ACCESSIBILITY ANALYSIS FOR BASIC SERVICES

JUNE 2019

MIAMI VALLEY
Regional Planning Commission

Miami Valley Regional Planning Commission
10 North Ludlow Street
Suite 700
Dayton, Ohio 45402

This document is the product of a study financed by the U.S. Department of Transportation (U.S. DOT), the Ohio Department of Transportation (ODOT), and the Miami Valley Regional Planning Commission.

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Regional Planning Commission

1. Overview

Accessibility to daily necessities and basic services can be a challenge for residents of the Miami Valley. This is especially true for vulnerable populations who may have limited or no access to automobiles, or may not have the ability to drive. This analysis sets out to determine the extent to which it may be particularly difficult for these populations to access these facilities, and how this access compares to the general population.

2. Defining Vulnerable Populations

MVRPC, as the Metropolitan Planning Organization (MPO), receives federal funding to support many of its programs and activities, and must address federal Environmental Justice requirements as a condition of receiving those funds. Various statutes and rulings exist to guide funding priorities with regard to their impact on racial and ethnic minorities and persons in poverty. MVRPC has traditionally expanded its definition of vulnerable populations to include other disadvantaged groups, including persons with disabilities, the elderly, persons of Hispanic origin and households without automobiles.

2.1. Data Sources

A variety of data sources exist pertaining to population demographics. Not all sources, however, are of equal quality. MVRPC, therefore, used the 2010 Census and 2008-2012 American Community Survey data as primary data sources for analysis of target population groups. For minority, elderly, and Hispanic variables, 2010 Census Summary File 1 (SF1) block level data were aggregated to the traffic analysis zone (TAZ) level using GIS. For the remaining variables (poverty, disability, and zero-car households), 2008-2012 American Community Survey 5-Year Estimate block group data was converted to the TAZ level, using spatial analysis techniques.

2.2. Definition of Population Groups

MVRPC defined the target populations as follows:

Minority Population

All persons of races other than Caucasian were considered minorities, including African-American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; some other race alone; and persons of two or more races. It is important to note that the population of Hispanic origin was not counted as a race since the U.S. Census Bureau treats persons of Hispanic origin as an ethnic group, not a race.

Persons in Poverty

Persons in poverty are defined as the sum of the number of persons in families with income below the poverty threshold and the number of unrelated individuals with incomes below the poverty thresholds. The set of poverty thresholds varies by family size and composition and age of

householder. MVRPC defined the poverty population based on available ACS data tabulated for total household population plus non-institutionalized group quarters.

Disabled Population

In 2010, the ACS began using a new definition of disabled populations, focusing on the impact conditions have on basic functioning rather than the presence of conditions. Consistent with this new definition, MVRPC defined the disabled population based on available ACS data tabulated for household population 18 years of age and over. A person was considered as having a disability if he/she met any of the following conditions. A brief description of each disability category is as follows:

- Hearing difficulty — deaf or having serious difficulty hearing.
- Vision difficulty — blind or having serious difficulty seeing, even when wearing glasses.
- Cognitive difficulty — because of a physical, mental, or emotional problem, having difficulty remembering, concentrating, or making decisions.
- Ambulatory difficulty — having serious difficulty walking or climbing stairs.
- Self-care difficulty — having difficulty bathing or dressing.
- Independent living difficulty — because of a physical, mental, or emotional problem, having difficulty doing errands alone such as visiting a doctor's office or shopping**.**

Elderly Population

The elderly population is defined as all persons 65 years of age and older.

Hispanic Population

Persons who classified themselves in one of the specific Spanish/Hispanic/Latino origin categories listed, such as Mexican, Mexican-American, Puerto Rican, or Cuban, as well as those who indicated that they were of other Spanish/Hispanic/Latino origin. Persons of Hispanic origin may be of any race.

Zero-Car Households

Zero-Car Households are households with no automobiles at home and available for the use of household members.

3. Identifying Target Areas

MVRPC identified target areas by examining the concentration of the target populations at the TAZ level using Geographic Information Systems (GIS).

3.1. Population Thresholds

The target population thresholds were calculated for each population demographic variable under examination in order to locate the areas of high concentration. The TAZ population (e.g., elderly persons) was aggregated to the county level and a county average percentage for each target population was calculated. Using the county average percentage as a threshold, the areas of high concentration were identified. Target population averages were calculated individually for each

county, as opposed to an MPO average, to reflect the unique nature of each county. The county thresholds for each target population are listed in Table 3.1.

Table 3.1 – Target Population Thresholds

	County	Total	Threshold
People in Poverty	Greene	20,714	13.53%
	Miami	12,366	12.16%
	Montgomery	87,503	16.73%
	Warren	3,929	6.33%
Disabled Population	Greene	16,647	14.13%
	Miami	11,897	15.50%
	Montgomery	73,416	18.44%
	Warren	4,396	11.42%
Zero-Car Households	Greene	3,037	4.83%
	Miami	2,112	5.17%
	Montgomery	21,304	9.51%
	Warren	2,047	2.68%
Minority Population	Greene	21,903	13.56%
	Miami	5,784	5.64%
	Montgomery	139,881	26.14%
	Warren	20,262	9.53%
Hispanic Population	Greene	3,439	2.13%
	Miami	1,341	1.31%
	Montgomery	12,177	2.28%
	Warren	4,784	2.25%
Elderly Population	Greene	21,998	13.61%
	Miami	15,731	15.35%
	Montgomery	81,041	15.14%
	Warren	22,936	10.78%

Sources: 2010 Census and 2008-2012 American Community Survey

- ***Minority Population*** — Montgomery County has the highest percentage of minorities in the Region. Over 26% of Montgomery County residents are minorities. On the other hand, only 5.6% of the Miami County residents are minorities.
- ***People in Poverty*** — In the Region, Montgomery County has the highest percentage of people in poverty (16.7%), compared to Greene, Miami, and Warren Counties (13.5%, 12.2%, and 6.3%, respectively).
- ***Disabled Population*** — Montgomery County has the highest percentage of disabled population in the Region (18.4%), followed by Miami, Greene, and Warren Counties, at 15.5%, 14.1%, and 11.4%, respectively.

- ***Elderly Population*** — A higher percentage of elderly population lives in Miami and Montgomery counties (15.4% and 15.1%, respectively), compared to Greene and Warren Counties (13.6% and 10.8%, respectively).
- ***Hispanic Population*** — A higher percentage of persons of Hispanic descent live in Montgomery and Warren Counties (2.3% each), followed closely by Greene County (2.1%) and Miami County with the least (1.3%).
- ***Zero-Car Households*** — Montgomery County has the highest percentage of households without access to cars. Almost one in ten households (9.5%) reported having no cars in the 2008-2012 data.

3.2. Distribution of Target Areas

Using the county's threshold for each target population, TAZs were examined and coded as either "Above County Average" or "Below County Average." It is important to note here that a specific TAZ could be a target area for several target population groups.

MVRPC used GIS to produce a series of maps showing the geographic distribution of target areas for each population group in the Region. The maps are shown on the following page.

- ***Minority Population Distribution*** — Minority areas are concentrated around urban areas or cities.
- ***Distribution of People in Poverty*** — The distribution of people in poverty revealed a high concentration in the central city areas of Montgomery County. Greene and Miami Counties also showed the highest concentrations in the central city areas, as well as selected rural areas.
- ***Disabled Population Distribution*** — The distribution of the disabled population showed no particular pattern. Disabled populations are spread throughout the entire Region.
- ***Elderly Population Distribution*** — No strong patterns were identified with the elderly population, aside from a slight but perceptible lack of concentration near urban centers. In general, the elderly population appears to be spread evenly over the Region.
- ***Hispanic Population Distribution*** — In contrast with the distribution patterns for the minority population and people in poverty, the Hispanic population in the Region appears to be located away from city centers and closer to rural areas and large employment centers, particularly Wright Patterson Air Force Base.
- ***Zero-Car Households Distribution*** — The distribution of households with no cars shows greater concentration patterns in city centers.

