

Mapping the Landscape of Aging

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Paper Abstract

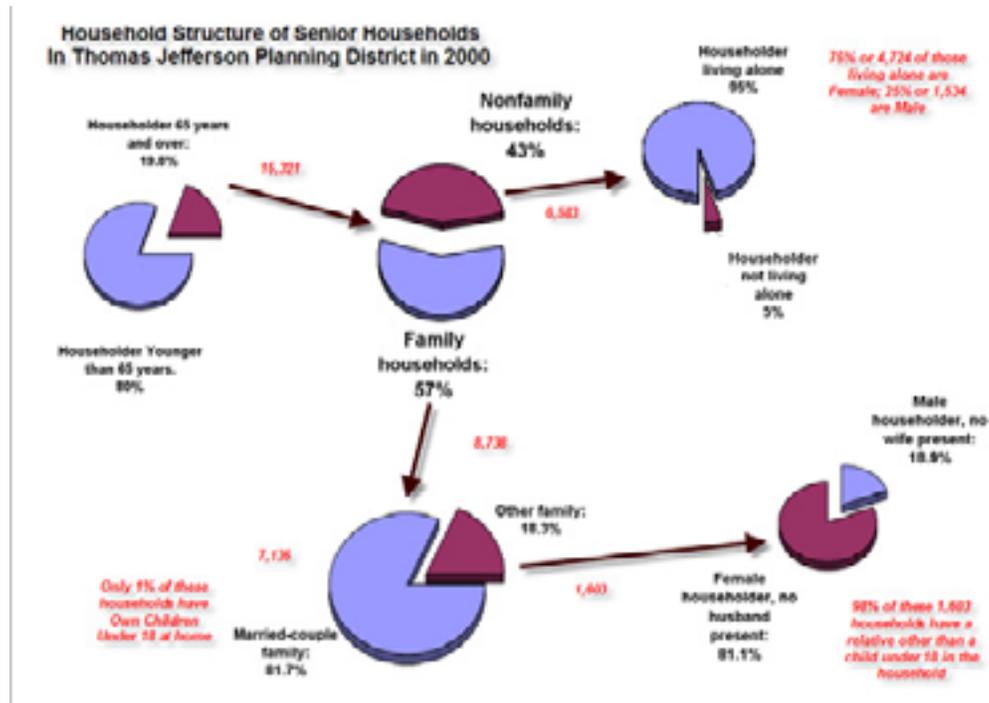
What does the spatial landscape of a growing senior population and the services they need look like? A collaborative mapping project between a senior citizen service provider, Jefferson Area Board of Aging, and a university GIS research course helped address several key issues. What is the nature of the growing senior population in the region surrounding Charlottesville, Virginia? How many seniors are able to stay in their homes? What is the distribution of specialized services often needed by a more senior population? How accessible are those services? How effective have the senior services agencies been in reaching their intended audience? What are some of the social and public issues that are raised by this analysis? The results of this project and the methodological issues raised in its completion will be presented.

Introduction

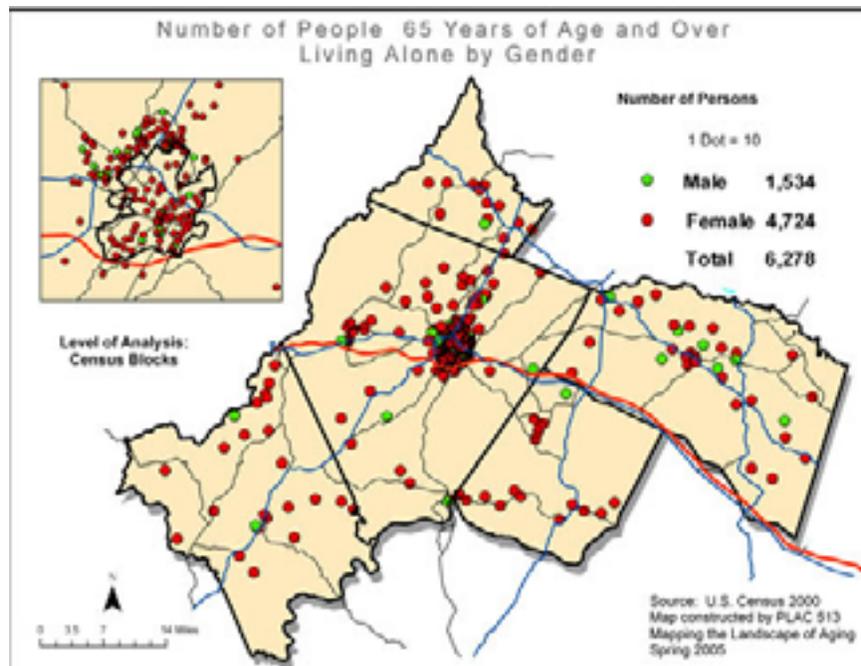
The Jefferson Area Board of Aging (JABA) serves seniors in six governmental jurisdictions surrounding the City of Charlottesville in central Virginia. (Charlottesville is roughly 125 miles southwest of Washington D.C. and 70 miles west of Richmond, Virginia.) In 2000, 12.3% of the region's nearly 200,000 persons were 65 years of age or older. JABA has been the leading provider of information and services to seniors in central Virginia since 1975. They recently completed their "2020 Community Plan on Aging for the Thomas Jefferson Planning District". The plan moves beyond providing specific services to low-income seniors. It addresses a much broader perspective of the community's need to improve healthcare accessibility, housing affordability, and quality of life for the aging population and their caregivers. To communicate the breadth of concerns of the 2020 Community Plan on Aging and to provide a base point from which progress on the plan might be monitored, JABA partnered with author and his Urban and Environmental Planning GIS course to "Map the Landscape of Aging".

