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Partnership For Age-Friendly
Communities in Larimer County

Effects of Limited Transportation Services on Older Adults: Implications for Larimer County, CO

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06.04.2018

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Introduction

Life-space mobility is defined as mobility as it pertains to movement from within ones home to movement beyond their town or geographic location (Takemoto, Carlson, Moran, Godbole, Crist, & Kerr, 2015). Preserving autonomy in mobility remains a challenge due to the normal changes associated with aging (Dahan-



Oliel, Mazer, Gélinas, Dobbs, & Lefebvre, 2010). This paper will discuss mobility in regards to older adults as well as challenges to maintaining mobility among this group.

Transportation for Mobility

According to the 2010 census, the United States population of people over 65 years was 40,267,984, comprising 13% of the total population during that period (United States Census Bureau, 2010). Across the globe our aging population is growing, with projected growth of older adults from 12% of the total population in 2010 to 20% in 2050 (Lowsky, Olshansky, Bhattacharya, & Goldman, 2014). The number of older adults age 85 and older is expected to rise from 1.9% of the population in 2012 to 4.3% of the population in 2050, adding roughly 12.1 million older adults to this demographic (Eby, Molna, Kostyniuk, Renee, & Zanier, 2017). As our population ages, we can expect an increase in the services needed to accommodate this group.

Transportation is an essential component of mobility is undeniably entangled with quality of life as it allows people to engage in activities that make life enjoyable, stay connected with family and friends, and conduct essential activities of daily living (Eby, Molnar, Kostyniuk, Renée M St Louis, & Zanier, 2017). Therefore, it is no surprise that lack of access to

transportation can have serious consequences. Lack of transportation can affect receipt of healthcare services and is estimated to deter 3.6 million urban living Americans annually from receiving services (Smith et. al, 2017). Therefore, health concerns may be intensified or exacerbated due to limited resources and lack of access to transportation (Smith et. al, 2017).

Additionally, mobility in ones environment through driving and transportation is consistently regarded as an essential function for aging in place (Choi & DiNitto, 2016). Many older adults who can no longer drive are forced to enter into long term care setting because of transportation problems (Freeman, Gange, Munoz, & West, 2006). Average cost of admission to a nursing home in the Fort Collins region was \$93,623 annually for a semi private room and \$48,300 annually for assisted living accommodations in 2017 (Genworth, 2017). Given this price tag, many western countries are investing in systems that will allow independently living and aging in place as opposed to promoting institutionalized living (Dahan-Oliel, Mazer, Gélinas, Dobbs, & Lefebvre, 2010). Being a non-driver, either due to never having driven or cessation of driving was found to be an independent risk factor for entry into a long term care setting (Freeman, Gange, Munoz, & West, 2006). In order to avoid institutionalization in long term care settings and maintain independent living, facilitating transportation services to allow older adults to maintain their physical, mental, and social health is essential (Heinz & Kelly, 2015).

Modes of Transportation

Transportation for older adults falls into four main categories including personal automobile use, caregiver provided transportation, public transportation, and alternative transportation methods. The following section will discuss the proponents, disadvantages, and struggles encountered with each method.

Personal
Automobile Use

Caregiver Provided
Transportation

Public
Transportation
& Walking

Alternative
Transportation

Personal Automobile Use

Driving for older adults has many advantages, making it the preferred mode of transportation for this age group. Driving is associated with feelings of youthfulness, status, control, and independence (Buys, Snow, Van Megen, & Miller, 2012). Being a driver also greatly increases an older adults ability to be engaged in their environment. In fact, non-driving status increases the risk of isolation and 54% of non-drivers do not leave their home on an average day compared to 17% of active drivers (Silverstein & Turk, 2016). Driving for older adults is not without its risks. Older adults age 65 and over involved in automobile accidents are more at risk of serious injury or fatality due to their fragility and are projected to account for 25% of all fatal crash involvements by 2030 (Silverstein & Turk, 2016).

An area of interest that has recently gained the spotlight is the risk of cognitive deterioration and dementias, specifically Alzheimer’s disease on driving performance (Silverstein & Turk, 2016). Roughly 40% of older adults continue to drive after receiving a diagnosis of dementia (Silverstein & Turk, 2016). Older adults living with dementia that have recently stopped driving have a unique need for transportation services, especially if they are unmarried or do not have another licensed driver living in the same household (Freeman, Gange, Munoz, & West, 2006). Table 1 below presents the unique challenges for drivers with dementia.