Target Group Populations

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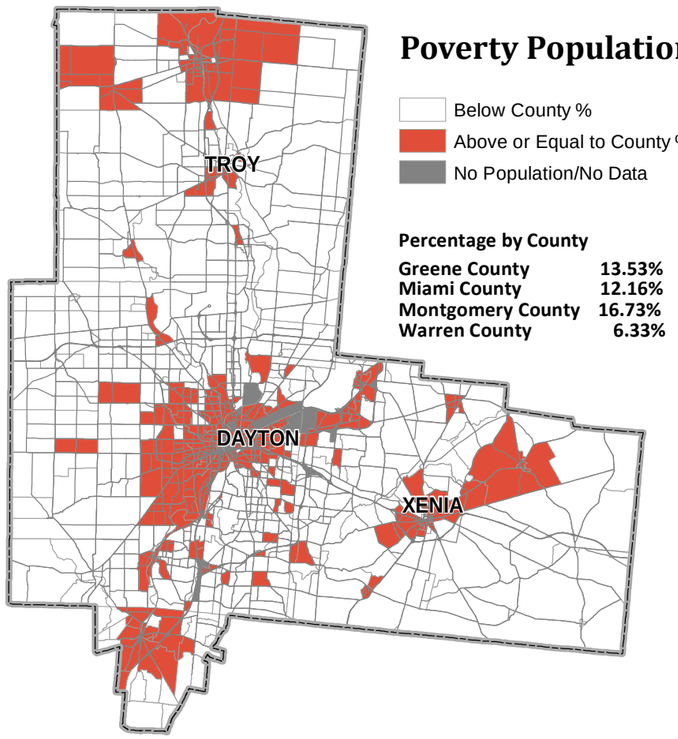
Poverty Population

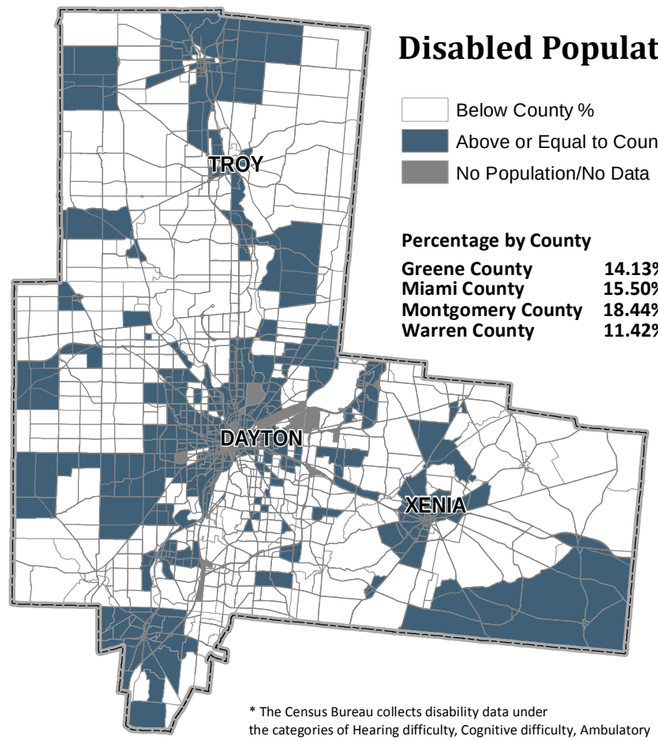


Below County %
Above or Equal to County %
No Population/No Data

Percentage by County

Greene County	13.53%
Miami County	12.16%
Montgomery County	16.73%
Warren County	6.33%

Disabled Population



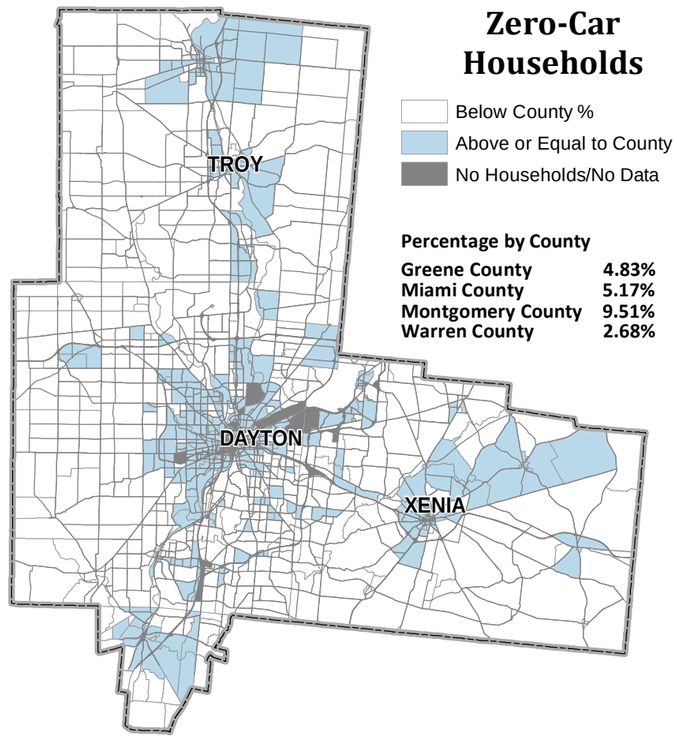
Below County %
Above or Equal to County %
No Population/No Data

Percentage by County

Greene County	14.13% *
Miami County	15.50% *
Montgomery County	18.44% *
Warren County	11.42% *

* The Census Bureau collects disability data under the categories of Hearing difficulty, Cognitive difficulty, Ambulatory difficulty, Self-Care difficulty, and Independent Living difficulty.

Zero-Car Households

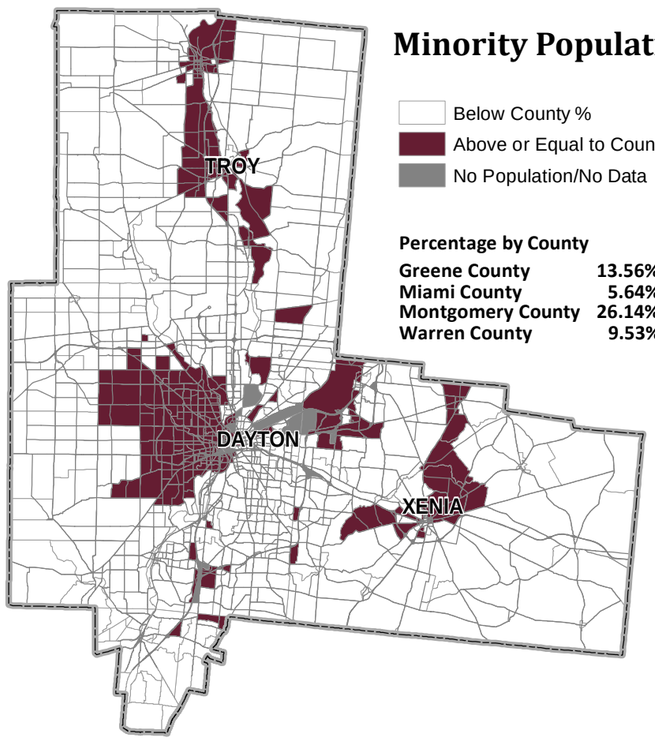


Below County %
Above or Equal to County %
No Households/No Data

Percentage by County

Greene County	4.83%
Miami County	5.17%
Montgomery County	9.51%
Warren County	2.68%