This project provided a comprehensive picture of the demographic, economic and housing dimensions of the senior population. Second, it inventoried the location of many services often required of seniors (health care, pharmacies, senior centers, assisted living facilities) and explored the regional accessibility to those facilities by seniors. Third, current clients of JABA services were compared with the distribution of potential clients to assess the effectiveness of JABA's outreach and intake activities. And finally, the precinct level pedestrian accessibility was assessed in a neighborhood in which a number of senior oriented facilities are located. Examples of each of these products are presented here. The comprehensive report is available on line at www.arch.virginia.edu/~dlp/MLAging/

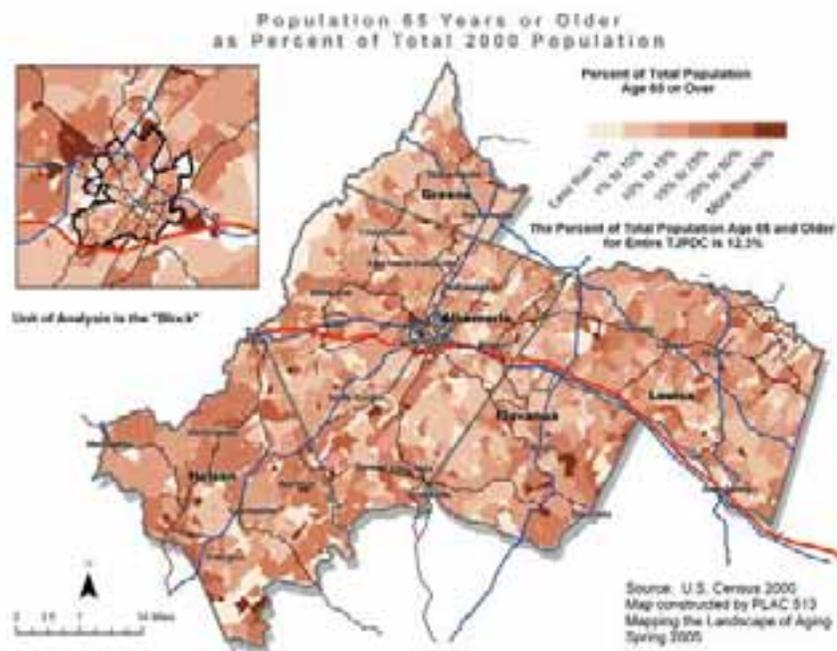
Mapping the composition and needs of the Senior Population:



In the Thomas Jefferson Planning District in 2000 there were 24,488 persons 65 year of age and older. Ninety-four percent or 22,970 were in households. The remaining 6% or 1,518 were in group quarters. The diagram above subdivides the households into Family (57%) and Non-Family (43%) Households. The overwhelming majority (95%) of the 6,583 non-family households were persons over 65 years of age living alone. Three-quarters of these were females. Married couple households were approximately 82% of the Senior Family Households. Few of these had children under 18 living at home. Of the 18% of Other Family Households (where one spouse is not present) 98% had some relative other than their own child living in the home. The total picture of senior households is dominated by small household size and almost 30% of which are women living alone. The distribution among the census blocks of seniors living alone by gender is shown in the following map.



The relative specialization of each block's senior population is shown below with some close in suburban blocks (with senior oriented apartments and group quarters) and some rural blocks (small and isolated locations) having as many as 50% of their population being seniors.¹

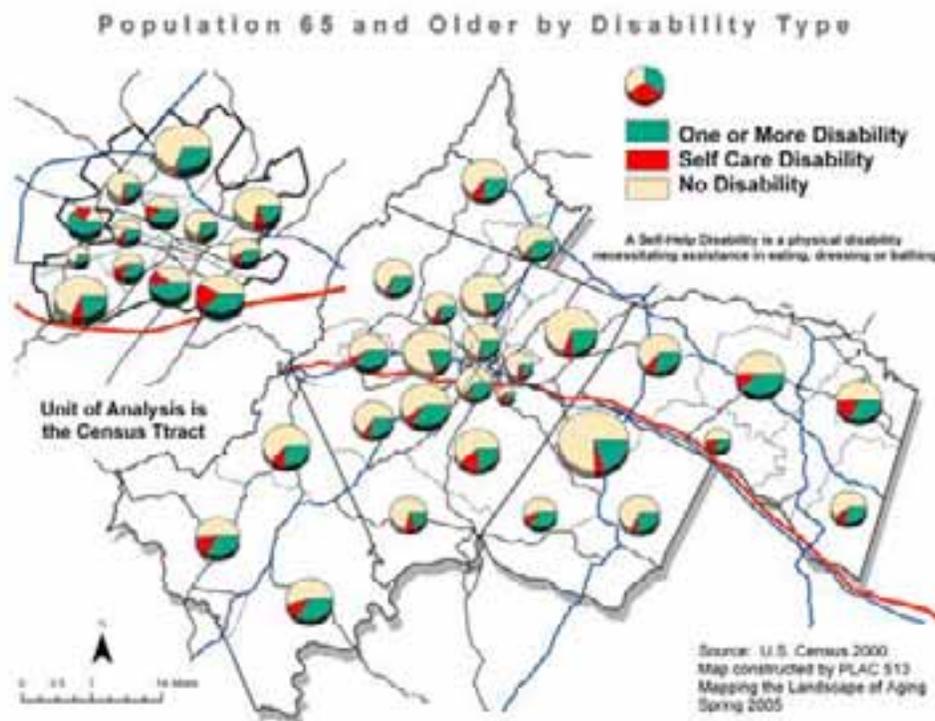


Senior Populations and Daily Functional Needs

Health and functional mobility increase in importance as a person ages. Certainly not all seniors have disabilities and hardly are all persons with disabilities older persons. Maintaining an independent and wholesome life may require special accommodations or assistance from others. But as a person ages, coping with disabilities or having a spouse, family member or friend to help becomes more problematic. Seeking to understand the needs of individuals as they age is a balance between understanding what they "cannot do" and what they are "able to do" as they make adjustments and accommodations.²¹

Needs in the Home:

The data reported below at the Census Tract Level of analysis shows the distribution of the population 65 and older (the size of the pie diagrams) and the presence of persons with one or more disabilities. The "Self Help" disability is separated out. Persons with these disabilities require some assistance in eating, dressing or bathing.

