Whose 15-Minute Windy City?

Evaluating Access to Walkable Places in Chicago

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Abstract

This paper extends an existing accessibility analysis of Chicago based on the policy platform known as the 15-Minute City, which focuses on proximity of destinations at threshold level (whether categories of destination exist at all within the travel sheds). The author used indexing to compare the metric to an alternative, more complex metric. He then used GIS software and zoning districts to conduct a dasymetric areal interpolation to assign demographic data to walksheds from the original analysis and evaluated potential relationships between level of access and these data. Case studies follow, investigating demographic differences between five contiguous high-access clusters. While the trends that arose suggested that this threshold-focused accessibility metric used has some utility, stark differences between the clusters reinforce that a baseline level of proximity to resources is insufficient for generating equitable outcomes.

Introduction

In June 2020, Anne Hidalgo was re-elected as Mayor of Paris, France amid the global COVID-19 pandemic. Her platform included a commitment to the 15-Minute City ("ville du quart d'heure"), a policy centered around residents being able to fulfill daily needs within a fifteen walk or bike ride from home with implications for emissions, public health, mobility, and equity, among other impacts.[1] While this particular lens may be *en vogue*, the fundamental idea is not revolutionary; similar spatial structures of population density and use diversity have echoed through urban history with varying levels of intentionality and involvement of city planners. Similar framings around 15- or 20-Minute neighborhoods have already been seen in cities like Detroit[2], Ottawa[3], Boulder[4], Melbourne[5], and Portland, OR[6]. In the wake of the COVID-19 pandemic – during which public transit ridership waned[7] - considerations of urban walkability and bikeability are especially salient.

This analysis applies the core of the 15-Minute City (15MC) lens – proximity of key destinations – to Chicago, IL. While the city has a similar population size to that of Paris, Chicago is less dense and, like many other Midwestern cities, is deeply segregated on racial and socioeconomic lines

[1] Willsher, "Paris Mayor Unveils '15-Minute City' Plan in Re-Election Campaign."
[2] Runyan, "Report."
[3] CBC News, "Welcome to the 15-Minute Neighbourhood: Intensification Key to City's Official Plan."
[4] "Housing Goals and Tools."
[5] Planning, "20-Minute Neighbourhoods."
[6] Steuteville, "Portland Pursues the '20-Minute Neighborhood.'"
[7] EBP US, Inc., "The Impact of the COVID-19 Pandemic on Public Transit Funding Needs in the U.S."

thanks, in large part, to inequitable twentieth century urban planning practices like urban renewal. That segregation has major impacts on health and behavior: the neighborhoods with the longest and shortest life expectancies are separated by a 30-year gap.[8]

While taste, cost, and other specifics can be limiting factors, to achieve goals of the 15-Minute City, destinations need to be distributed at a threshold level. One cannot access food within a fifteen-minute walk if there is not at least one grocery store to buy it, for instance. A 2020 analysis suggested that many parts of Chicago already fulfill this basic consideration of the 15-Minute City, based on the simple presence of amenities.[9] The following analysis seeks to determine what this type of threshold model communicates about distribution of access to accessible places and what differences between existing high-access neighborhoods suggest about the limits of this policy frame. Trends in demographic data suggest that this type of threshold-focused model does have some predictive power, however stark differences between neighborhoods with the greatest level of destination accessibility reinforce that a baseline proximity to resources – while a requisite of urban accessibility, 15-Minute City model or otherwise – will not, in and of itself, generate equitable outcomes.

Background

Ville du Quart d'Heure: The 15-Minute City in the context of planning/spatial structure

Paris's 15-Minute City is a recently popular version of chrono-urbanism, a lens that reframes urbanist themes in the perspective of a user (a citizen) through the constraint of time. Initially proposed in 2016 by Carlos Moreno[10], the policy is broad, but as indicated by its name, centered on proximity of destinations. In particular, it suggests being able to access key resources within a 15-minute walk or bike ride in any place in a city, generally supporting six essential functions:

(1) Living
(2) Working
(3) commerce (including food)
(4) health(care)
(5) education
(6) entertainment (including recreation).[11]

[8] "Chicago Has the Largest Life Expectancy Gap in the Country. Why?"
[9] Glover, "The 15-Minute City."
[10] Moreno et al., "Introducing the '15-Minute City.'"
[11] Moreno et al.

An additional function that appears in Paris's presentation of the policy, but not in Moreno et al.'s recent clarification of the concept[13] is access to different modes of transportation (see Figure 1; "circuler", to get around, is represented by a Métro train car).[14] What access means more specifically in terms of quality, choice, or other filters, remains vague.

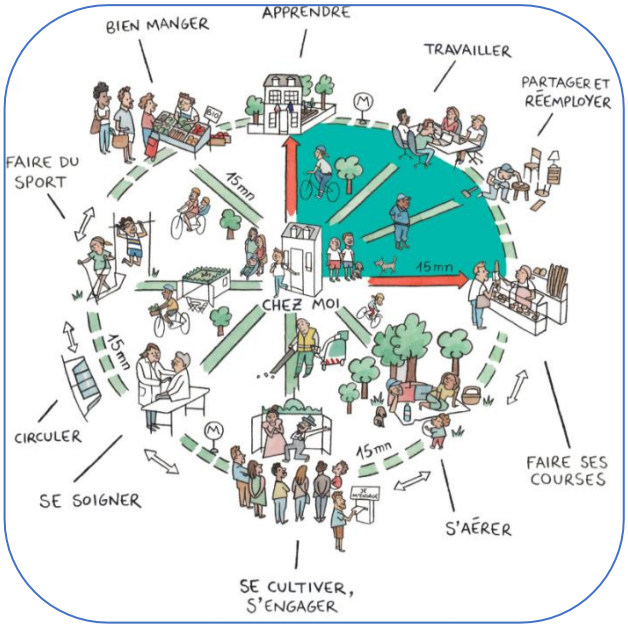

Figure 1: La ville du quart d'heure diagram from City of Paris website[12]

Other components of the concept are also inconsistent. Moreno defines four "guiding principles" as ecology, proximity, solidarity, and participation,[15] but later identifies the concept's four "dimensions" as density, proximity, diversity (of land use and of demographics), and digitalization.[16] While proximity of resources is a constant theme, specific strategies for achieving it also vary, including adaptive, flexible use of existing infrastructure and space (with schools at the center of the strategy), institutional programming being shifted outside of formal institutions, building new small-scale green spaces, implementation of "citizen kiosks," and more.[17]

One clear and consistent foundational goal is for citizens to actually walk and bike more frequently (especially for utilitarian travel - "getting around") once stronger opportunities for using these modes are present. The policy is anchored around built environment (density, diversity, infrastructure, and proximity), but it also incorporates considerations of social determinants of active travel. In the context of a deeply socioeconomically segregated place like Chicago, considering elements like racial segregation and its associated outcome (economic, educational, and health inequities among them) is vital. Studies on the subject suggest that some of these components do impact travel.[18,19]

[12] "La Ville Du Quart d'heure En Images - Ville de Paris."
[13] Moreno et al., "Introducing the '15-Minute City.'"
[14] "La Ville Du Quart d'heure En Images - Ville de Paris."
[15] *15-Minute City*; Moreno et al., "Introducing the '15-Minute City.'"
[16] Moreno et al., "Introducing the '15-Minute City.'"
[17] "Paris ville du quart d'heure, ou le pari de la proximité."
[18] McDonald, "Household Interactions and Children's School Travel."
[19] Rees-Punia, Hathaway, and Gay, "Crime, Perceived Safety, and Physical Activity."