Minority Population

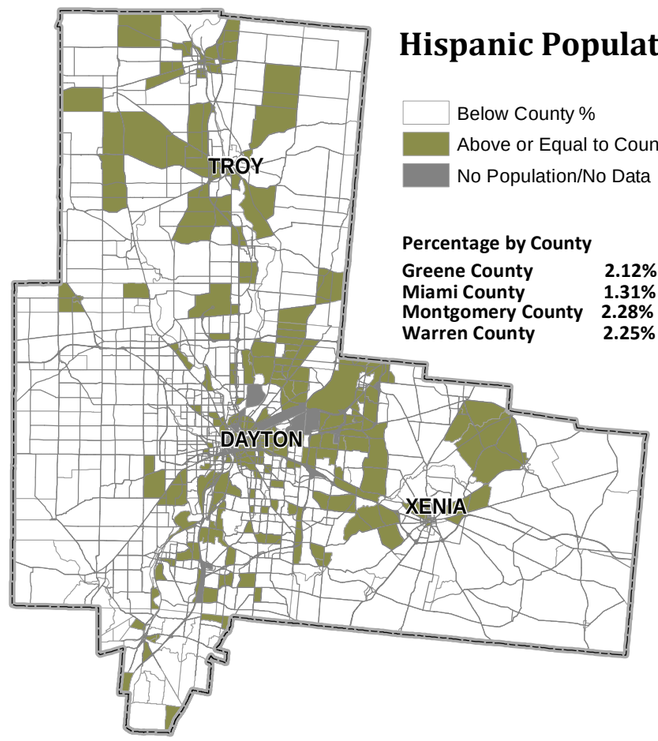


Below County %
Above or Equal to County %
No Population/No Data

Percentage by County

Greene County	13.56%
Miami County	5.64%
Montgomery County	26.14%
Warren County	9.53%

Hispanic Population

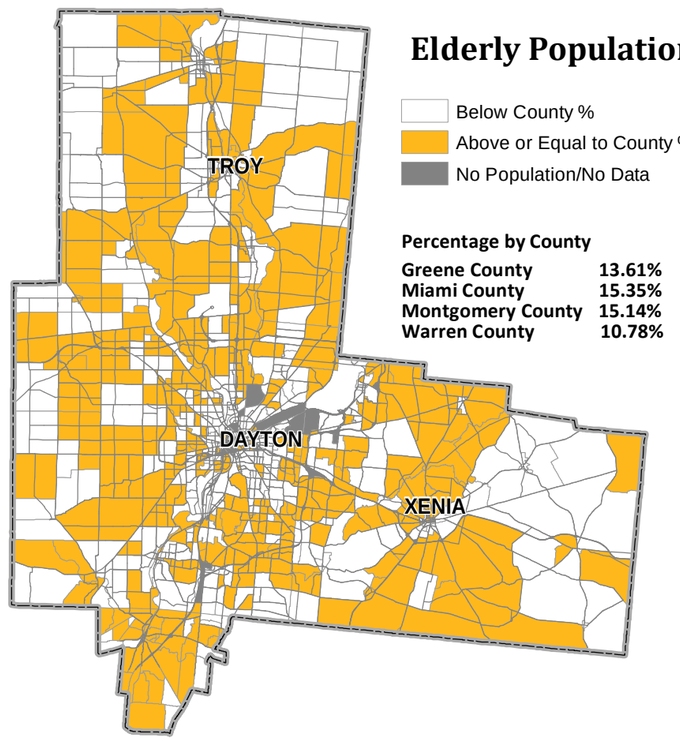


Below County %
Above or Equal to County %
No Population/No Data

Percentage by County

Greene County	2.12%
Miami County	1.31%
Montgomery County	2.28%
Warren County	2.25%

Elderly Population



Below County %
Above or Equal to County %
No Population/No Data

Percentage by County

Greene County	13.61%
Miami County	15.35%
Montgomery County	15.14%
Warren County	10.78%

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4. Identifying Facilities

MVRPC started the accessibility analysis considering travel times to facilities necessary for everyday life: grocery stores and medical centers. The analysis was expanded to include community centers.

Grocery Stores

Grocery stores can come in many different forms, so a set of criteria was developed to standardize whether a particular store should be included. The following criteria were used:

- The store must stock fresh produce;
- The store must have a deli and/or stock butchered meats;
- The store must carry basic pantry items, like rice and canned goods;
- The store must carry staples including milk, bread, and eggs; and
- The store must meet basic sanitation requirements.

A thorough analysis was completed in the summer of 2018, including searching through registered businesses by NAICS category, internet image and information searches, and site visits, to ensure thoroughness and compliance with inclusion criteria.

Medical Centers

Hospitals and urgent care centers were included in the medical center analysis. Urgent care centers were defined as follows:

- Hours which extend beyond the business day (after 5 p.m. and/or some weekend services);
- Provide basic emergency services, such as stitches; and
- Staffed by a doctor.

Community Centers

The community center analysis was intended to capture locations which contribute to the civic, social, and physical health of a community. Public schools were included for their common usage as a meeting space for local events. Libraries often hold classes and programs for community enrichment and vitality, in addition to their everyday functions. Cultural centers, recreation centers, and senior centers were also included for their contributions to community cohesion and vitality.

5. Defining Accessibility

In this document, accessibility refers to infrastructure or (in the case of public transit) service, as well as the amount of time it takes to get somewhere. If it takes an hour to drive to a hospital, that hospital would generally be considered inaccessible. The time threshold that is acceptable for considering a destination to be accessible also varies based on the mode of transportation used, the nature of typical reasons for visiting the destination, and the logistics involved. For example: people are willing to spend more time taking transit than walking, and a community center must be reasonably close to be considered as serving one's community.

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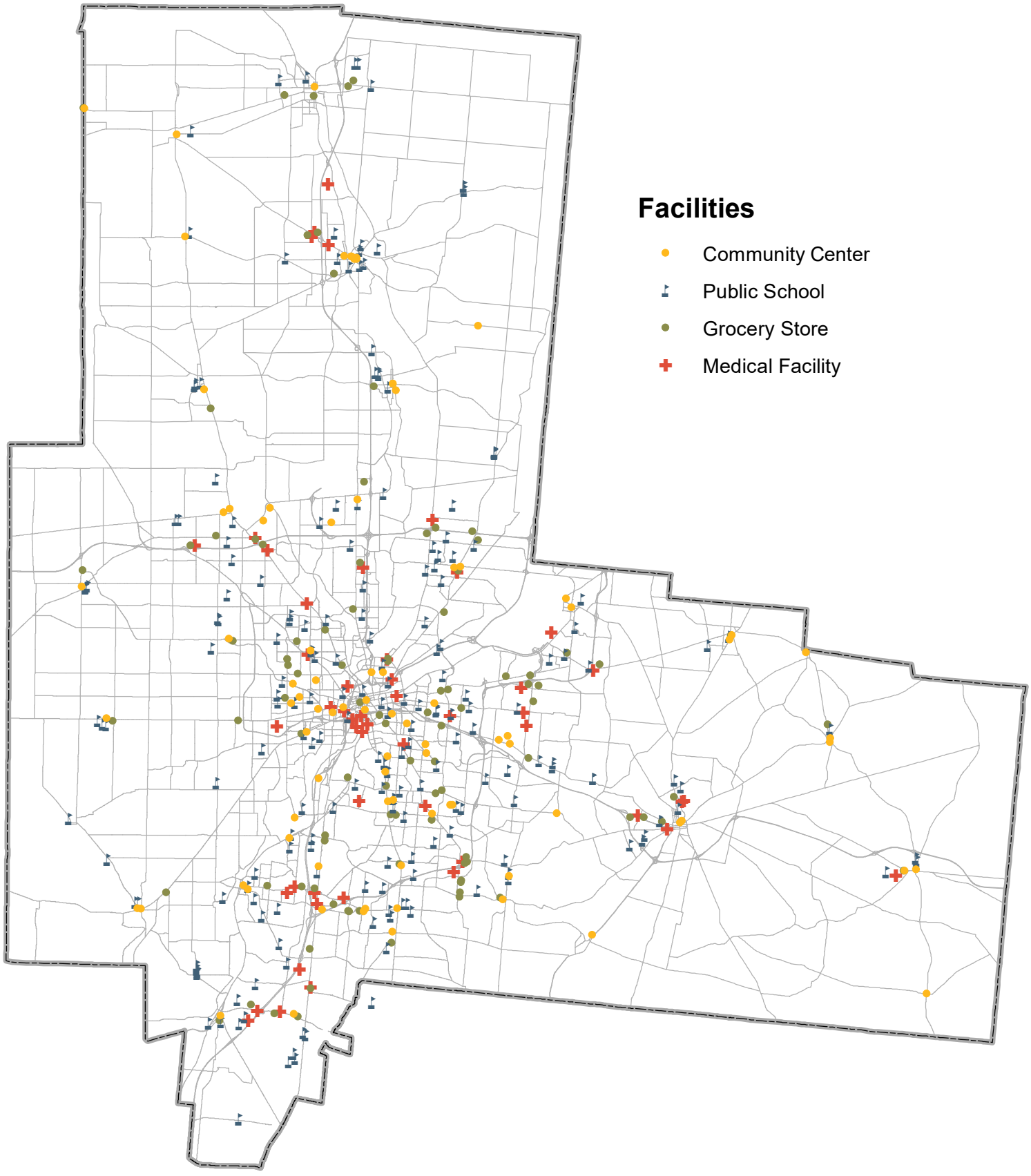
Regional Facilities