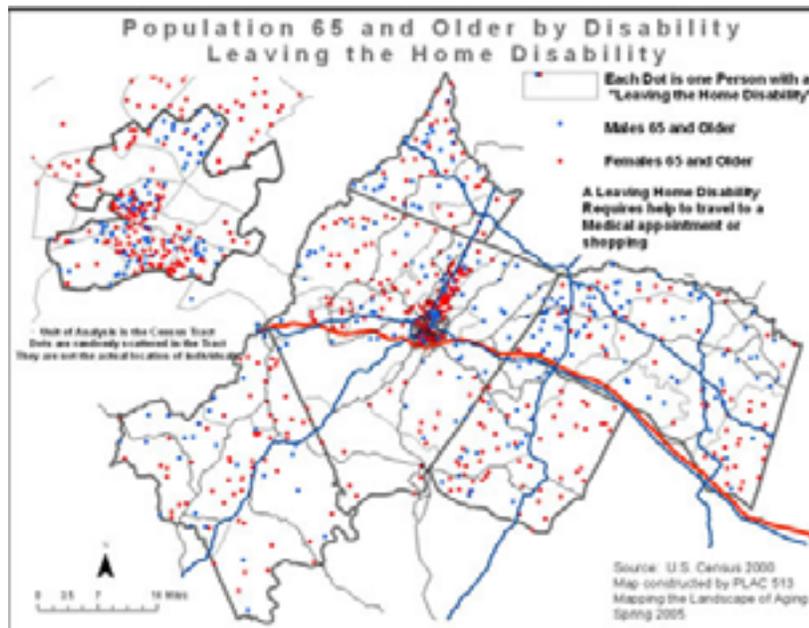


Nearly all census tracts have at least one quarter of the senior population with one or more disabilities. In a few census tracts in Charlottesville and several of the outlying rural census tracts, one-half or more of the senior population have disabilities of some kind. In some instances these census tracts are also those with larger numbers of individuals in group care institutions.

Needs when going outside the Home:

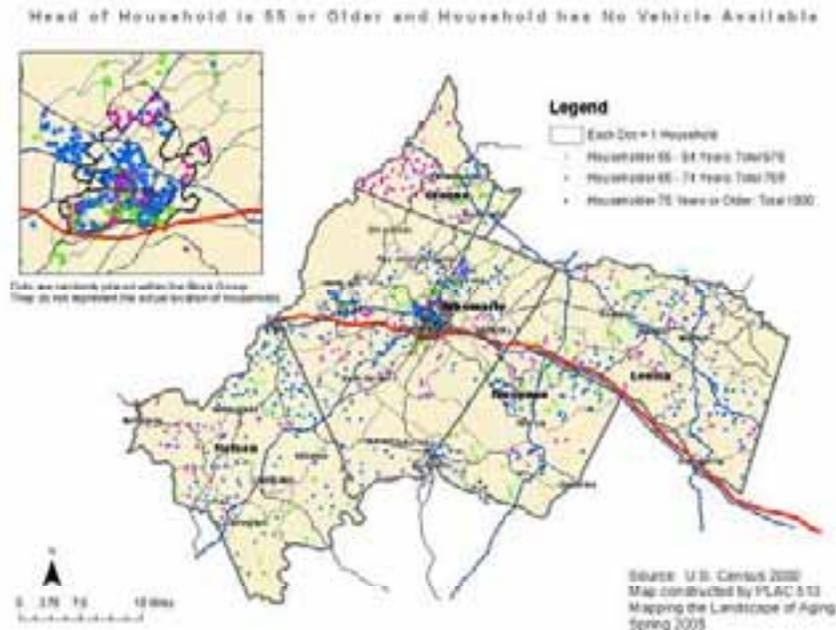
The dots in the following map are randomly distributed within each census tract. They show the distribution of persons 65 and older by gender that need assistance when traveling outside the

home as to a doctor's appointment, pharmacy or shopping. This does not include individuals who are residents of institutions.



