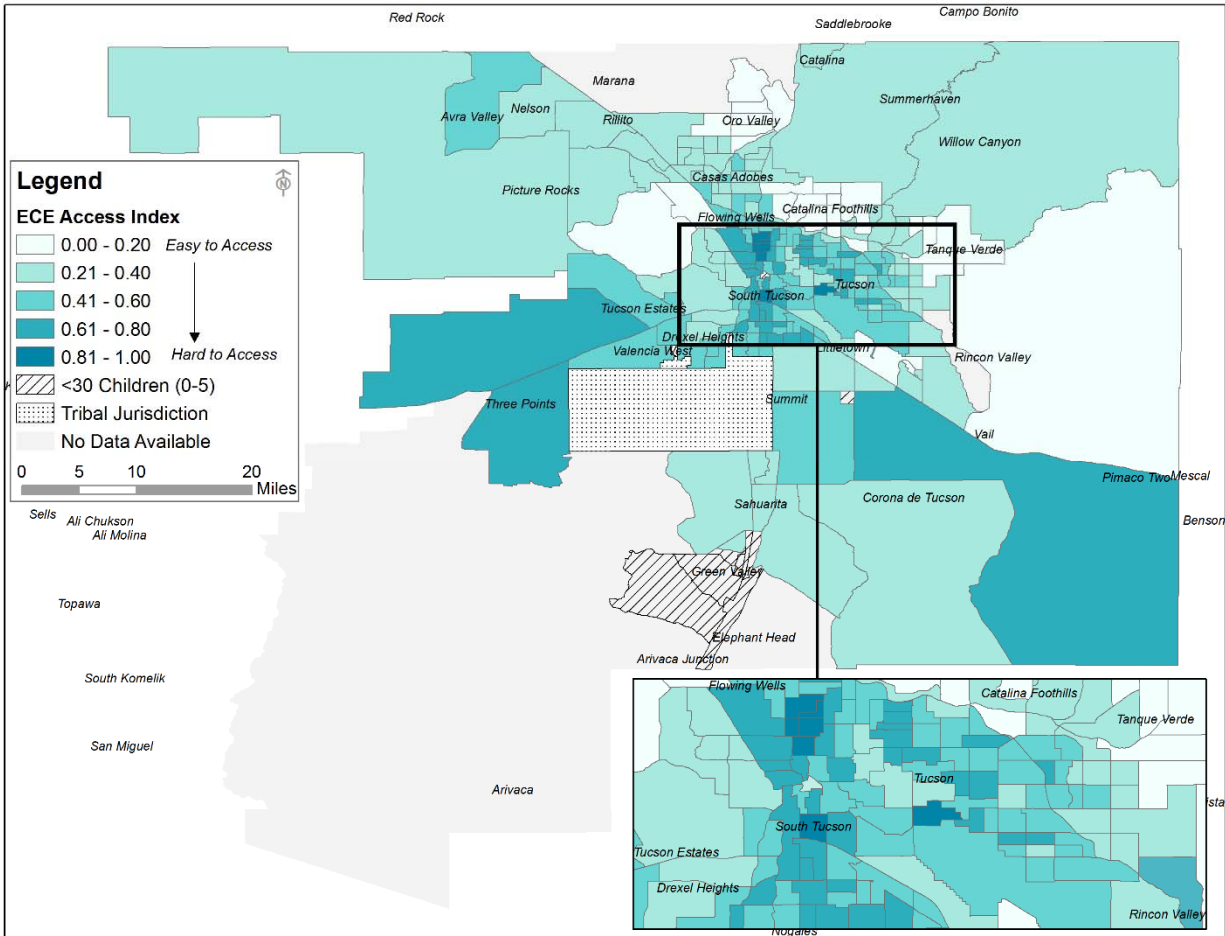


Figure 19. Early Care and Education Accessibility by Tract

Home-based care providers are an important part of the early care and education system in the greater Tucson area. They tend to provide more flexible care for families with atypical work schedules and are more likely to provide infant care for those who need it than center-based care providers. They are currently an important source of care for Hispanic or Latino families and families with low financial resources. Providing opportunities for further professional development and education for home-based providers can help ensure the availability of high quality early care and education for these families. Finding ways to support the establishment and continuation of high quality home-based programs could strengthen this resource in communities across Tucson, with the additional benefit of promoting small, local businesses.