TABLE 1 Warning Signs of Alzheimer’s Disease and Impact on Transportation Options

Warning signs	Transportation impact
Memory loss	Can’t remember ride time or appointment
Difficulty performing tasks	Has a problem making transit arrangement
Problems with language	Is unable to communicate with driver
Disorientation to time/place	Gets lost after transit drop-off
Poor or decreased judgment	Has difficulty paying fares
Abstract thinking	Is unable to navigate route changes
Misplacement of things	Leaves belongings in vehicle
Changes in mood/behavior	Becomes agitated for no apparent reason
Changes in personality	Becomes suspicious of driver
Loss of initiative	Does not want to get in or out of vehicle

Source. Beverly Foundation (2008).

It is estimated that over one million older adults stop driving each year due to health decline (Choi & DiNitto, 2016). There are various reasons for driving cessation among older adults including age related declines in cognitive, functional, and/or visual capacities or a new health crisis such as a fall or stroke (Choi & DiNitto, 2016). Only 55% of women over the age of 70 continue to drive (Freeman, Gange, Munoz, & West, 2006). There may also be a link to racial/ethnic identities when it comes to driving cessation. Among older Latinos, females are more likely to have never driven and all racial minorities as well as women are more likely to stop driving than men and non-Hispanic whites (Choi & DiNitto, 2016)

Giving up driving symbolizes a loss of independence, which is a trait highly valued among older adults (Turner, Adams-Price, & Strawderman, 2017). Driving cessation among older adults has been linked to negative physical, mental, and cognitive effects as well as a significant negative impact on social functioning (Choi & DiNitto, 2016). Giving up driving has also been linked with decreased quality of life, anxiety, and depression (Buys, Snow, Van Megen, & Miller, 2012). Former drivers who recently lost driving privileges are at an increased risk of entering into a long term care setting, and one study found they are even at an increased risk of death (Choi & DiNitto, 2016).

Caregiver Provided Transportation

Primary informal caregivers are defined as those providing cares necessary for the older adults to achieve their activities of daily living, and may be family members or friends. Transportation for shopping or other needs is the most frequent activity performed by informal caregivers with over 85% reporting this activity as a part of their normal duties (Eby, Molnar, Kostyniuk, Renée M St Louis, & Zanier, 2017). A large portion of caregivers (37%) provide transportation services at least 1-2 times per week and 21% provide transportation services at least once per month (Eby, Molnar, Kostyniuk, Renée M St Louis, & Zanier, 2017). It is important to remember that informal caregivers may not be readily available to meet the transportation needs of older adults as over 50% are gainfully employed and around 55% volunteer in the community an average of 6 hours per week (Eby, Molnar, Kostyniuk, Renée M St Louis, & Zanier, 2017). Additionally, being reliant on others for transportation restricts interactions with the environment and can negatively impact quality of life (Heinz & Kelly, 2015).

Public Transport & Walking

For non-drivers of any age, public transport may be the next best mode of transportation. Utilization of public transportation among older adults is far from optimal for several reasons. Public transportation and walking may not be feasible for rural residents due to the distance they need to travel (Park et. al, 2010). Over 40% of older adults living in rural areas do not have access to public transportation (Freeman, Gange, Munoz, & West, 2006). When available, older adults do not utilize public transportation, using it for only 2% to 3% of their trips (Freeman, Gange, Munoz, & West, 2006). There are also considerable marketing difficulties that must be assessed when trying to reach rural older adults who may be unfamiliar with public transit (Bond, Brown, & Wood, 2017).