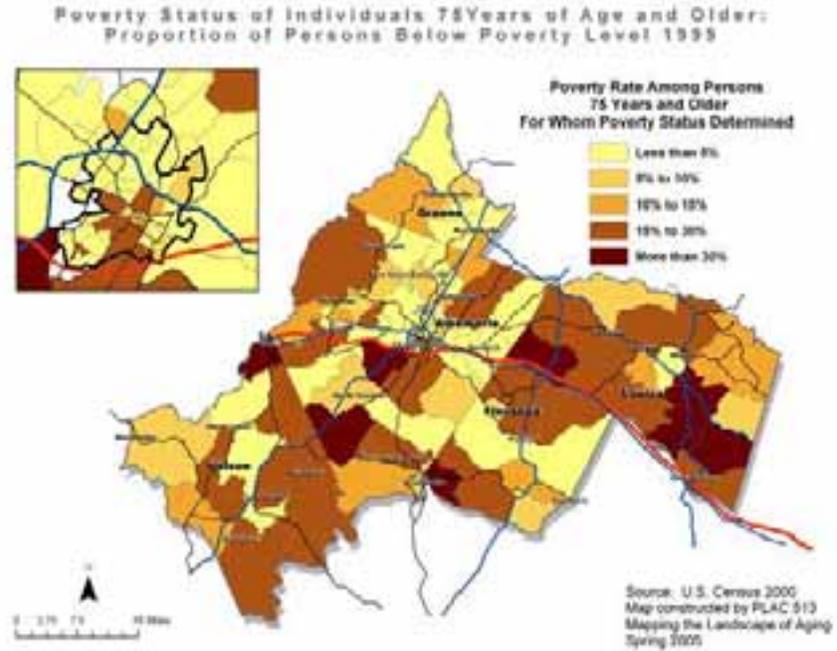
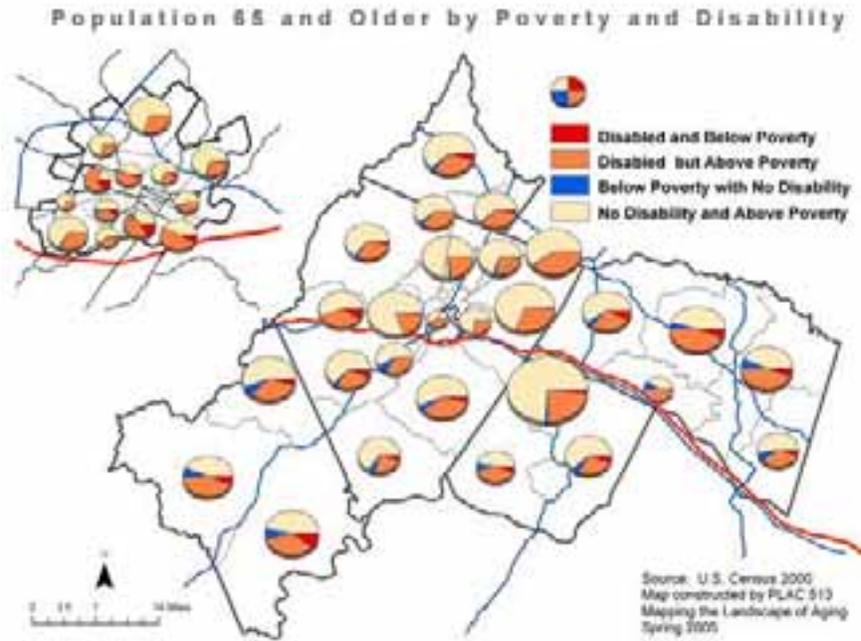
Seniors without Cars:

While we do not know whether these same individuals live in households without vehicles, many households headed by persons 55 years of age and older do not have a car or other vehicle available for use. They rely on friends, neighbors, taxis or public transport when they need to get to services outside their neighborhood.



Disabilities and Poverty:

Physical needs are amplified if there are few financial resources with which to purchase accommodations. The following map shows the distribution of those below poverty as well as those with disabilities. These two groups are the prospective clients of many of JABA's services. Again, central city neighborhoods and outlying rural census tracts have a larger share of these needs.



Mapping Activities Locations for the Aging Population and their Regional Accessibility

The 2020 Plan for Aging was community-focused identifying the desirability of seniors having access to multiple activities. A major portion of the Mapping the Landscape of Aging Project was to identify numerous activity facilities specifically serving seniors or facilities often used by seniors. These included hospitals, doctor's offices, libraries, places of worship, schools, pharmacies, grocery stores, emergency service facilities, assisted living facilities and of course senior daily activity centers.

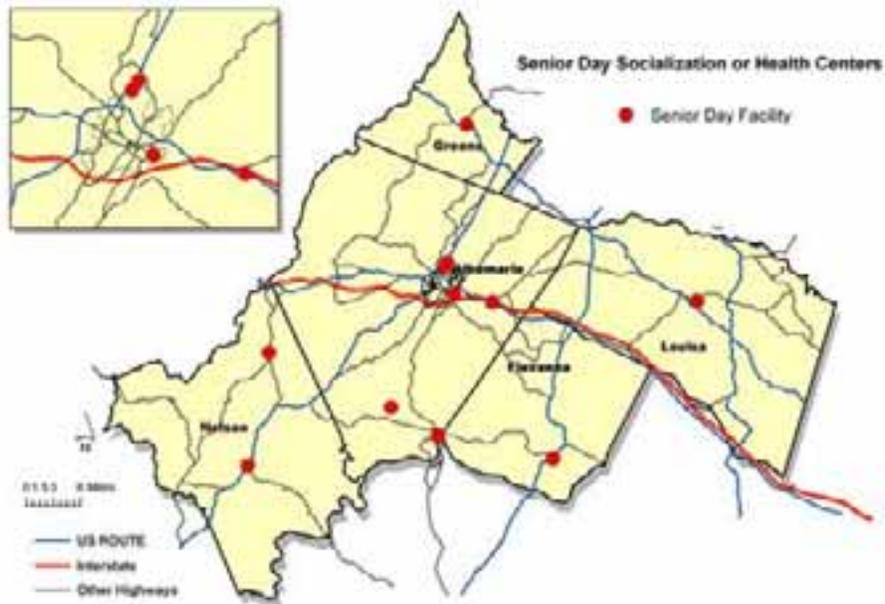
Collecting comprehensive lists of such facilities was a time consuming task. Agency lists were often incomplete or out of date, phone directories were dated or incomplete. These traditional methods were complemented with web searches, word of mouth and "post-it" notes on maps at public presentations.