People may choose their mode of travel to a given destination at a given time based on convenience (or a greater accessibility afforded by a given mode). If parking is difficult or expensive at a destination, depending on the distance of the destination or its proximity to transit stops, one may choose walking or riding a bus over driving. However, some people may not have the luxury to make such a choice. Someone with a disability may be unable to walk or operate a motor-vehicle. Another person may live in a household without access to a motor-vehicle, for economic or other reasons. Thus, for many people in the region, accessibility by automobile is no accessibility at all. These circumstances arise with greater frequency among the target analysis groups, making it important to examine non-automobile accessibility of facilities.

Taking the above into account, MVRPC developed separate criteria for accessibility for automobile, transit, and walking based on the particulars of each type of facility.

5.1. Accessibility Thresholds

- Walking Threshold:
  - Accessible: 15 minutes
- Transit Threshold:
  - Includes access/egress, waiting, transfers, and in-vehicle times
  - Accessible for Grocery Stores and Medical Centers: 45 minutes (equivalent to 10 minutes driving in Travel Demand Model)
  - Accessible for Schools and Community Centers: 30 minutes
- Driving Threshold:
  - Accessible: 10 minutes

6. Methodology

MVRPC used the regional travel demand model to calculate transit and driving travel times to each type of facility. The model does not adequately measure walking times, so spatial analysis is used for estimating walking time.

The walking access part of the analysis uses distance to approximate walking times. The distance used corresponds to a 15 minute walk using a walking speed of 3 miles per hour, when multiplied by 1.4 to approximate a street network (versus “as-the-bird-flies” linear distances). Micro Analysis Zones (MAZs) based on U.S. Census blocks are used for the walking analysis. A facility within an MAZ is treated as being at the center of the MAZ, and any MAZ with its center within 0.5 miles of an MAZ with a facility is considered to be accessible to the facility by walking, which approximates a street network walking time of 15 minutes.

The travel demand model outputs travel times for transit and driving. The times are given from each Traffic Analysis Zone (TAZ) to every other TAZ, from TAZ center to TAZ center.[1]

For each mode and each facility type, maps were created to classify the TAZs with driving or transit access to a facility and MAZs with walking access. The proportion of target populations with access to each facility type by each mode was then calculated based on the population or households of the groups residing within TAZs and MAZs for each analysis group.

7. Accessibility Analysis Results

MVRPC examined travel times to the nearest grocery store, medical center, and community center for each TAZ. Results are shown by highlighting the TAZs with driving and transit access to each facility type and MAZs with walking access to each facility type. There are tables displaying the proportion of the general population and each target population with access to each facility type. A layout for each facility type with maps and labels can be found on the following pages. In general, all examined populations have better accessibility than the general population except for the elderly, whose accessibility closely resembles that of the general population due to a similar geographic distribution. Rural populations have more gaps in accessibility than urban and suburban populations.

7.1. Grocery Store Accessibility

All populations have greater than 95% driving access, greater than 55% transit access, and greater than 20% walking access. The groups with the most access per mode are minority for driving and transit (99.5% and 80%, respectively), and zero-car households for walking (31%).

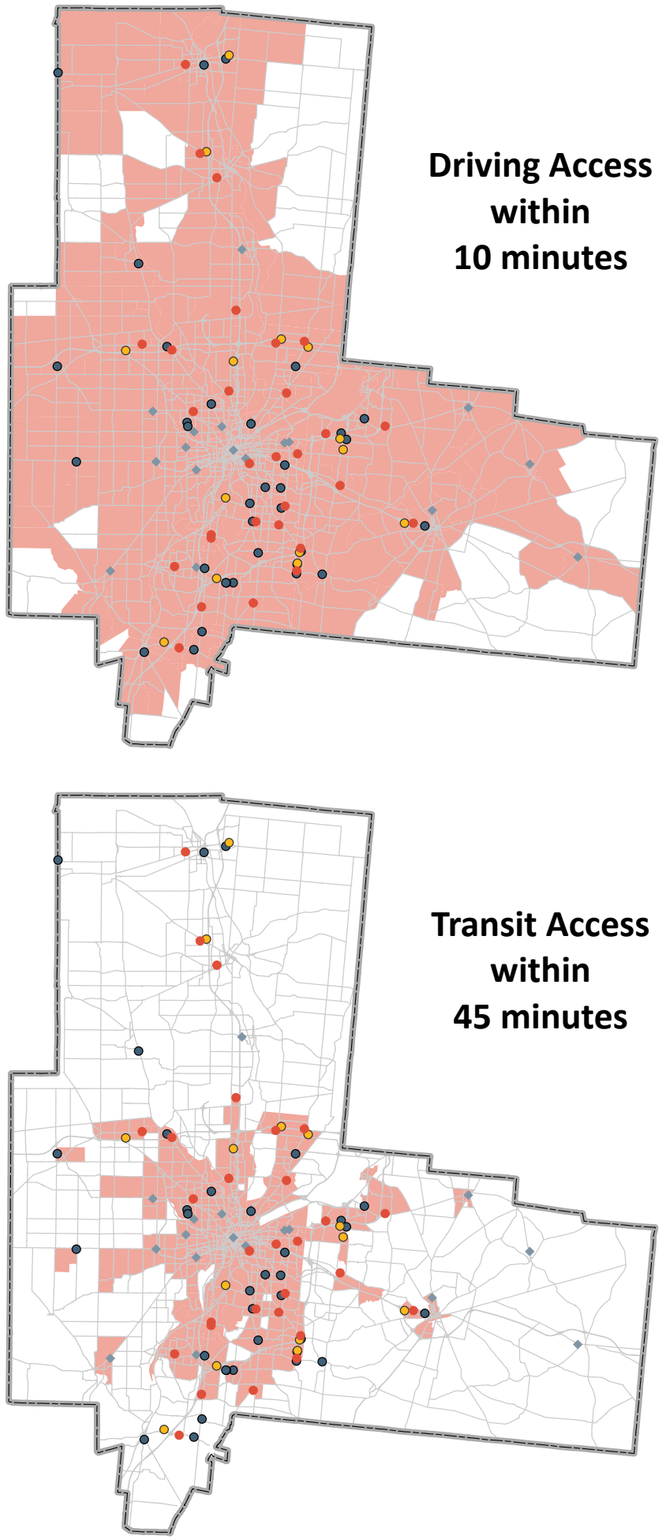
Rural populations tend to have lower access than urban and suburban populations to grocery stores. Driving access tapers off on the outskirts of the region (e.g. western Greene and western Miami counties), especially outside the Interstate 75 corridor. Target populations living in rural communities, especially those unable to drive, may experience difficulty shopping for food.