The idea of planning for the proximity of important destinations to residents and to each other is far from novel. Clarence Perry's 1929 neighborhood unit model, for instance, used a quarter-mile walk as its idealized radius, including institutions like schools, community centers, churches, and retail, albeit with specific spatial relationships oriented on the arterial road network bounding neighborhoods. The New Urbanist movement of the 1990s echoed this model closely, including the quarter-mile radius, a center and edge, and diversity of destinations.[21] Each of these models differs from the Parisian model, however, in their definitions of neighborhoods as standalone entities, and thus, designable from scratch. The fifteen-minute city concept ties more closely to "human-scale" design or "quality of life" approaches notably seen in (northern) European planning from firms like Gehl.[22] The "chrono-urbanist" framing, however, conflicts with this by specifying a boundary and thus suggesting that the accessibility it promises is based on something spatially quantifiable.

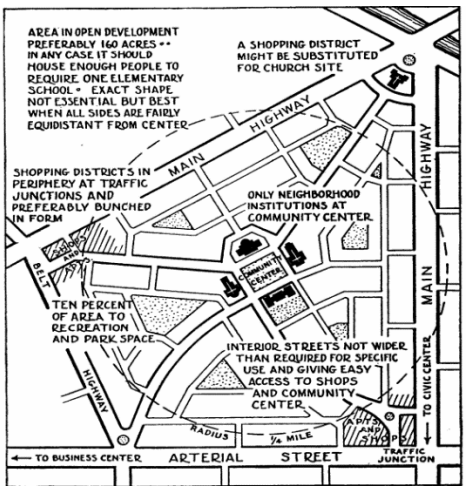

Figure 2: Diagram of Clarence Perry's Neighborhood Unit[20]

Measuring Accessibility/Walkability

Among many goals of transportation planning efforts, two contrasting themes emerge: those of mobility and accessibility. Mobility emphasizes the movement of people (via their chosen mode). It includes outcomes like levels of service (LOS), speed, delay, and throughput, driven by analysis and treatments of networks, routes, and modes or mode share. With accessibility, on the other hand, the ability to reach destinations is the focal point. Because land use patterns can impact both the number of destinations and the journey to reach them, they can contribute to accessibility, especially in the case of density and mixed use.

Measures of accessibility vary, incorporate different combinations of factors capturing both the built and social environment, as well as both benefits and costs of travel (see one graphical representation in Figure 3**Error! R eference source not found.**). Costs are particularly important when considering walkability (accessibility via foot), when travelers are relatively vulnerable.

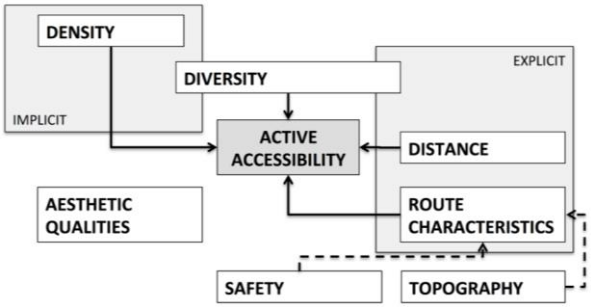

Figure 3: One representation of the factors involved in accessibility (via active transportation)[23]

Perhaps the simplest common approach to measuring accessibility is cumulative-opportunities measures, which set a time or distance threshold (cost) and counts the number of opportunities (benefit) within the determined limits, known as a travel shed. The shape of this shed will vary depending on the way the cost is measured, including how a network (e.g. roads) is represented. One downside is the coarseness of a sharp boundary, which fully discounts all destinations outside it, even if just across the street, and counts all destinations within the shed as equally accessible.[24,25] The framing of the 15-Minute City evokes this hard-limit style, with a (typically) more distant 15-minute bike trip defining the outer bounds of the travel shed.

A more popular approach is a gravity measure, which provides a more nuanced measurement, rewarding closer destinations with greater scores and allowing an opportunity to weigh resources dependent on their impact (e.g., the size of a park). Utility-based measures incorporate the preferences of individuals or groups in the weighing of destinations (e.g. the average senior may have more utility in a nearby pharmacy than the average child). Constraints-based measures consider how limitations on time practically limit the combined number of destinations available. Various components of these methods are extractable and combinable into composite metrics.[26]

One such popular metric - Walk Score® - utilizes components of multiple measures, weighing destinations by category and distance from origins (gravity), but capping value at a 30-minute walk (cumulative opportunities). It goes beyond destination-oriented measures to also incorporate measures of urban form such as block length and intersection density.[27] An earlier version of the method included nine categories (grocery, banks, parks, schools, books, entertainment, restaurants, shopping, coffee,); for the first six categories, only the closest destination was allotted points.[28] Studies across multiple countries (including Canada[29] and Japan[30]) have confirmed connections between Walk Score and walking (and related health impacts).[31,32,33] Many studies, however, qualified the metric's use not as a full representation of

[20] Patricios, "The Neighborhood Concept."
[21] Patricios.
[22] Sim, *Soft City*.
[23] Vale, Saraiva, and Pereira, "Active Accessibility."
[24] El-Geneidy and Levinson, "Access to Destinations."
[25] Pirie, "Measuring Accessibility."
[26] El-Geneidy and Levinson, "Access to Destinations."
[27] "Walk Score Methodology."
[28] Score, "Walk Score Methodology."
[29] Chiu et al., *Walk Score and the Prevalence of Utilitarian Walking and Obesity among Ontario Adults*.
[30] Koohsari et al., "Validity of Walk Score® as a Measure of Neighborhood Walkability in Japan."
[31] Hirsch et al., "Walk Score® and Transit Score® and Walking in the Multi-Ethnic Study of Atherosclerosis."
[32] Manaugh and El-Geneidy, "Validating Walkability Indices."
[33] Camhi et al., "Associations between Walk Score and Objective Measures of Physical Activity in Urban Overweight and Obese Women."

walkability (especially perceived walkability), but as a representation of utilitarian walking potential, and noted that indices may work differently in varying geographic contexts.[34]

2020 Chicago analysis

As chrono-urbanist framings are far from novel, there exist other policy efforts and/or analyses from recent years in Kirkland, WA,[35] Tempe, AZ,[36] Redmond, OR,[37] and Detroit, MI,[38] among other places. Because the 15-Minute City – as named and defined in Paris – is recent, analysis of this particular framing is sparse. Among them, though, is one recent application to the city of Chicago, IL.

In August 2020, Jeremy Glover published a blog post on the Metropolitan Planning Council (MPC) website entitled "The 15-Minute City: How close is Chicago?".[39] Glover, a Transportation Associate for MPC -- "an independent, nonprofit, nonpartisan" planning thinktank in Chicago – used GIS to produce maps showing the number of resources Chicagoans have access to within fifteen-minute walks and bike rides. For networks representing walk and bike infrastructure, Glover used a 2019 regional sidewalk inventory conducted by the Chicago Metropolitan Agency for Planning (CMAP)[40] and official Chicago Department of Transportation (CDOT) bike routes.[41] He used eight destination categories, based largely on data availability: grocery stores, parks, libraries, primary schools, secondary schools, hospitals or urgent care facilities, pharmacies, and CTA 'L' stations.

Table 1: Analysis categories mapped to 15MC functions

15MC Functions	MPC destinations
Living	N/A
Working	N/A
Commerce	Grocery stores
Healthcare	Hospitals and urgent care Pharmacies
Education	Primary schools Secondary schools Libraries
Entertainment	Parks
**circuler*	CTA 'L' stations

[34] Hall and Ram, "Walk Score® and Its Potential Contribution to the Study of Active Transport and Walkability."
[35] "10 Minute Neighborhood Analysis."
[36] Schoon et al., "Tempe and the Transition to a 20-Minute City."
[37] Harrison and Kohler, "Creating a 20-Minute Neighborhood."
[38] Runyan, "Report."
[39] Glover, "The 15-Minute City."
[40] "Sidewalk Inventory, 2018."
[41] Chicago Department of Transportation, "Bike Routes."