Displaying the aggregate person-hours of travel time it would take for all seniors in each census block to travel to the nearest facility was used to assess regional accessibility. Using a grid of the regional street network and network speeds, a cost-weighted travel time was computed from each set of facilities to all points on the network. The average travel time to the nearest facility was computed for each census block using the zonal statistics function. The number of persons in each block who were 65 and older was multiplied by this time to get the aggregate travel time. High values of aggregate travel time show places that are either far removed from a particular type of facility or have large numbers of seniors at a modest distance. These "dark" areas would indicate "underserved" portions of the region. Below the Regional Accessibility for Senior Daily Activity Centers illustrates the process used for each set of the above mentioned activity types.

Senior Daily Activity Centers

For many seniors having a safe, pleasant, friendly place to spend one or more days per week is essential. Here they can visit with their friends, receive a good nutritious meal, have their medical vital signs monitored or just enjoy being away from their home for a while.

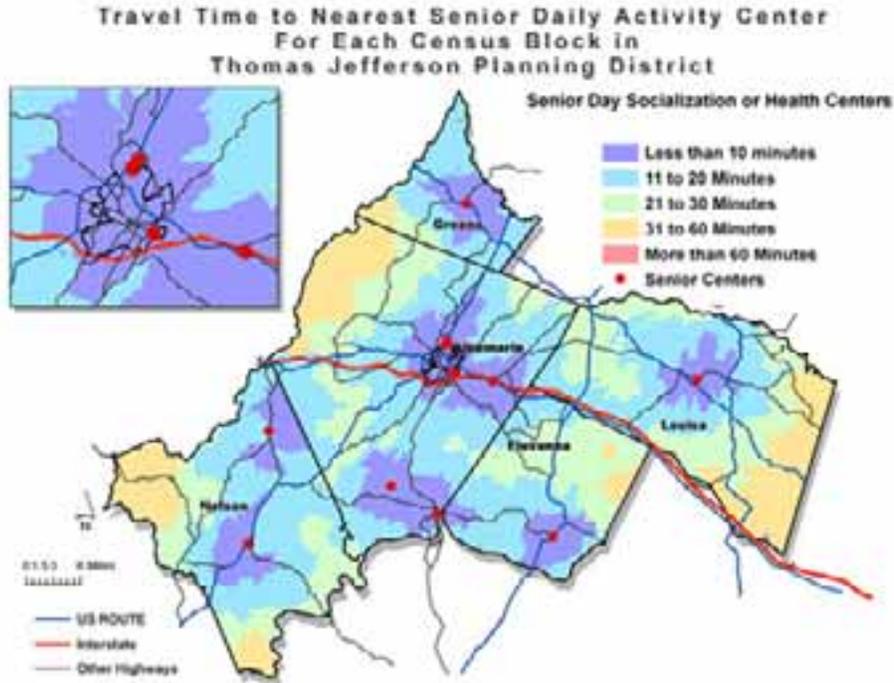
**Senior Daily Activity Centers
Thomas Jefferson Planning District**



The map above indicates senior centers within the Thomas Jefferson Planning District. A number of the centers are operated by JABA, with some offering adult day health care specifically. The table below lists these facilities.

Facility	JABA Facility?	Adult Day Health Care?
JABA Headquarters	YES	YES
Mary Williams Senior Center	YES	
Senior Center, Inc.		
Esmont Senior Center	YES	
Keswick Community Senior Center	YES	
Scottsville Senior Center	YES	
Greene County Senior Center	YES	YES
Louisa Senior Center	YES	YES
Nelson County Senior Center	YES	
Rockfish Senior Center		
Fluvanna Senior Center	YES	

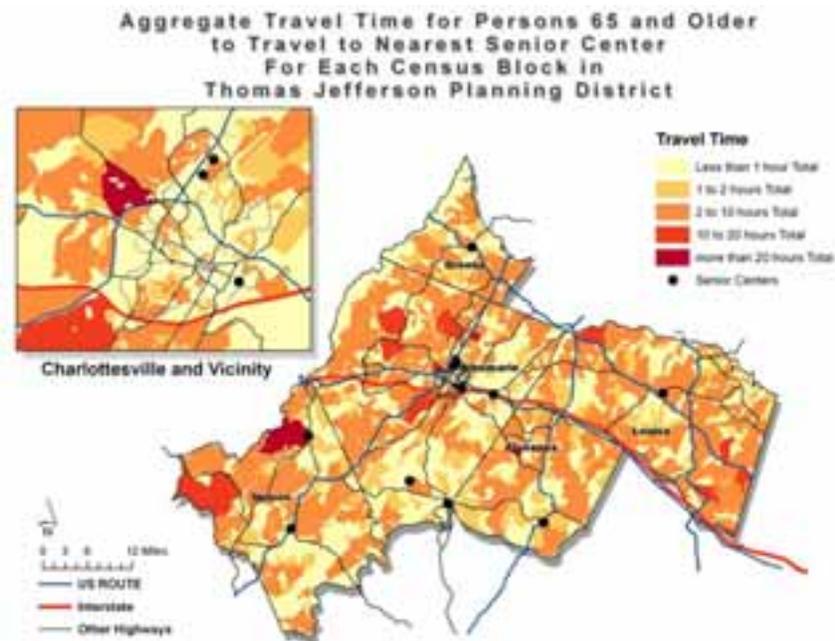
Travel time to Senior Centers



The map above indicates the mean travel time to the nearest senior daily activity center for each census block within the Thomas Jefferson Planning District. Although it is possible that area residents utilize senior centers outside the boundaries of the study area, the map does provide a good indication of the proximity of JABA's target population to its and other private facilities.

Total Time for all Persons 65 Years or Older to Travel to the Nearest Senior Center for Each Census Block

The following map shows the aggregate travel time for those 65 and over within each census block to reach the nearest senior center.