It is also notable that accessibility would decrease significantly if only major grocery chains were included in the analysis.

7.2. Medical Center Accessibility

All target groups have greater transit and walking access than the general population. All populations have greater than 88% driving access, greater than 50% transit access, and greater than 8% walking access. The groups with the most access per mode are minority for driving and transit (98% and 76%, respectively), and zero-car households for walking (17%).

[1] The center of a TAZ is the activity center (weighted by trip generation), rather than the geometric center.



Driving Access within 10 minutes

Transit Access within 45 minutes

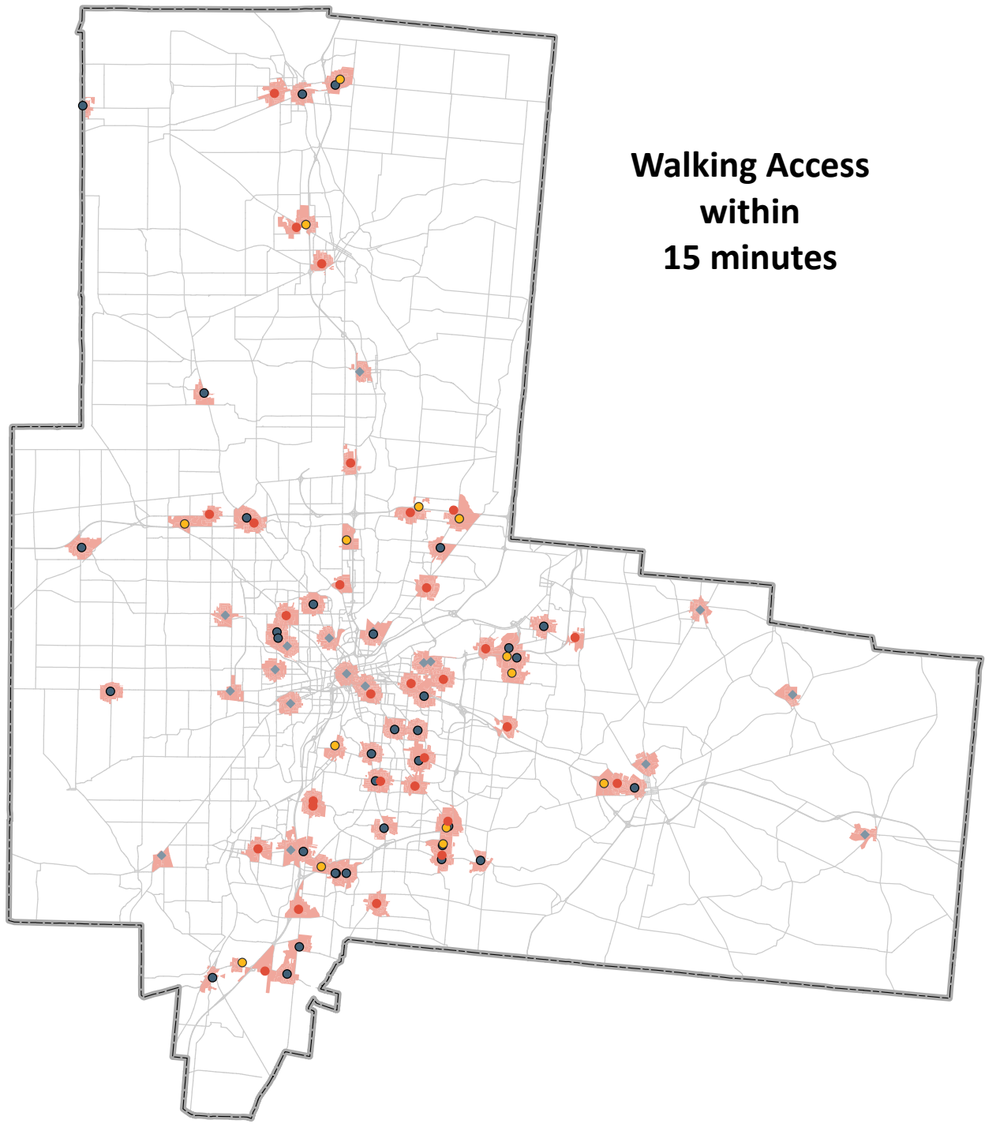
N

All Maps

- Walmart/Target
- Kroger/Meijer
- Other Chain
- Non-Chain

Within Access Time

- Any Grocery



Walking Access within 15 minutes

	Grocery Stores		
	Driving	Transit	Walking
General Population	96.75%	56.25%	21.89%
Poverty	98.92%	71.63%	29.08%
Disability	97.43%	61.91%	24.22%
Zero-Car Households	99.11%	76.39%	30.52%
Minority	99.54%	79.72%	26.50%
Hispanic	98.38%	66.38%	27.53%
Elderly	96.90%	56.19%	20.83%

Source: MVRPC

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Grocery Store Accessibility

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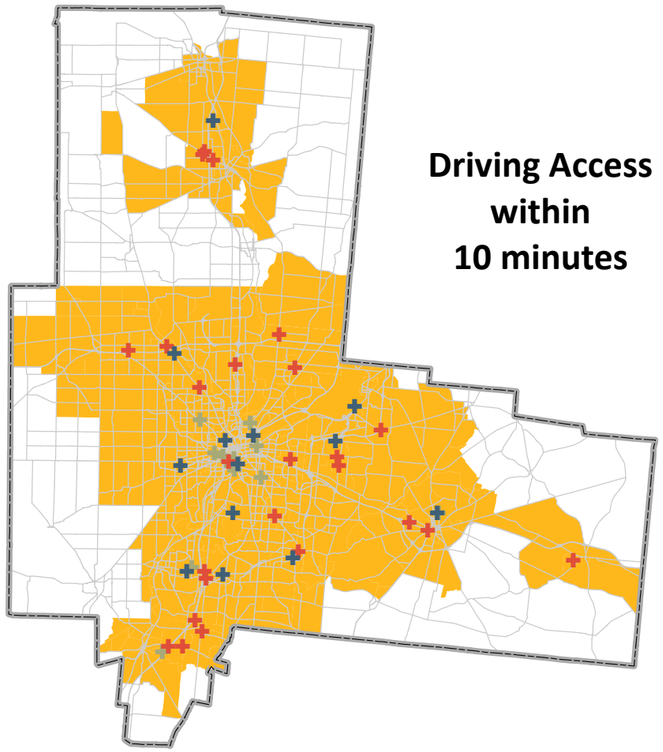
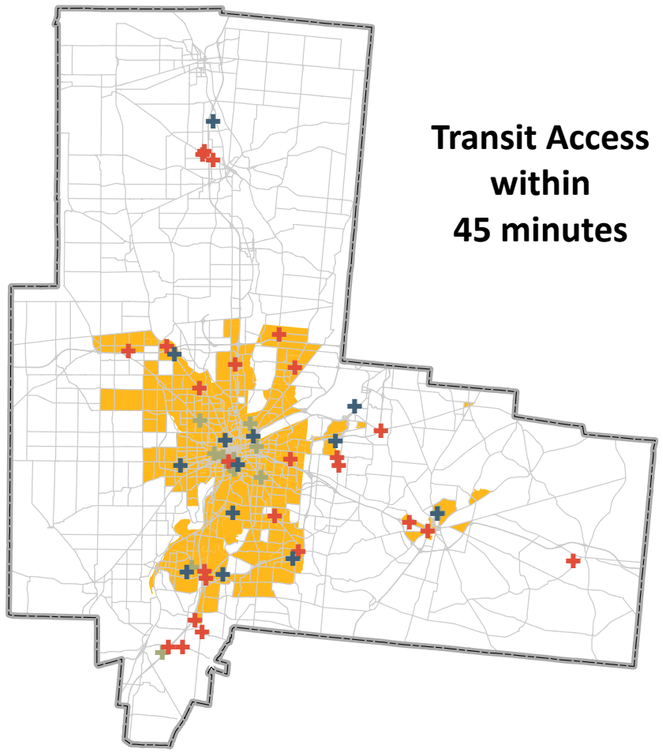