The only function category of 15MCs left uncovered by this list of resources is "working", or jobs (see Table 1). Of all functions, living and working may be least closely situated spatially and may be the hardest distance to shrink via policy, given its personal and specific nature. While specifically accomplishing the 15-Minute City for the function of work, proximity to CTA 'L' stations may boost job access, as all lines provide relatively fast, reliable, and cheap access to the Loop, Chicago's central business district.

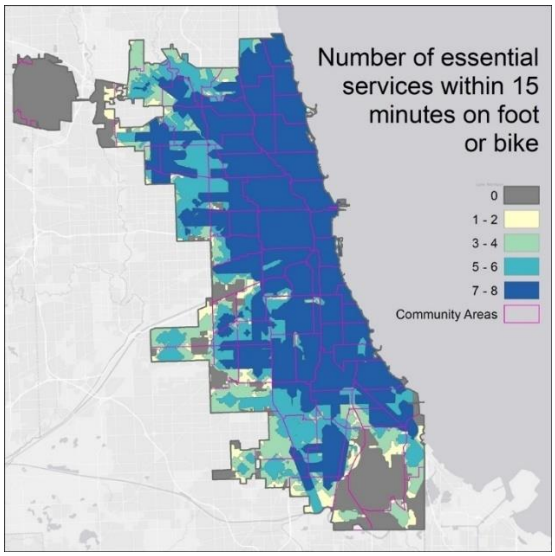

Figure 4: Glover's access map (bike and walk) [1]

He found that the majority of the city's landmass had access to seven or eight destination categories via 15 minutes on foot or bike (see Figure 4). He noted two large areas without any destination access: O'Hare International airport (to the northwest) and the heavily industrial Lake Calumet area (to the south). Glover attributed some of the reduction in level of access at city limits to the exclusion of suburban destinations close to the city border in the data.

While access via biking and walking appeared strong, Glover noted that access without a bike was significantly more limited (see Figure 5). After all, a 15-minute bike ride nets a 2.5-mile route, but the same amount of time spent walking is limited to ¾ of a mile. Glover notes that assuming 10 miles per hour on a bike may be generous, especially when street conditions are challenging (as in the winter). Beyond this, while Chicago is a relatively bike friendly city for American standards, reliance on bikes for utilitarian transportation is still limited. Of Chicagoans who commute to work, only two percent use a bike.[43] Given the existing limitations on biking in cold weather and the baseline cultural limitations on the mode, the analysis here focuses only on pedestrian accessibility – a walkable 15-Minute City.

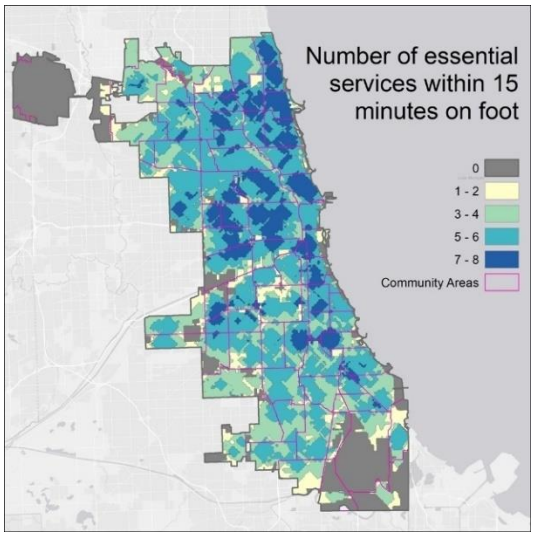

Figure 5: Glover's access map (walk only)[42]

[42] Glover, "The 15-Minute City."
[43] "American Community Survey 2019 (5-Year Estimates)."

Glover included other caveats to his initial analysis, ones that remain for this extended analysis. The methods used here are simple in comparison to other strategies for evaluating real walkability. Here, "access" is binary. A given destination falls into a category or it does not. This model does not consider quality, price, or other factors that play into preference. There are significant differences between the experience offered by different schools, hospitals, grocery stores, etc. access is also framed via a binary distinction in terms of the journey itself. While using sidewalk inventory data is more accurate than a simple radius, a walking route either exists or it does not, defined by the presence of sidewalks. Infrastructural deficiencies (uneven sidewalks, potholes, poor lighting) and environmental factors (those impacting perceptions of safety or other quality of experience, with magnified impact on certain groups) both impact the likelihood of walking to a destination, even if it is less than fifteen minutes away.

The approach taken by Glover in 2020 is a simplified version of the cumulative-opportunities model representing a minimum-threshold version of the 15-Minute City. Scoring is based on the resource categories being fulfilled (by one or more destinations within a fifteen-minute walk of an origin), rather than scoring being associated with the cumulative number of destinations. Resource categories are evenly weighted. Instead of destinations, categories are counted (as with Walk Score's approach to grocery stores, banks, etc.), where the presence of one destination within the 15-minute shed results in a score and additional destinations do not contribute further.

For comparison, a recent Chicago Metropolitan Agency for Planning walkability analysis uses the cumulative opportunity model's hard threshold (30 minutes) and awards points based on the number of destinations in differently weighted categories. Just as Walk Score does, it assigns points based on block length and intersection density, but incorporates other environmental factors like tree cover, population density, parcel size, and bike/ped crash data.[44] This approach used streets (not sidewalks) as the network for creating walksheds, a weakness relative to the Glover analysis.

As suggested by Walk Score's methodology, this approach may be more appropriate for some destinations (i.e. grocery stores) than others, especially those that vary more significantly from each other (i.e. restaurants). In the Glover analysis, the categories chosen generally have a quickly decreasing marginal utility. For instance, most public schools in Chicago are neighborhood schools, with a 1:1 assignment between a school and an address; another public school nearby does not directly benefit a resident as a destination (though it could have other benefits). A second CTA 'L' station on the same line has a low marginal utility, as the destinations available

[44] "Walkability Methodology."

are the same and, in most cases, residents will use the station closest to home (of course, additional benefits are greater if a 2nd line is accessible).

Despite any limitation on the methodology, it still aims to represent a threshold level of proximity required for a 15-Minute City. While Glover's analysis delineates which parts of the city meet this threshold, it lacks data on who has access to this threshold and the amount of variation across neighborhoods that meet this threshold. Upon request, Glover generously shared the data behind the analysis with the author of this analysis. Using Glover's spatial analysis as a starting point, this analysis aims go beyond land area results to investigate who lives in 15-minute neighborhoods within Chicago and how select how existing 15-minute clusters differ.

Methods

Comparing Accessibility Indices

To investigate the rough impact of the simplicity of this model, the author compared it to the more complex CMAP Walkability metric as follows (using ESRI ArcPro):

1. **Spatial join**: Centroids of the sub-zones (appearing mostly as a grid) used by CMAP were used to identify and associate a corresponding level of access from the Glover analysis.
2. **Indexing**: Translate each scoring system to a range of 0-1. Glover's system ranges in scores from 0-8 while CMAP's ranged from -40 to 156 (negatives exist due to penalty components). For instance, a 4 in Glover's system and a 58 in the CMAP model both translate to a 0.5.
3. **Compare**: Subtract the Glover indexed score from the CMAP score to create comparative index scores. Positive numbers suggest that CMAP determined an area to be relatively more accessible, while negative numbers suggest Glover's relative accessibility score was higher. These scores were then mapped (see Figure 6).

Determining who lives in fifteen-minute neighborhoods within Chicago

Glover's boundaries separating areas with different levels of resource access do not match boundaries of demographic data sources such as the American Community Survey. To understand who falls into these boundaries, tract-level and block group-level data must be translated to the new geographies. This is broadly known as (areal) interpolation, but there are a number of possible methods to achieve this aim. In addition to statistical error built into the foundational data (e.g., margins of error in ACS data), this process imparts its own potential inaccuracy.