Where are the people JABA serves?

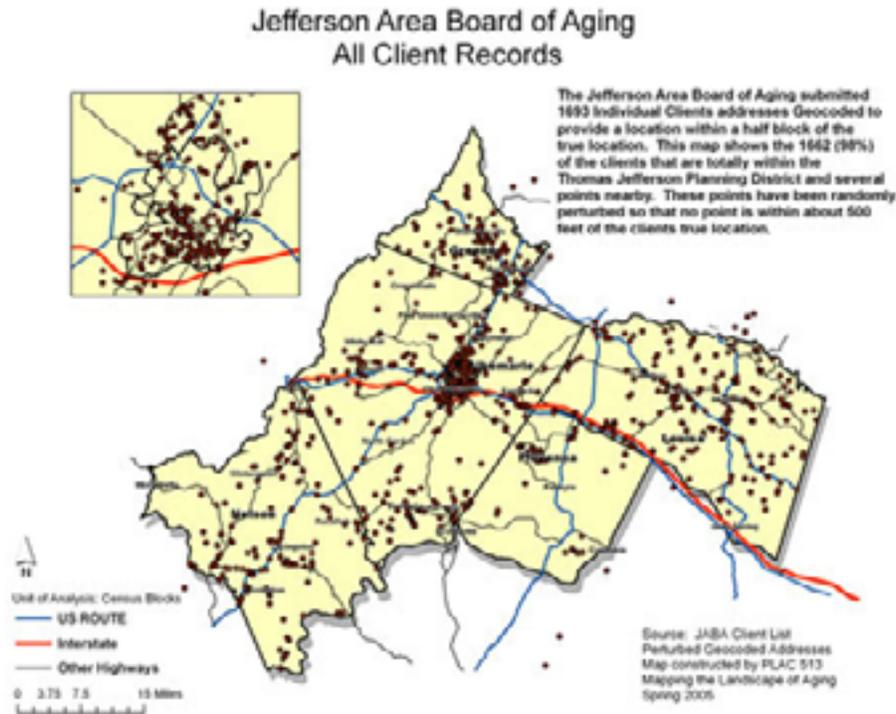
In 2004 Jefferson Area Board of Aging served more than 1700 different clients. Many of the clients received multiple services. Client services are tracked by the administrators of the program and reported to the Virginia Office of Aging and other Aging administrative offices. The classes of services so reported include:

Case Management: Assistance, either in the form of accessing needed services, benefits, and/or resources, or arranging the needed services by providers. ***Access and Acquisition***: Similar to Case Management, only the clients have a higher degree of financial need and receive services for free or on a sliding fee scale. ***Disease Prevention, Health Assessment and Health Promotion***: Health risk assessments; routine health screening; nutritional counseling and educational services; health promotion programs; programs regarding physical fitness group exercise, and music, art, and dance movement therapy, and other similar services. Other services are ***Adult Day Health Care, the Cool Aid Program, Home Delivered Meals, Home Safety, Home Care, Senior Center Clients, Transportation, and Congregate Volunteers***

Jefferson Area Board of Aging worked collaborated with the Mapping Project to make the spatial distribution of the clients available while insuring the confidentiality of the clients. The geocoded location of the client was perturbed by a random distance from the actual location so that no

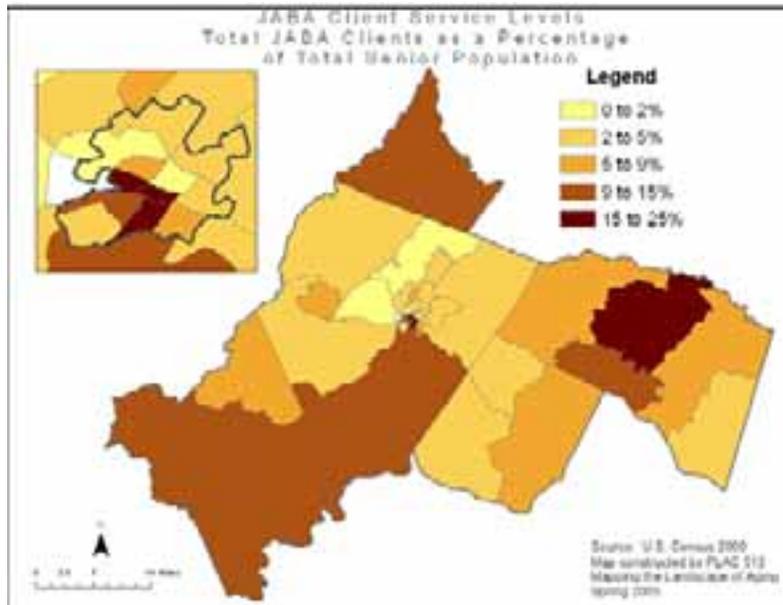
point would be within one-half block of its actual location. Consequently the pattern of clients can be analyzed, but the specific location of a client cannot be derived. ()

About 98% of the clients could be placed on the map. The remaining clients had P.O. Boxes or incorrect street addresses.



How effective is JABA in reaching prospective clients?

Knowing the location of the clients allows comparing them with the enumerated number of persons in the 2000 Census of Population and Housing. Here, total clients in each census tract are compared with the total population 65 years of age and older as enumerated in the 2000 census. While the client data is for 2004 and the census data is for 2000, there is not strict correspondence. However, the resulting ratio does present a useful indicator of effectiveness. The darker the color, the higher the proportion of the "target" population is being served by JABA. Areas light in color do not have as many JABA clients. These may be areas with other services or populations that do not meet JABA's low and moderate income target population.