Driving Access within 10 minutes



Transit Access within 45 minutes

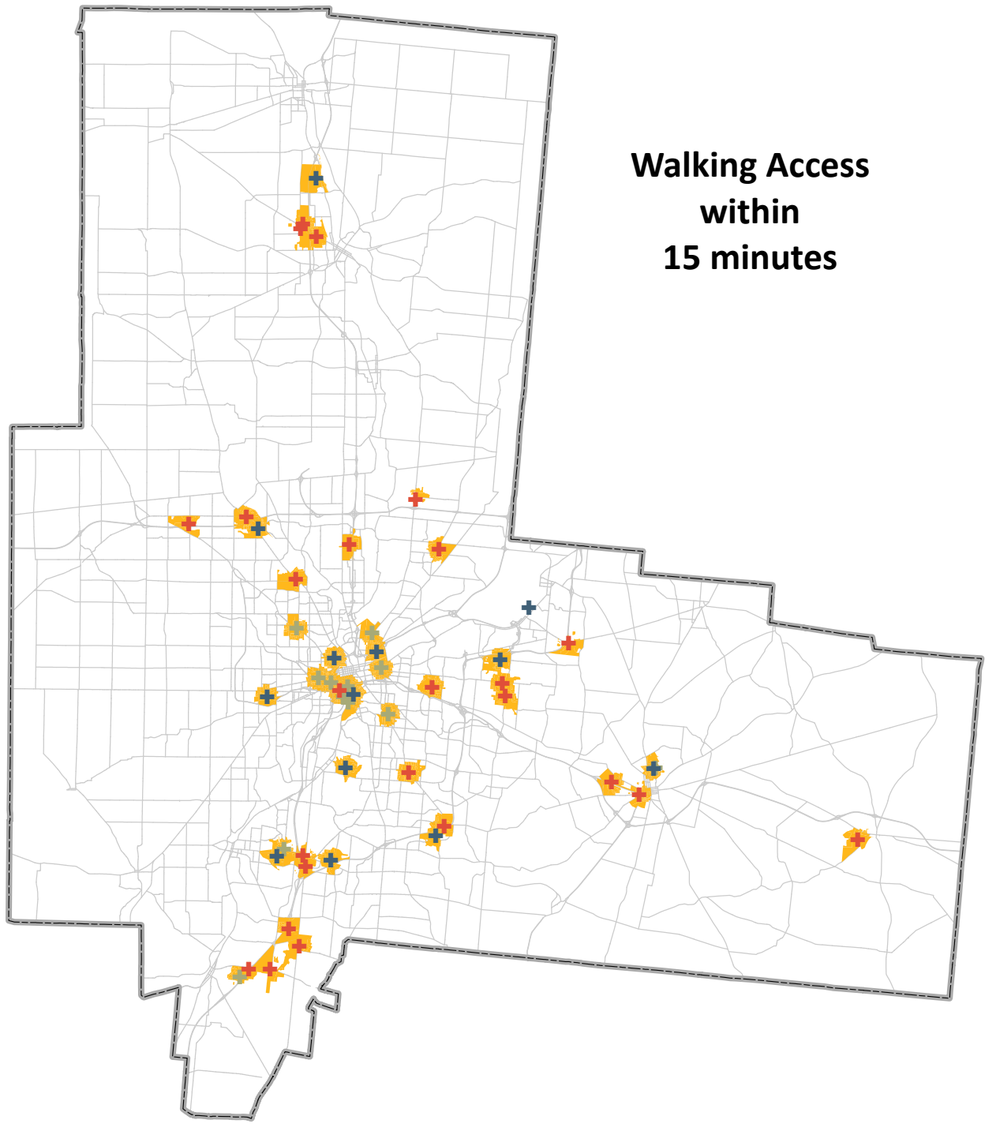
N

All Maps

- Hospital
- Community Health Center
- Urgent Care Center

Within Access Time

- Medical Facility



Walking Access within 15 minutes

	Medical Centers		
	Driving	Transit	Walking
General Population	89.17%	50.15%	8.72%
Poverty	94.38%	64.72%	13.01%
Disability	91.08%	56.17%	10.64%
Zero-Car Households	96.65%	70.99%	17.03%
Minority	98.06%	76.07%	11.58%
Hispanic	94.54%	58.83%	10.97%
Elderly	88.68%	50.34%	9.66%

Source: MVRPC

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Medical Center Accessibility

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Medical center access for rural communities is the lowest of any facility type. Low driving access extends into some exurban communities such as Germantown and Brookville.

7.3. Community Center Accessibility

All target groups have greater driving access than the general population. All populations have greater than 98% driving access, greater than 35% transit access, and greater than 18% walking access. The groups with the most access per mode are minority for driving (99.72%), and zero-car households for transit and walking (58% and 27%, respectively).

For schools, the elderly population has about the same proportion with driving access as the general population, while all other target groups have greater driving access than the general population. All target groups have greater transit and walking access than the general population. All populations have greater than 98% driving access, greater than 48% transit access, and greater than 40% walking access. The groups with the most access per mode are minority for driving (99.86%), and zero-car households for transit and walking (71% and 51%, respectively).

Community centers and schools enjoy a wider geographic coverage than the other facility types. Still, there are accessibility gaps, even for driving, in less-populated parts of the region.

8. Service Gap Analysis

Locations were identified where population density is relatively high but there are no nearby facilities of a given type. A different population threshold was used to determine service gaps for each facility type. A grocery store was estimated to need 3,000 people in an underserved area. A medical center was estimated to need 10,000 people, and community centers and schools were estimated to need 1,000 people in underserved areas.

8.1. Grocery Store Gaps

Grocery stores have a high level of clustering, leading to gaps in coverage elsewhere and contributing to congestion on the road network surrounding clusters as residents have no choice but to drive to a grocery store. For example, the Wilmington Pike corridor near I-675 has a dense cluster of grocery stores, while northeast and southwest of this cluster there are gaps. Eastern Trotwood has areas which could support one or more grocery stores (these areas have clusters to the north and south). Troy has underserved populations on the east and south sides.

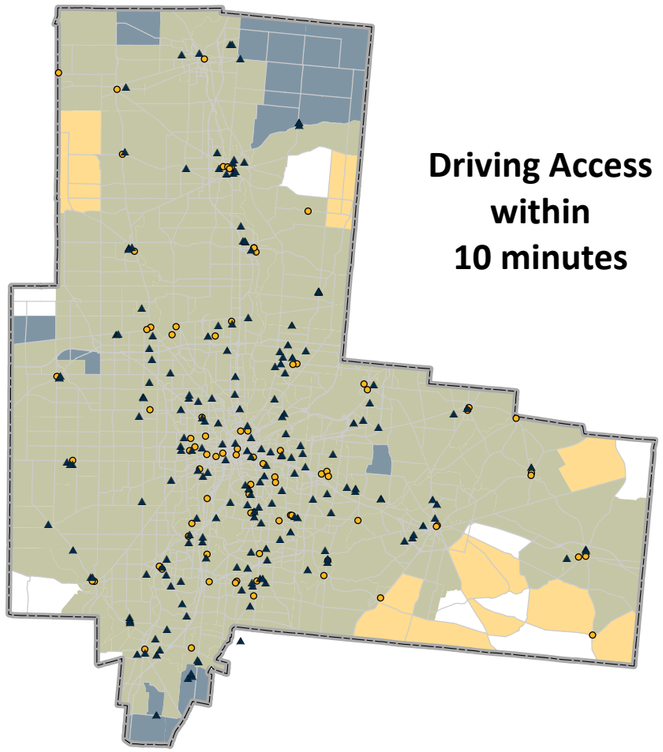
8.2. Medical Center Gaps

Medical centers require a larger population to support them than the other types of facilities analyzed, but there are some areas with substantial population density and a relative lack of facilities. Tipp City, Vandalia, and Trotwood stand out as large population centers lacking a facility, as well as southern Beavercreek, and the southwestern corner of Montgomery County covering Washington Township and Centerville.