There is a need to strengthen the quality of existing early care and education programs in the greater Tucson area and to establish new high quality programs. Currently, there are nearly five times as many children ages birth to 5 as slots in high quality early care and education programs. The current capacity limitations of high quality providers mean that it is not possible for all families to access high quality early care and education, even before considering cost and transportation constraints. *The importance of*

high-quality early care and education cannot be overstated. The most dramatic long-term positive effects have been found in programs with highly trained staff and structures that support both teachers and families outside of the classroom. Furthermore, low quality programs have actually been associated with undesirable outcomes such as increased behavioral problems. Research attempting to determine if there were thresholds of quality concluded that high levels of socio-emotional support and at least moderate levels of instructional support were critical components of early education. Thus, continued support to help more programs reach and maintain high levels of quality is an essential component of a productive early education approach. Given that high quality early care and education has consistently shown the strongest positive effects for children from more disadvantaged backgrounds, in communities faced with limited funds, targeted early care and education programs may be a more strategic choice than universal programs.¹⁶ Ultimately, expanding options for families will provide children with better access to safe, quality care to support their learning and development, and can offer a better chance for parents to contribute to the economy of our community.

Additional Information

The Data We Use

Data for this study were drawn from a number of sources. Sociodemographic data were obtained from the 2010 Census and the 2011-2015 American Community Survey at the tract, ZIP code²⁷, and urban area levels. For all estimates of the population of young children, we use the U.S. Census counts because of their higher level of accuracy. Because there is no single source available, we compiled a dataset of early care and education provider locations from four major sources: the First Things First Data Center (maintained by First Things First, Arizona's early childhood state agency); the Child Care Resource & Referral (CCR&R) Guide; the Arizona Department of Education; and the federal Head Start Locator.²⁸ Data on enrollment and licensed capacity were obtained through data requests to First Things First and to Child-Parent Centers, the Head Start grantee for southeastern Arizona, and from the Tucson Unified School District statistics page (TUSDStats).²⁹ Although these sources provide a reasonably comprehensive portrait of programs focusing on early education, they do not capture care providers such as nannies and au pairs, relatives providing care, or others who provide home-based care to fewer than five children and are not registered with or regulated by any agency.³⁰ Therefore, only those providers registered through the CCR&R, regulated or licensed through the Arizona Department of Education or Arizona Department of Health Services, or participating in Quality First (the state's Quality Rating and Improvement System) could be included in this analysis. Tribally-operated Head Start and child care programs located on the lands of the Tohono O'odham Nation and the Pascua Yaqui Tribe are not included.

Child care centers and family home providers are often small businesses.³¹ According to the U.S. Small Business Administration, only half of all small businesses survive five years or more, and about 20 percent close in the first year.⁵⁴ Because of this dynamic nature of early care and education provision, locations of providers, as well as some enrollment data, were ground-truthed through online searches and phone calls to

²⁷ Because ZIP codes are not areal units but rather postal routes, the U.S. Census Bureau created ZIP Code Tabulation Areas (ZCTAs) as generalized areal units that represent U.S. Postal Service ZIP codes.⁵⁵ We use these ZCTAs as our unit of analysis, but refer to them as ZIP codes throughout the text as this is more familiar to the reader.

²⁸ Note that these data were pulled in March 2017. Due to the dynamic nature of early care and education provision, some providers may have opened or closed or had a change in their enrollment or quality rating status between the time the data were pulled and publication.

²⁹ Updated information for other districts were obtained by phone.