A point-in-polygon method uses the location of a point (often a centroid) in a source zone to assign the entire zone's data of interest to the category of interest in which it lies.[45] Simple areal weighting assumes even distribution of population across its zones of analysis (here, block groups and tracts), applying the proportion of area overlap directly to the data of interest. There are also alternative manners of weighting – such as network weighting, in which the proportion of roads replaces proportion of land area. Pycnophylactic models replace sharp transitions across boundaries by simulating smooth gradients based on the distribution of data across zones, which assumes that patterns within zones tend to follow patterns across zones. [46] Simple (binary) dasymetric methods are used to improve accuracy of spatial population data by excluding regions thought to have no residents. Given that tracts and block groups in Chicago are relatively small (due to high population density), many would (almost) fully fall into one level of accessibility. Because of this and the potential to add accuracy through a binary dasymetic method (here, excluding any area outside of zoning districts that permit residential use), the author chose to use simple areal weighting as the foundational method.

Population interpolation method

Using ESRI ArcPro:

1. Start with walkshed maps (Glover) identifying how many resource categories – and which - are reachable within 15 minute walk (achieved by counting overlaps of sheds created through network analysis, with destinations as origins).
2. Gather block group, tract maps and data (ACS 2019 5-year), and Chicago zoning map.
3. On zoning map, select only zoning districts with residential uses (codes starting with R, downtown residential and mixed use, planned developments including residential); export selection.
4. Use Clip tool to extract overlaps between block group/tract maps and residential zoning layer.
5. Tabulate intersection between residential block group (and tract) map and walkshed map to determine how much of the residential area of each block group is overlapped by each walkshed zone (access to between 1 and 8 destination categories).
6. In Excel, multiply ACS data with proportions found via previous step. Use Pivot Tables to find cumulative data for residents in each walkshed zone.

Determining how existing fifteen-minute neighborhoods differ

The conversion of single part polygons to multi-part allows for the extraction of specific 15 Minute (8-category) clusters. The five largest by area were selected. The same methods as above were used in order to interpolate ACS data to the boundaries of the five clusters.

[45] Sadahiro, "Accuracy of Areal Interpolation."
[46] Hawley and Moellering, "A Comparative Analysis of Areal Interpolation Methods."

Findings

Comparison of Indices

After indexing CMAP and Glover's walkability measures, the difference between them was mapped to the subzones that defined the structure of the CMAP analysis (Figure 6). The most notable pattern that arose was close to the city's borders with surrounding suburbs, where CMAP tends to overrate accessibility relative to Glover. Because CMAP's walkability data includes the suburbs, this aligns closely with Glover's suggestion that his exclusion of suburban data would artificially depress accessibility scores near the borders. Given that, outside of these areas, areas with access to zero categories are primarily uninhabited (Lake Calumet, O'Hare), the results corresponding to this level of access should be discounted. Beyond this, the majority of the map saw relatively small (20%) deviations between the indexed metrics and suggests that away from the city's border, Glover's simplified analysis tends to provide similar ratings despite including significantly fewer variables.

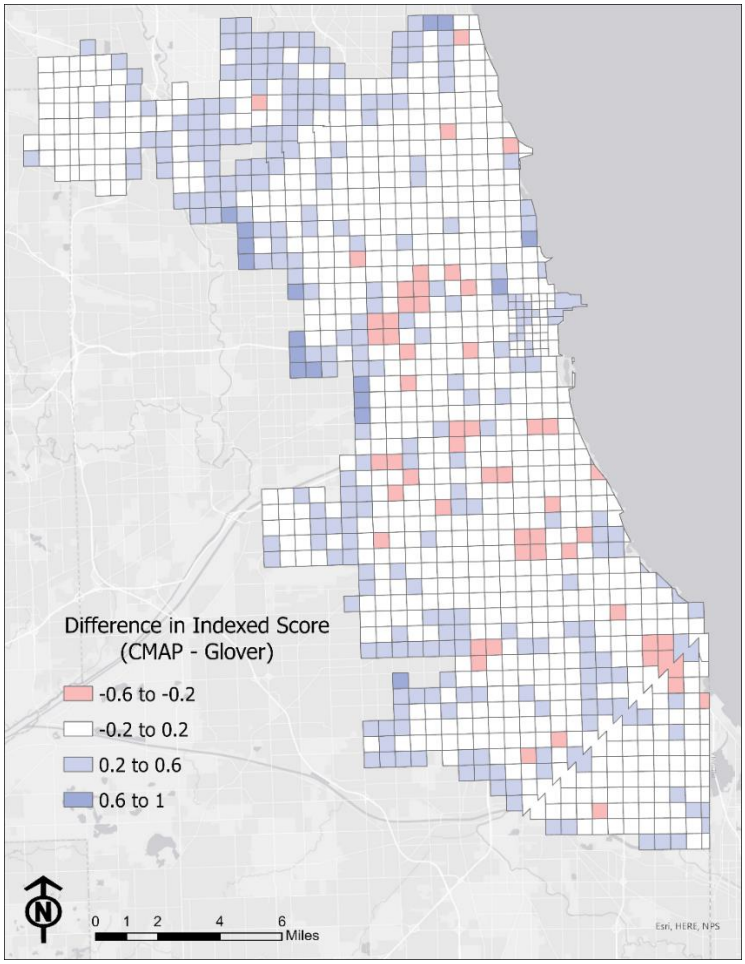

Figure 6: Comparison between CMAP and Glover accessibility models

Who lives in a walking 15-minute neighborhood?

While Glover presented his findings in increments of two (e.g. access to 7-8 categories), in order to achieve greater specificity and closer emulation of a 15-Minute City threshold, the top level of access was defined as having all eight resources fulfilled within a 15 minute walk. This significantly reduced the amount of area covered (see Figure 7), as a much greater area of the city have access to seven categories. More granularity in level of access also provides greater opportunity to see trends upon interpolating ACS data.