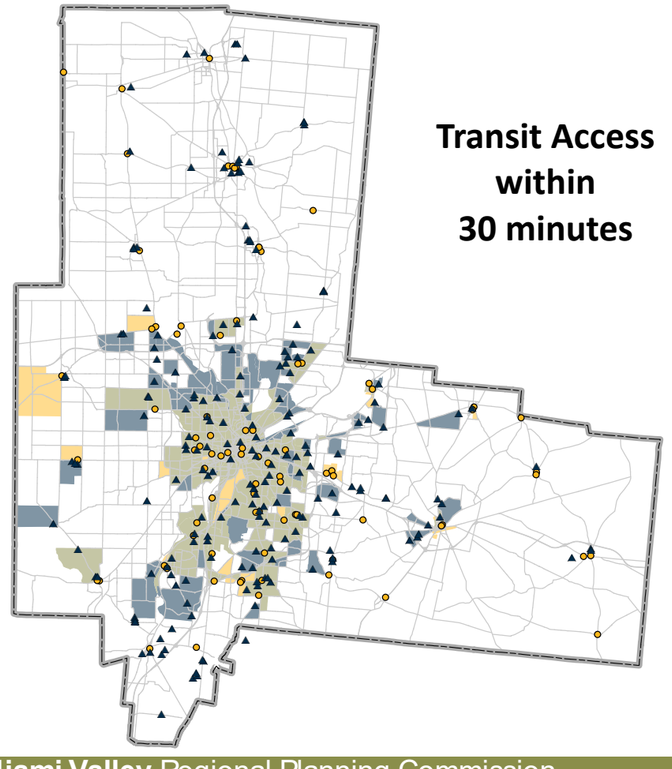
8.3. Community Center Gaps

Community centers enjoy relatively strong coverage, with even most small communities having a school or library, but there remain areas with gaps. The area around Frederick Pike, Peters Pike, and Philadelphia Drive is one such location. Peripheral parts of the Miami County cities along I-75 also have populations which may support additional community centers. Warren County also has a couple locations in Franklin and Franklin Township which may have a need for and the population to support new community facilities.

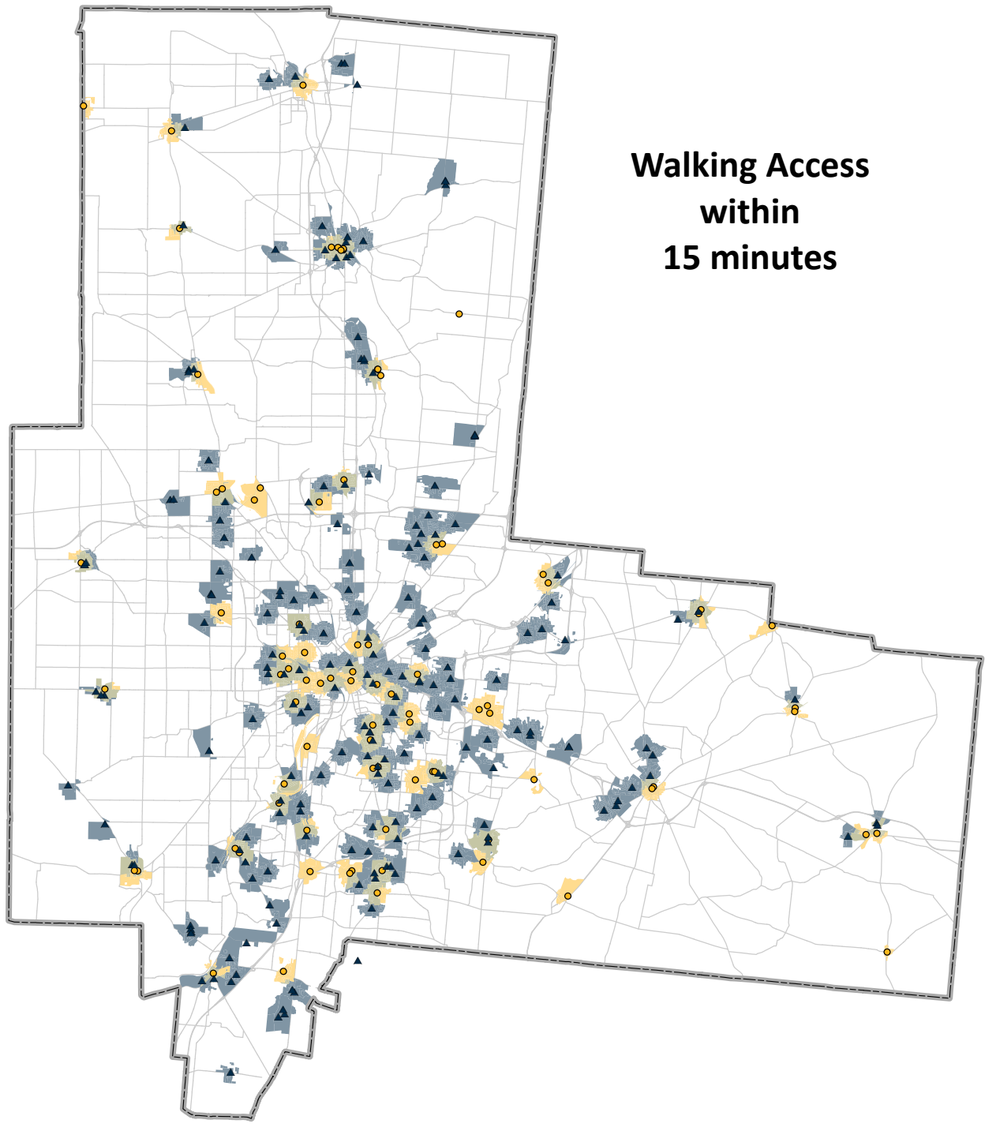
Community Center Accessibility



Driving Access within 10 minutes



Transit Access within 30 minutes



Walking Access within 15 minutes

N

All Maps

- Public School
- Community Center

Within Access Time

- School Only
- Community Center Only
- Community Center and School

	Community Centers			Schools		
	Driving	Transit	Walking	Driving	Transit	Walking
General Population	98.28%	35.91%	18.05%	98.93%	47.75%	40.59%
Poverty	99.48%	51.26%	25.38%	99.61%	63.28%	48.30%
Disability	98.59%	42.78%	21.09%	99.12%	54.61%	44.58%
Zero-Car Households	99.37%	57.94%	26.80%	99.74%	70.72%	50.51%
Minority	99.72%	53.76%	21.23%	99.86%	69.37%	42.71%
Hispanic	99.06%	42.78%	19.59%	99.65%	55.87%	43.93%
Elderly	98.33%	35.65%	17.35%	98.91%	48.43%	40.92%