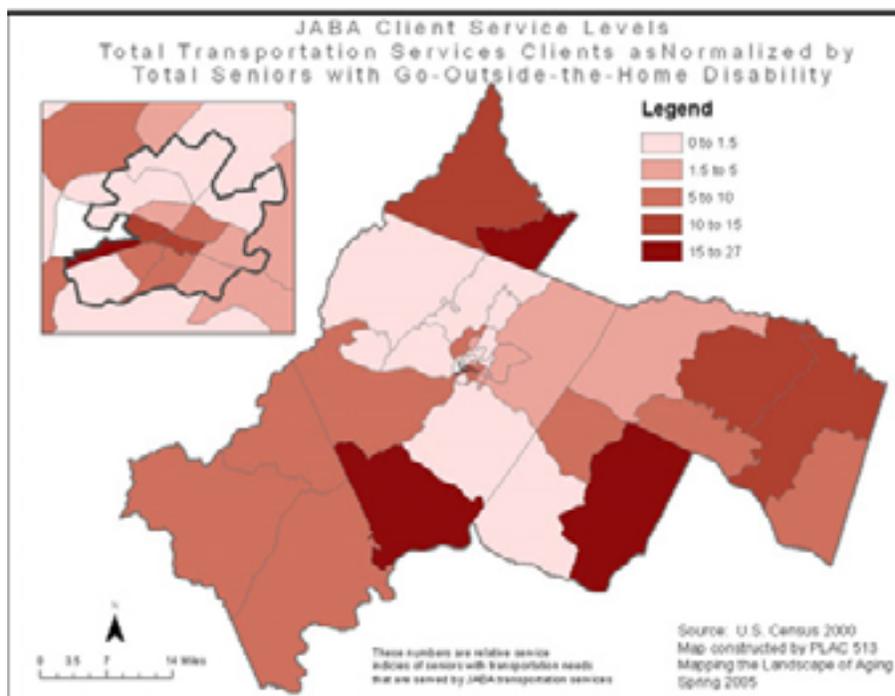
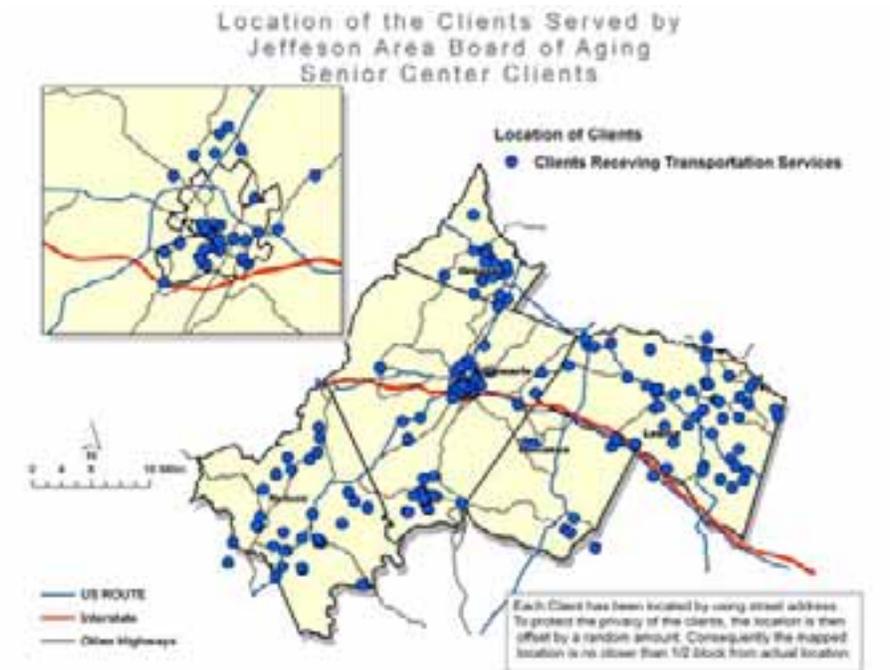


The largest concentration of clients, not surprisingly, is in the urban area in and around Charlottesville. At the same time, a large proportion of the clients are scattered throughout the rural regions of the Planning District. A few clients list addresses outside the boundaries of TJPDC. This may be due to the address being of a "responsible party" and it may also indicate that JABA services are indeed received by a few who live outside the TJPDC Counties.

Comparing the residential location of the clients in 2004 with the reported population in the 2000 Census by census tract shows the effectiveness of JABA in reaching the lower income and higher poverty census tracts in the rural counties and central city of Charlottesville. The areas of lowest service rates are those with the higher incomes and lowest poverty rates in the region.

Transportation Service Clients

Earlier in this paper persons with "leaving-the-home" disabilities and "senior households without a vehicle for their use" were identified. JABA addresses the needs of these persons with Transportation Services. The following maps show the distribution of those clients and compares them against the known level of "leaving-the-home-disabilities":



Clients receiving Transportation Assistance exist in all of the jurisdictions of TJPDC. There appears to be some "clustering" near senior day care centers, but no precise analysis is conducted here. The effectiveness comparison across the entire TJPDC is against the senior population with an "Leaving-the-home" disability as reported by the 2000 Census of Population.

How easy is it to walk in your neighborhood?