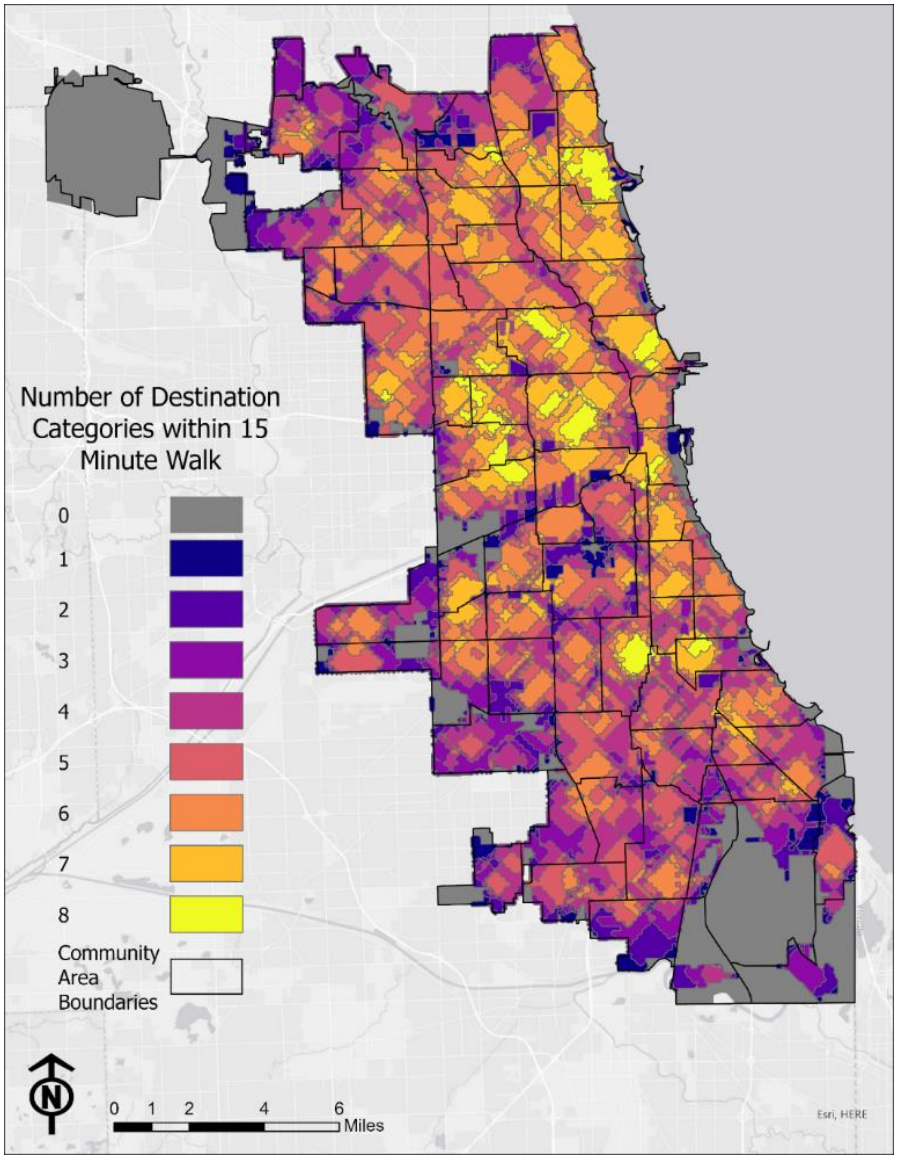

Figure 7: Recasting of Glover's data from 5 categories of access to 9

At a high level, only 5% of Chicagoans have access to all eight categories within a 15 minute walk from home (see Figure 8). Another 18% have access to seven, with another 28% having access to six; as such more than half of Chicagoans have six or more resource categories represented within their personal walksheds. As may be expected from Figure 7, which shows that these resource categories account for less than half of Chicago's land area, increasing levels of access also see increases in population density (see Figure 8).

When examining the levels of access by other demographic basics like race and ethnicity, the pattern becomes less clear. One takeaway is that White Chicagoans are over-represented at the highest levels of access (Figure 9). While Whites also appear overrepresented at level 1, it is important to remember that low levels of access aligned with the border of the city with its suburbs, where access may be artificially skewed.

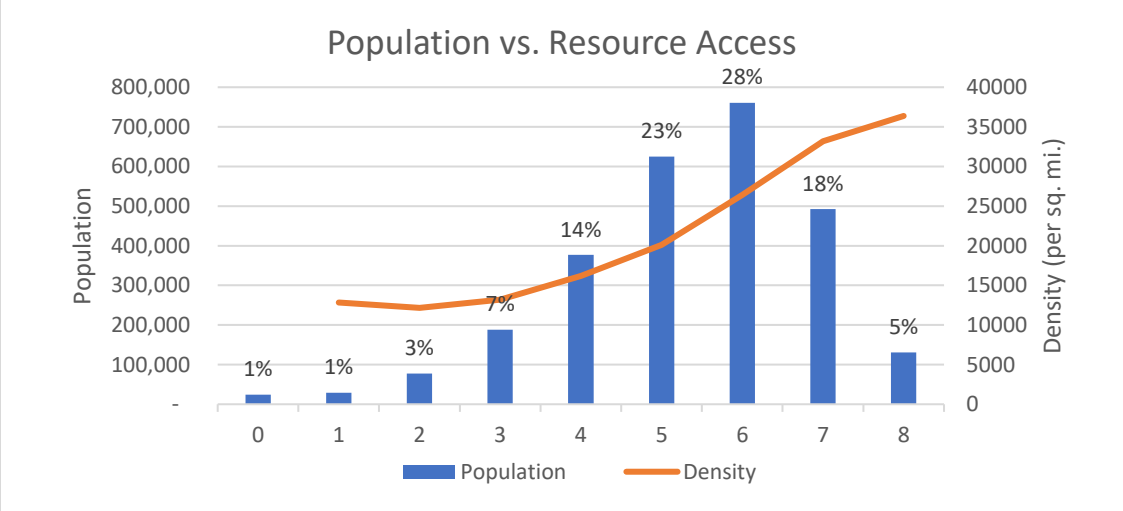

Figure 8: Population vs. Resource Access

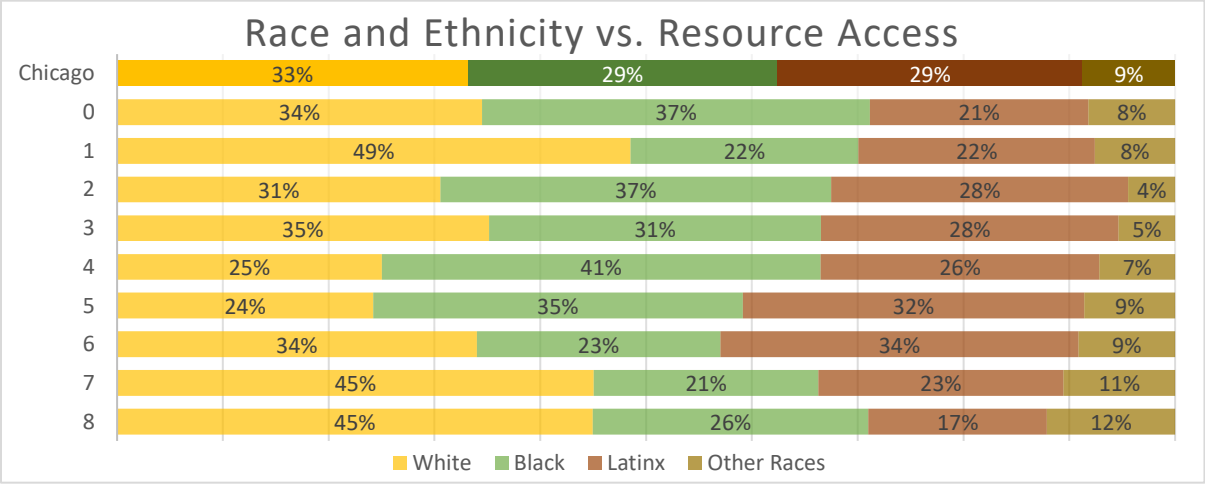

Figure 9: Race and Ethnicity vs. Resource Access

In general, the presence of more resource categories tends to correlate with decreasing car ownership; in 15MC areas, more than 40% of households are without a vehicle. A similar pattern arises for commuting by foot, with the highest access areas having a pedestrian commuter rate of 14%. While the Glover analysis did not include jobs, commute patterns were investigated as a proxy for propensity to walk for utilitarian means.

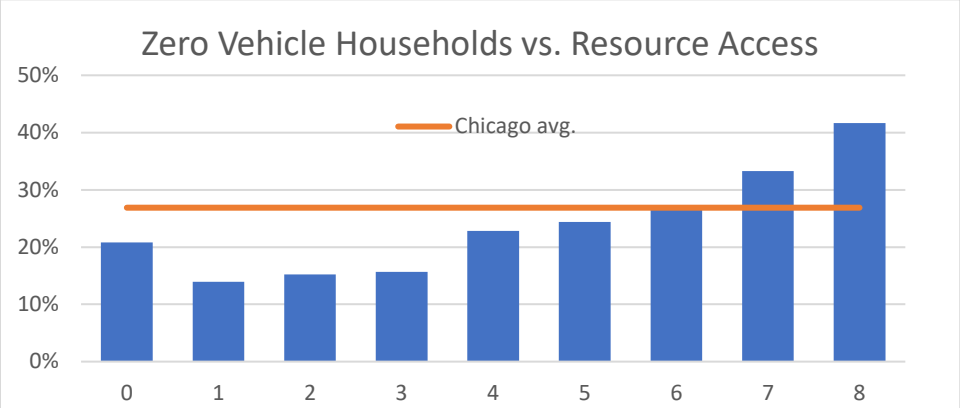

Figure 10: Zero Car Households vs. Resource Access

Life expectancy does not vary strongly with access to resource categories, with all levels seeing average life spans of between 76 and just over 79 years, with a citywide average of 77 years. Housing cost burden (spending 30%+ of income on housing costs) is likewise narrowly distributed, ranging from 33-41% across access levels; extreme cost burden (50%+ of income spent housing costs) ranges from 17 to 21%.