³⁰ According to state statutes ARS § 36-891 and ARS § 36-897, all facilities and homes providing care to five or more children under age 14 must be licensed or regulated through the Arizona Department of Health Services. State statute ARS § 36-884 provides exemptions for care provided in the homes of parents or blood relatives, child care provided while parents are on facility premises (such as at churches or gyms), public, private, and charter schools providing care for school-age children during school hours, and educational preschool programs providing fewer than 6.75 hours of care a week. While there may be unregulated child care centers or homes serving five or more children in the greater Tucson area, such operations are illegal and not included in this analysis.

³¹ Defined by the U.S. Small Business Administration as an independent business having fewer than 500 employees, or child day cares with \$7.5 million or less in annual receipts for government contracting purposes (https://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf).

providers, as well as through the knowledge of key informants familiar with the early care and education landscape in Tucson. Enrollment numbers for public school-based program were particularly challenging to verify as many enrollment numbers reflect funding rather than students, such that a student in a half day program might be counted as half a student in official enrollment figures. Additionally, children in some community programs located in public schools do not count towards official enrollment numbers. Enrollment estimates for school-based programs used in this analysis represent the best available data cross-referenced across multiple sources, including Quality First data, CCR&R records, and DHS licensing information.

Overall, we identified 723 ECE providers in the greater Tucson area to be used in these analyses. Of these, 43 percent were center-based (n=314), and the remaining 57 percent (n=409) were family and group home-based providers.³² Together, these providers had a combined licensed capacity to serve 30,102 children. It is important to note that some providers included in the analysis provide both early care as well as after-school care to grade-school children, and thus their licensed capacity may not accurately reflect the number of slots available to young children. Providers who only provide after-school care were excluded. For some providers, only enrollment figures were available; the number of enrolled children was used in place of licensed capacity where capacity figures were unavailable.

Data on cost, ages served, and hours are drawn from the 2014 Arizona Department of Economic Security (DES) Child Care Market Rate Survey³⁴, which grouped the state into six areas, one of which is Pima County.³³ For that survey, all identifiable providers were contacted via telephone and asked to complete a survey. Providers who do not charge for care were excluded (i.e. Head Start and any other fully-subsidized programs). The response rate for the survey among eligible providers statewide with a working phone number was 99 percent.

Analysis Details of the Two-Step Floating Catchment Area (2SFCA) Method

The 2SFCA approach to assessing potential spatial access was first developed by Luo for use in determination of the ratio of population to health care providers.⁴⁸ Because we use a similar metric of the ratio of the population of preschool age children to the number of available early education slots, the 2SFCA method can be applied without extensive revision. In the first step, we estimate the slot-to-population ratio (R_j) for each ECE facility according to following formulation:

$$R_j = \frac{C_j}{\sum_{k \in (d_{kj} \leq d_t)} P_k}$$

where C_j is the capacity (number of slots) of the ECE provider j , d_{kj} is the travel distance from centroid k to provider j , d_t is the threshold distance that defines the size of the catchment area (which is the distance we expect individuals to travel seeking child care),

³² The Arizona Department of Economic Security defines home providers as those serving four or fewer children and group homes as those that serve five-10 children.

³³ Note that this means that Market Rate Survey data are a slightly different set of providers that we used in analyses since our analyses focused only on the metro-Tucson area, excluding Ajo and the Tohono O'odham reservation areas.

and P_k is the population of preschool age children at census tract centroid k . Larger values of R_j indicate facilities which have greater capacity, relative to the number of children living nearby.

In the second step, we calculate the ratio of children to slots by summarizing and inverting the slot-to-population ratio calculated in step one:

$$A_k = \frac{1}{\sum_{j \in (d_{kj} \leq d_t)} R_j}$$

where A_k is the availability (defined as the child-to-slot ratio) of accessible ECE providers at census tract centroid k , and R_j is the slot-to-child ratio at ECE provider j within the catchment area of centroid k . Larger values of A_k indicate geographical areas which have larger numbers of children, relative to the number of nearby ECE slots. We set the threshold distance to define the catchment areas in accordance with the findings from the NSECE that center-based care arrangements are, on average, located 3.9 miles from home for children ages 3-5.⁴⁹ Road network distances are used for all distance metrics.