Source: MVRPC

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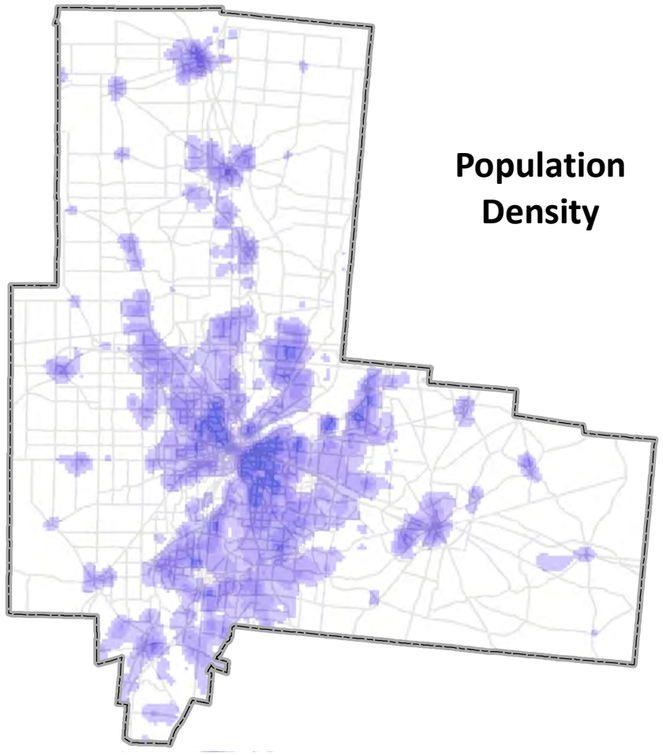
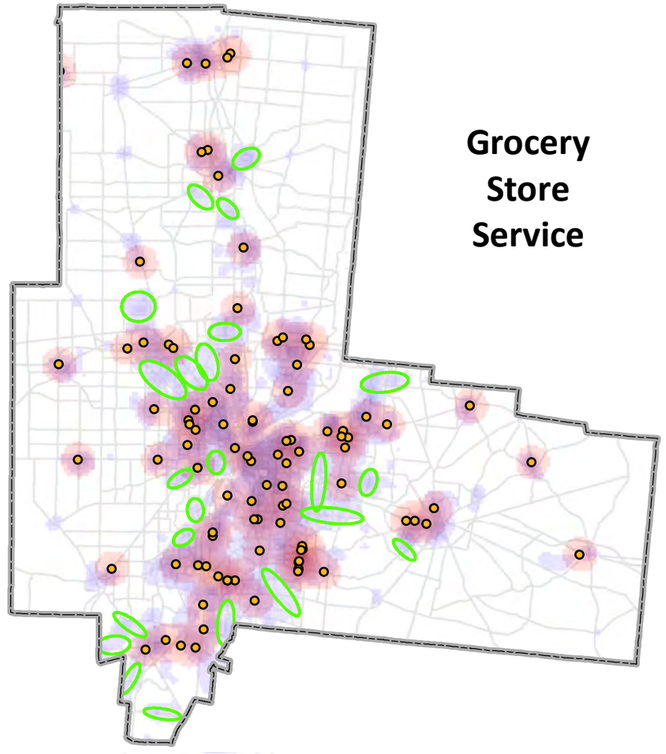
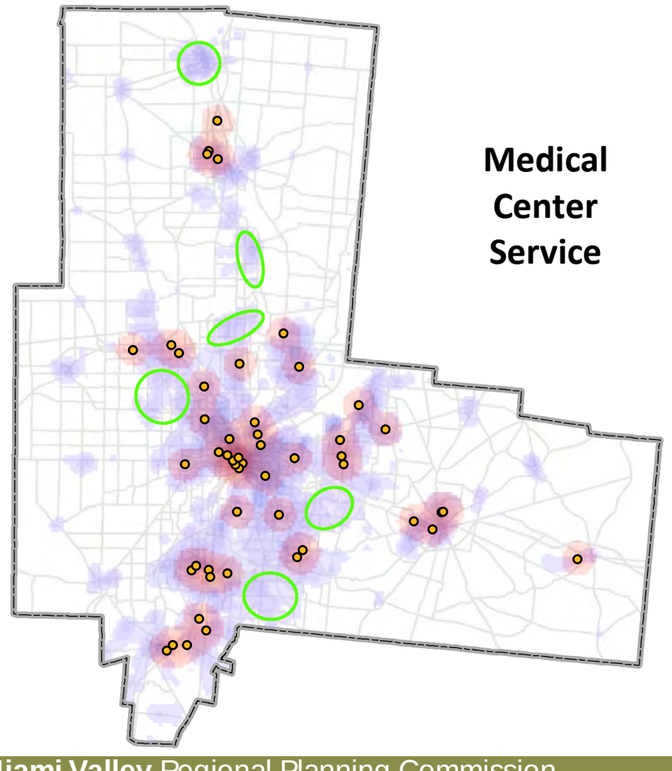


Population Density



Grocery Store Service



Medical Center Service

N

All Maps

Facility

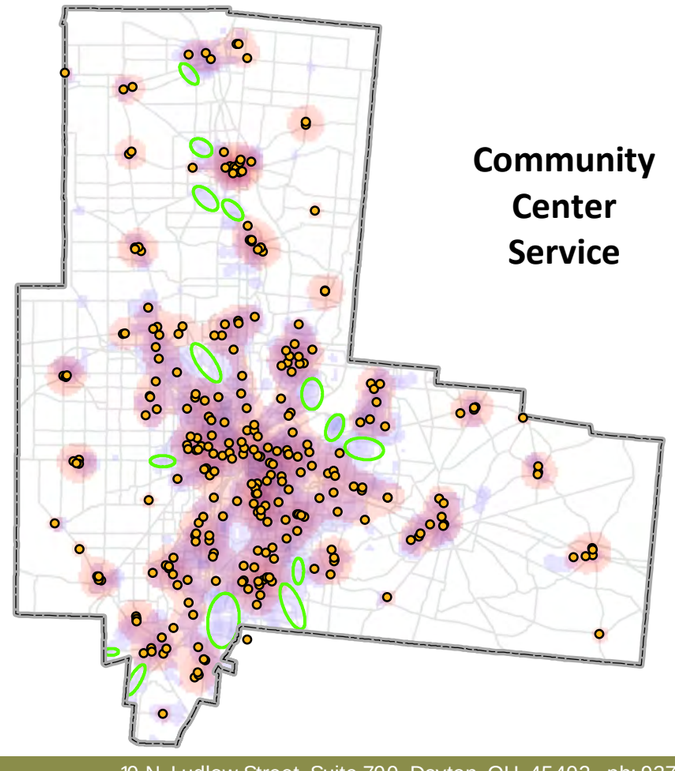
Population Density

Service Coverage

Service Gap

Miles

0 2 4 6 8



Community Center Service

MVRPC

Service Gap Analysis

9. Conclusion

Walking access is below 52% for all population groups, across all facility types. Schools have the greatest accessibility percentage of any type of facility in the analysis, as they are not particularly clustered in their distribution. Although it is also important to note that many schools are located in suburban and rural areas that are not particularly walkable.

While disparities between target group populations and the general population are minimal, and some populations (especially minority, people in poverty, and zero-car households) show significantly greater access than the general population for many mode-facility pairs, there is a significant proportion of each population without transit or walking access to each facility type. This can pose a number of problems, ranging from inconveniences to putting lives at risk. The data indicates a significant proportion of the region's population lives without access to a car, without sufficient funds to regularly operate a car, with an inability to operate a car due to disability, or with a declining ability to operate a vehicle safely due to age, while at the same time living in an area where essential facilities are located outside the analysis's accessibility thresholds.

9.1. Food Insecurity and Food Deserts

Vulnerable populations, such as those targeted for our analysis, are less likely to be able to drive to the grocery store. This creates a situation where affordable, fresh produce may be difficult to come by. Only 72% of people in poverty have transit access to a grocery store, meaning nearly 30% of those in poverty do not. More than 20% of the minority population does not have transit access to a grocery store. More than 70% among people in poverty and the minority population do not have access to a grocery store by walking. The proportions are worse among people with a disability, many of whom are unable to drive, and worse yet among the elderly population, who may find themselves eventually unable to drive.

9.2. The Silver Tsunami

The population in the Miami Valley is getting older, and the proportion of the population which is elderly is increasing. The analysis shows the elderly population as having the worst non-driving access of all target groups for every facility type, as well as worse access than the general population for community centers and grocery stores. While a significant majority of elderly people are still perfectly capable of driving, anyone who lives long enough will begin to experience atrophy of the necessary skills. A challenge for the future of the region will be enabling those experiencing declining driving skills to transition comfortably and conveniently to a post-car lifestyle with their dignity intact when the time is appropriate. Post-car life should include accessing basic services, like groceries and medical care, and social and activity centers.