Unemployment, education, and poverty rates see more variation. Poverty rate ranges from approximately 12% to 22%, with the highest rate found in communities with the greatest level of access. On the other hand, areas with 15MC access also have the lowest unemployment rate (5%, compared to an average of 8% in the city) and the lowest levels of limited education (only 45% with less than a college degree, compared to 61% in Chicago on average).

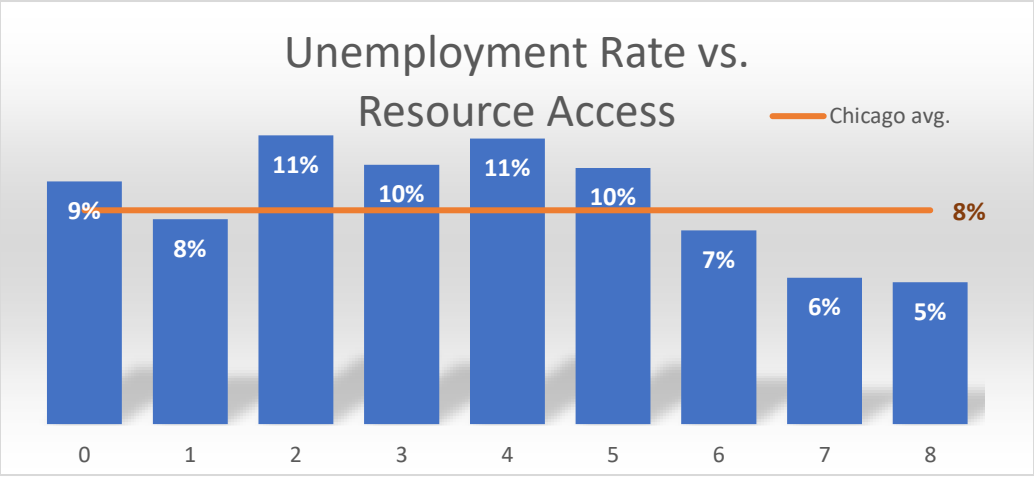

Figure 11: Unemployment Rate vs. Resource Access

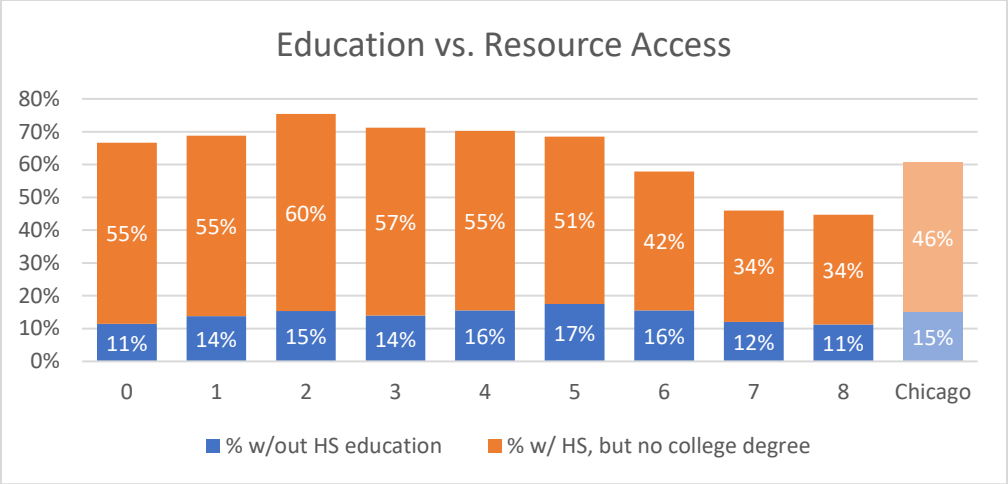

Figure 12: Education vs. Resource Access

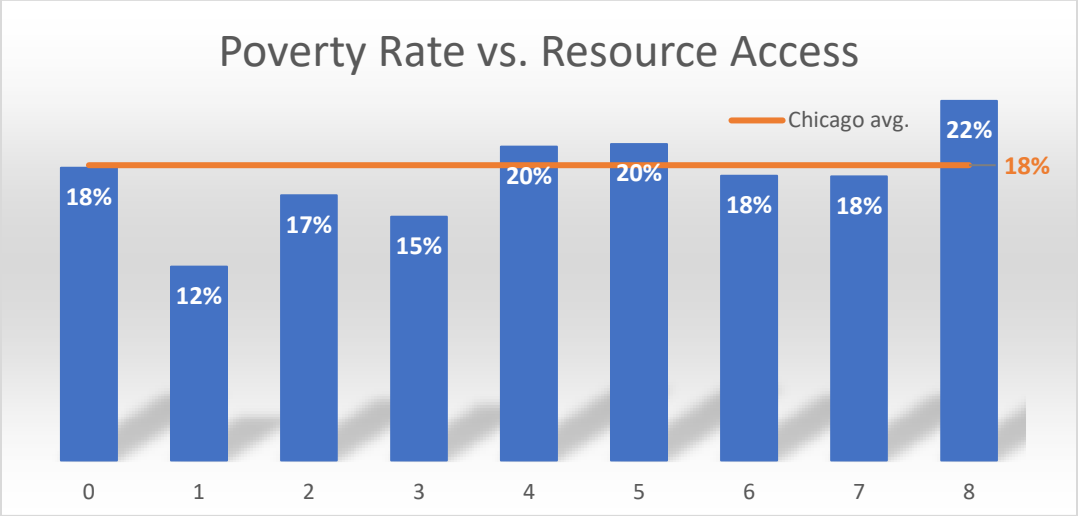

Figure 13: Poverty Rate vs. Resource Access

How do 15 Minute Neighborhoods compare?

Of all the areas in the city in which residents had access to all eight categories of resource ("15MC"), some were more contiguous than others. Among the largest "patches", arose five 15-Minute clusters. Here, they are identified by the neighborhood(s) they are located in: (from north to south) Uptown, Wicker Park, Little Italy/Medical District, Little Village/North Lawndale, and Englewood (see Figure 14).

They are similarly sized regions: four between 0.5 and 0.7 square miles, with one (Uptown) larger, at nearly 1 square mile. They are distributed widely across the city. In a deeply segregated city like Chicago, their spatial diversity suggest that their racial and ethnic makeups may also significantly vary. The data confirm this. The data also paint a picture of disparate outcomes and lives. This analysis reveals that there is likely to be more difference between high access neighborhoods than across different levels of access, city-wide.