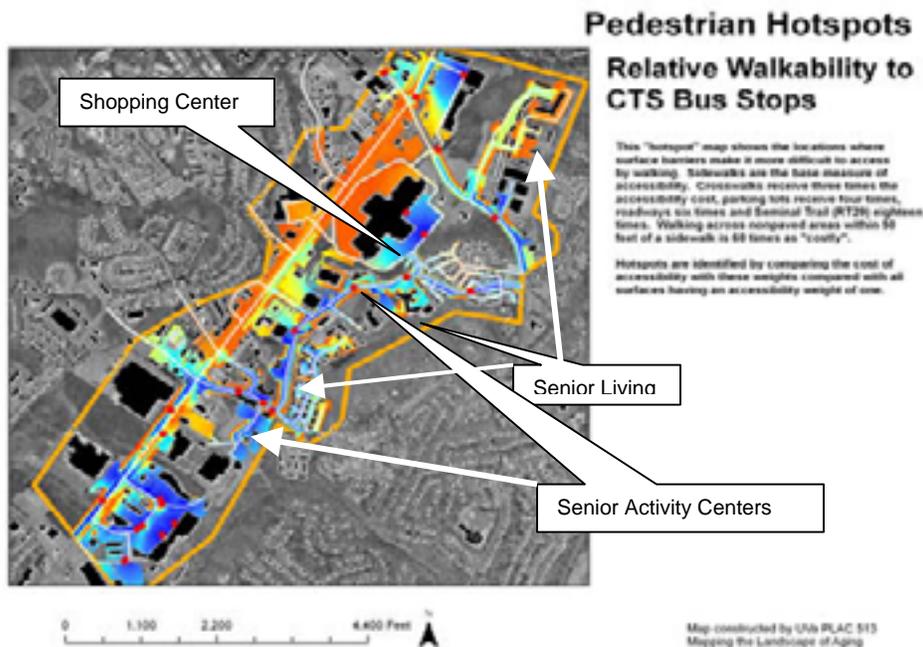
The neighborhoods in which our older citizens live should be safe and walkable. Our older citizens should be able to get exercise, meet their neighbors, access public transit and complete simple errands. Unfortunately so many of our communities are developed to suburban standards that have long walking distances between activities and few paved sidewalks. Often the street or parking lots are shared pedestrian ways.

The analysis of a major urban corridor in Charlottesville/Albemarle explores pedestrian "Hot Spots". It examines how easy, or how difficult, it is for a person to access typical activities within the neighborhood. Numerous Hot Spots are identified. The most critical of these is the barrier Seminole Trail (Route 29N) poses with its 10 traffic lanes and few if any crosswalks.

The map below shows a major shopping center

Barriers to walkability

Walking along a well-maintained sidewalk is generally safe, convenient and pleasant. Stairs, crossing a road in a crosswalk or having to take a shortcut through a parking area represents hindrances to the pedestrian. While these are places one where pedestrians are expected, they take additional effort or additional attentiveness to traverse. Walking in a street or having to cross a major arterial is much more of a barrier. These are not places designed for pedestrians are places of competition with automobiles and perhaps trucks and buses. Having to walk across broken terrain, up a slope, through landscaping is not what one would consider urban walking. That is hiking.



This map analysis explored the walkability of urban terrain by simply scoring each portion of the neighborhood on its ease of walking for a older citizen. Each unit of sidewalk was the base measure and received a score of one. Crosswalks were scored as requiring three times as much effort, parking lots scored as a four, walking in the street a six, crossing a major arterial eighteen and cutting across unpaved terrain a very high sixty.

Data was collected from planimetric drawings of roads, sidewalks, parking areas and non-pedestrian areas. Air Photographs were used to identify features that might not be clear in the planimetrics. Field checking was conducted where buildings, sidewalks and parking lots had been constructed in the intervening time since the photographs and planimetrics were produced. All data was digitally interpreted. Bus routes and stops had been digitized as part of the larger project. Objects in planimetrics and air photographs were digitized quickly to a four foot accuracy. All digitized objects were converted to a 4 foot grid for the entire neighborhood. Each grid feature was given the scoring for walkability. Off paved terrain was limited to 50 feet.

The results show the "cool" easy walking access from a bus stop to senior centers and senior living facilities near the center of the neighborhood, but the hot spot, hard to get to senior living apartments in the upper right of the map. The major barriers in the neighborhood are the large parking lots and the major 10 lane urban express way that bisects the area from southwest to northeast.

Conclusion:

This Mapping the Landscape of Aging project sought to extend the usual demographic mapping of individual characteristics for a special demographic to a mapping of the community in which these persons live and contribute. As local governments focus on populations of special interest such as the aging population, who are growing in number, or persons with disabilities, who have special access needs, the improvements to transportation, housing and community spaces that result will make better communities for all citizens.

Mapping the Landscape of Aging presents several challenges to the GIS community. These include managing the privacy of client information, blending material from multiple sources, and helping define what constitutes macro and micro accessibility.

Mapping the Landscape of Aging highlights how that landscape is also the landscape of the entire community. The fact that so many of our senior population is living alone, are more likely to have a disability that limits their activities, are more likely not to be able to enjoy their own vehicle of transportation, and may have limited financial means to find alternatives, makes that proverbial question "And who is my neighbor?" much more morally poignant and personal.

Appendixes

Visit <http://www.arch.virginia.edu/~dlp/MLAging/> for more information.

End Notes

¹ Other maps included age specific population distribution by block level, senior population density, group quarter senior population, housing characteristics of the senior owners and renters, household and family income, social security income and housing expense (affordability).

See the website for the maps.

² See the [Center for an Accessible Society](#) for a discussion.

<http://www.accessiblesociety.org/topics/demographics-identity/>

References

Armstrong, Marc P., Gerard Rushton, Dale L. Zimmerman, "Geographically masking health data to preserve confidentiality", *Statistics in Medicine*, Vol. 18, No. 5, pp. 497-525.

Jefferson Area Board on Aging, 2020 Community Plan on Aging for the Thomas Jefferson Planning District, September 2003, Charlottesville, Virginia. (Available at:

<http://www.jabacares.org/fullplanforemail.pdf>)

Stinchcomb, David "Procedures for Geomasking to Protect Patient Confidentiality, ESRI International Health Conference, October 19, 2004.

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