Analysis Details of the Model of Preschool Enrollment

We modeled the number of 3 and 4 year olds per census tract as a count variable. Tracts in which there were no 3- and 4-year-olds were excluded from the analyses (n=27). Initial use of Poisson regression indicated excessive overdispersion, at which point analysis proceeded with a negative binomial model. These models included the total number of 3- and 4-year-old children in the tract as an offset variable. Many tracts had no children enrolled (n=53), so we additionally attempted zero-inflated models. Tract-level predictors that were examined included variables related to economics (e.g., average cost of care as a proportion of median family income for families with children, median family income in the tract, proportion of families in the tract considered low income or in poverty), availability (e.g., ratio of children to slots, using the different metrics described above), and household structure (e.g., proportion of families where a grandparent was present in the household, proportion of two-parent families, proportion of families with one working and one stay-at-home parent, and the proportion of families with more than two children).

Further exploration of the early education enrollment estimates along with ACS estimates of the overall number of 3- and 4-year-olds revealed that these estimates are not very reliable at the tract-level (Figure 20). The wide margin of error for these estimates is due to the small sample sizes. The average sample size for 2011-2015 ACS in the Tucson area was 134 households per census tract. Only 14 percent of these households would be expected to have a child under the age of 6, which means that the tract-level estimates are based on an average sample of only 19 households. Given the inherent noisiness of these estimates, it is unsurprising that attempts to find relations between tract-level access variables and early education enrollment failed.

There is a wide margin of error for tract-level estimates of preschool-age children from the American Community Survey.

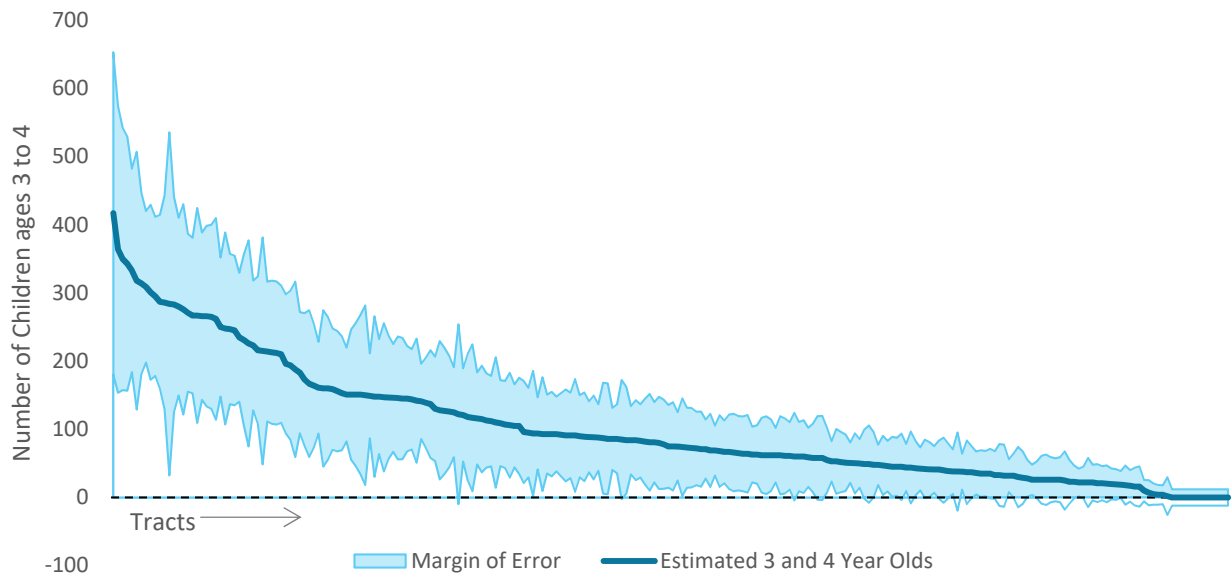


Figure 20. Estimate of 3- and 4- year old children by tract with margin of error

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