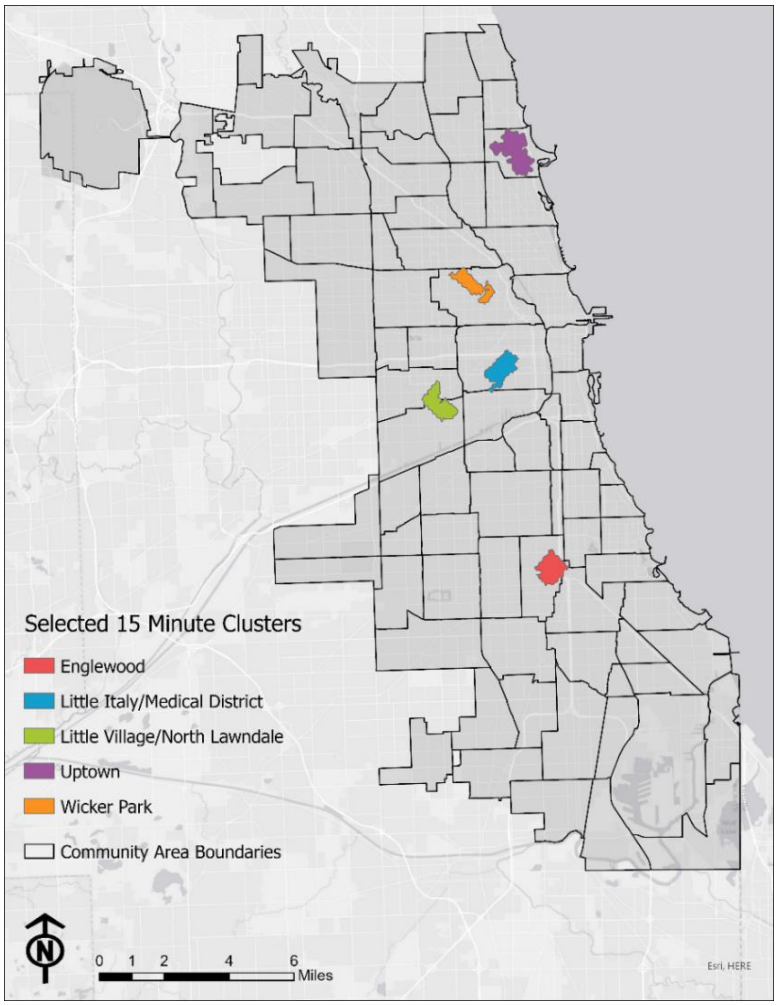

Figure 14: Selected 15 Minute Clusters

These five clusters have diverse demographic profiles. They vary widely in population density as well as in race and ethnicity. The densest neighborhood, Uptown, is roughly half White, while the least dense neighborhood, Englewood, is roughly one-sixth as dense and 97% Black. The distinction is important given

Table 2: Population and Population Density, Selected 15 Minute Clusters

Cluster	Area (mi^2)	Population	Pop. Density (pop/mi^2)
Englewood	0.63	3,756	6,003
Little Italy/ Medical District	0.64	10,124	15,875
Little Village/ North Lawndale	0.62	12,614	20,326
Uptown	0.99	36,008	36,459
Wicker Park	0.54	14,362	26,414
CHICAGO	**234**	**2,704,078**	**11,556**

the inclusion of density (both of population and of land use) in many accessibility assessments (including CMAP's).

The neighborhood with greatest proportion of residents who are White is Wicker Park (68%) and the most Latinx is Little Village/North Lawndale (67%). No cluster has a racial/ethnic mix representative of the city at large, which is roughly evenly White, Black, and Latinx.

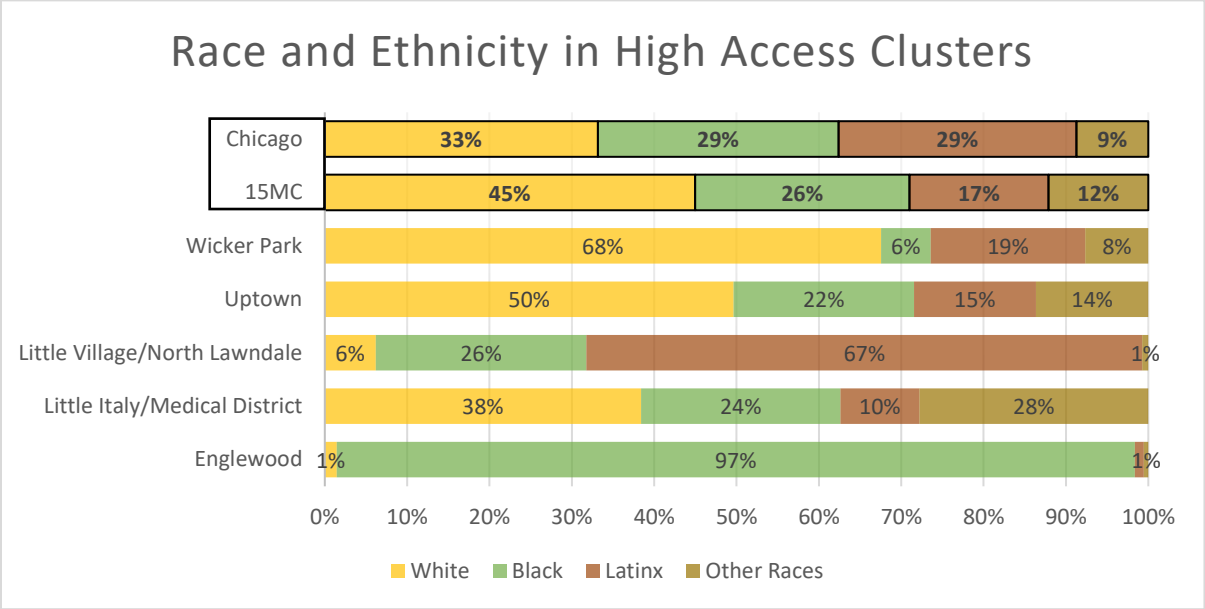

Figure 15: Race/Ethnicity in High Access Clusters

Access appeared correlated with walking commutes and negatively correlated with car access. It followed that four of the five communities had rates of zero vehicle households greater than the city's average. Only Wicker Park had a lower-than-average proportion. While less than 20% in Wicker Park were carless, more than 60% of households in Englewood were without a car.

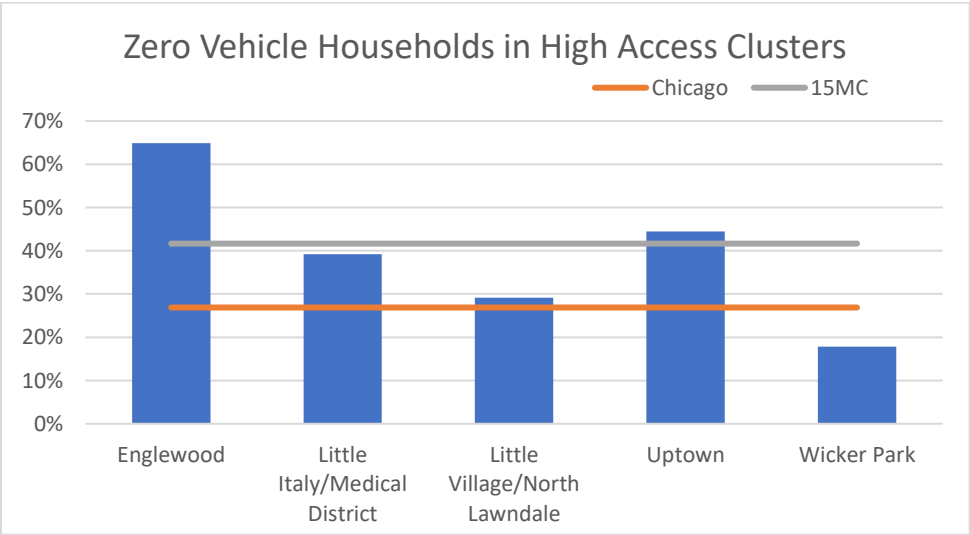

Figure 16: Zero Vehicle Households in High Access Clusters

When examining commuting patterns, the only apparent outlier was Little Italy/Medical District with high rates of walk commuting and commutes of less than 15 minutes, likely driven by large job centers and employers in the area including Medical District hospitals and the University of Illinois at Chicago.

When evaluating outcomes relative to level of access, some data (education, unemployment, and poverty rate) suggested trends while others (life expectancy) appeared less correlated with access. When investigating these metrics in across high access clusters, though, large discrepancies arose. Life expectancy in Englewood averaged 68 years, compared to between 75 and 80 years in the other four neighborhoods (see Figure 17).

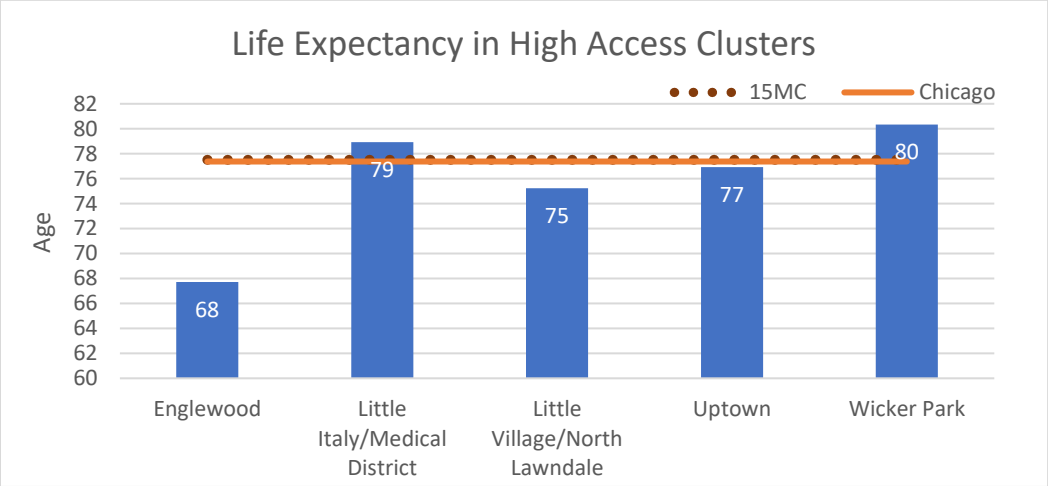

Figure 17: Life Expectancy in High Access Clusters

Unemployment rate (Figure 18), which appeared negatively correlated access, was also significantly higher in Englewood (21%), while the other four neighborhoods sat below the city's average of 8%. Wicker Park's rate was a remarkable 2%.

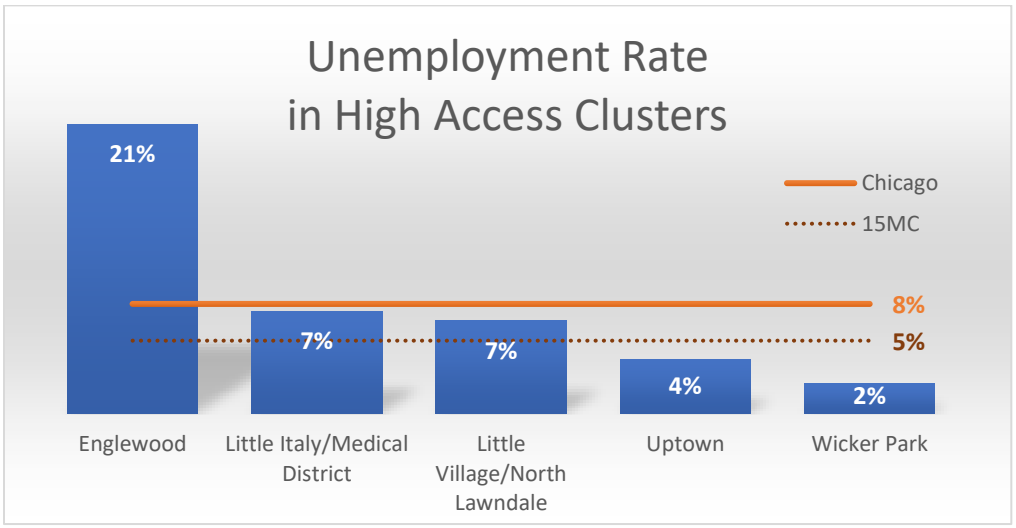

Figure 18: Unemployment Rate in High Access Clusters

Englewood also saw the highest poverty rate (43%), a metric seemingly correlated with increasing levels of access in the city. Only Wicker Park (10%) had a rate lower than city's average. Very similar patterns existed for housing cost burden.

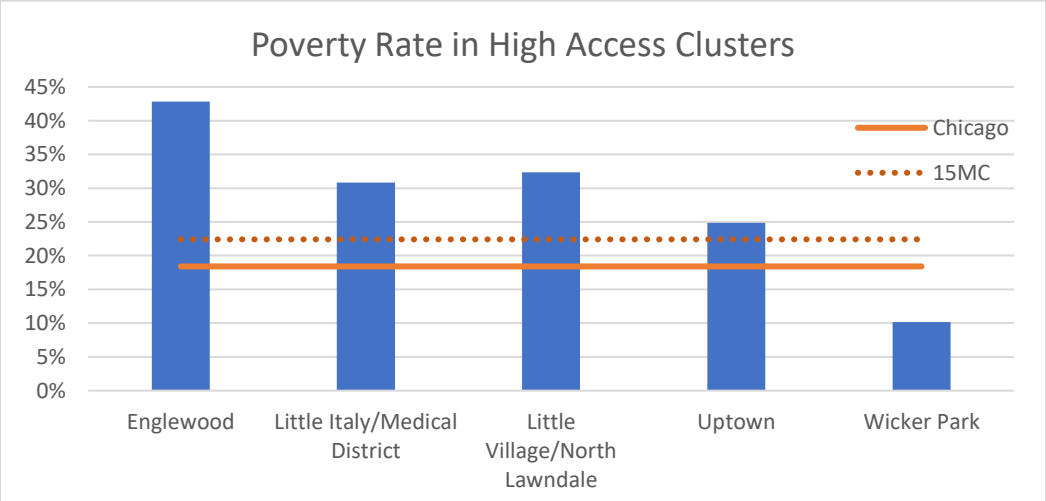

Figure 19: Poverty Rate in High Access Clusters

Future Work

Next steps in this analysis could include steps to clarify or improve the utility of the Glover model of accessibility. This could be done by conducting a similar demographic analysis using the CMAP walkability analysis, then comparing results with those presented here. Improvements to the accuracy of the Glover model (and thus the demographic analysis here) could include incorporation of suburban destination data or exemption parts of Chicago within a 15-minute walk of the Chicago border.

A new model of accessibility could combine strengths from both models to form a more complete picture of spatial accessibility. The application of a binary nature of the Glover model makes logical sense for certain destinations – like 'L' stations or (neighborhood) public schools. In the case of schools, however, the model could be improved by incorporating a neighborhood school assignment map to reflect the distance between homes and assigned schools; selective enrollment or private schools could be discounted or excepted from the model.

The trends observed in this analysis could be better verified by measuring the level of error (in pursuit of defining statistical significance), using a more accurate method to approximate population, or both, in combination.

Surveys or interviews in high access areas (defined as here or otherwise) could be conducted to better understand the relationship between walkability measurement and real patterns of

utilitarian walking and the reason for potential gaps, in a manner that's specific to Chicago's geographic context.

Implications

The trends that arose across access levels using the simplified categorical opportunities approach suggest that this method does capture some truths about spatial structure that enables accessibility. That said, much larger differences between clusters with the greatest level of access confirm that this measure is far from a complete picture of accessibility. A baseline proximity to resources – while a requisite of urban accessibility, 15-Minute City model or otherwise – will not in and of itself generate equitable outcomes. It follows that there is likely *no* level of density of destinations that should be considered sufficient for achieving equity in accessibility. This type of model remains useful for identifying those areas that have no chance at 15MC accessibility due to a complete lack of resources. For a 15-Minute City model, a minimum spatial arrangement suggests potential, but is far from sufficient.

Considering the local context (not just at a city-level but at a neighborhood level) and the nuances of destinations (including distances, especially that of segregation, will be important for addressing existing inequities. Alternative conceptions like the "one-minute city" emphasizes not proximity, but hyper-local, citizen-driven street design, which could be a useful approach for Chicago and other cities to consider.[47] Any strategies for planning imported (especially in a top-down manner) from other cities, countries, or continents should be regarded with a healthy skepticism, as one-size fits all approaches are bound to ignore important nuances and autonomy of a place.

[47] O'Sullivan, "A Tiny Twist on Street Design: The One-Minute City - Bloomberg."

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