Alternative Transportation

After cessation of driving, older adults live an average of 6 more years for men and 10 more years for women; however, transportation needs continue for the remainder of their lives (Eby, Molnar, Kostyniuk, Renée M St Louis, & Zanier, 2017). Older adults who cease to drive, whether planned or not, have an expectation that their transportation needs will be met (Eby, Molna, Kostyniuk, Renee, & Zanier, 2017). This need is often met through alternative transportation services including paratransit, volunteer driver programs, and ride-sharing. This method of transport, although necessary for some older adults, is not without its disadvantages. Older adults who are still drivers or use walking and other public transportation methods have a higher level of participation and ability to fulfill tasks and actions required for an organized social life than those who rely solely on adapted transport and taxi services (Dahan-Oliel, Mazer, Gélinas, Dobbs, & Lefebvre, 2010).

Preserving Mobility Among Rural Older Adults

A recent literature review concluded that research regarding transportation for rural older adults is sparse, focusing on the two components separately. A majority of the literature focuses on improving transportation infrastructure in urban areas to cater to older adults or simply urging rural older adults to continue driving (Bond, Brown, & Wood, 2017). Rural areas are home to a larger proportion of older adults than urban areas (Smith et. al, 2017). Transportation for rural older adults is essential because it allows them to maintain their existing social networks and connects them to essential goods and services (Park et. al, 2010). Rural older adults are particularly disadvantaged when it comes to transportation due to the structural barriers inherent in rural communities paired with the unique needs associated with their age (Park et. al, 2010).

Rural residents of any age disproportionately experience transportation difficulties (Park et. al, 2010). When looking specifically at transportation in rural areas, several challenges have been identified. The most prominent in the literature include long distances between destinations, fewer fiscal and technical resources, lower population densities, and shortages of suitable staff and equipment (Bond, Brown, & Wood, 2017). Nationally, 40% of rural residents do not have access to public transportation and 25% have insufficient transportation (Park et. al, 2010). Due to their location in mainly urban areas, access to specific specialized medical services such as dialysis, physical rehabilitation, and mental health services are further limited (Smith et. al, 2017).

Older riders often have unique set of preferences and transportation needs due their age and physical state, including accessible vehicles and driver support to adapt to level of mobility, larger print maps and timetables, and services catered to their perception of transit (Bond, Brown, & Wood, 2017). Concerns over cost, safety, unreliability, limited access, and lack of knowledge of services may prohibit older adults from utilizing alternative transportation services (Dahan-Oliel, Mazer, Gélinas, Dobbs, & Lefebvre, 2010). Perception of transportation deficits may be magnified within older adults and many individuals tend to round up estimated travel times and are poor estimators of travel distance (Takemoto, Carlson, Moran, Godbole, Crist, & Kerr, 2015).

Popular Transportation Models

In response to the unique transportation needs of rural and older adults, several models of transportation have been developed. The following section discusses some promising solutions to transportation deficits.

Planned Transitions

Many older adults are able to and choose to continue driving into older adulthood (Turner, Adams-Price, & Strawderman, 2017). Increased car dependency of older adults will result in transportation deprivation when they stop driving later in life (Buys, Snow, Van Megen, & Miller, 2012). The physical and emotional health implications of driving cessation have already been discussed. If proper stress coping measures are not taken, the problems related to driving cessation may be exacerbated (Turner, Adams-Price, & Strawderman, 2017). An upcoming solution to this is to offer services that help older adults plan their transition to a non-driving lifestyle. A planned transition into a lifestyle without driving leads to decreased stress compared to a sudden instruction to cease driving (Buys, Snow, Van Megen, & Miller, 2012).

Flexible Transportation Services

Flexible Transportation Services (FTS) have been identified as a possible solution to meet the transportation needs of rural older adults. This unique approach combines flexibility and innovation, allowing providers to adapt to local needs. Examples of FTS include Paratransit, volunteer driver programs, and ride-sharing. This form of transit is not without financial and operational hardships due to autonomy from a funder or government authority (Bond, Brown, & Wood, 2017).

One Click/One Call Programs

A common misconception is that older adults do not know how to operate technology and would not be able to utilize the internet or mobile devices to facilitate their transportation needs; however, once introduced to these modes of technology

they tend to incorporate them into their daily lives (Heinz & Kelly, 2015). Several transportation services are using technology to expand their reach. Using a technology based connector service, which links multiple providers to a large network, increases access for older adults (Bond, Brown, & Wood, 2017). Partnership between transportation providers as well as non-profits could be the next step in providing appropriate transit to rural older adults (Bond, Brown, & Wood, 2017).

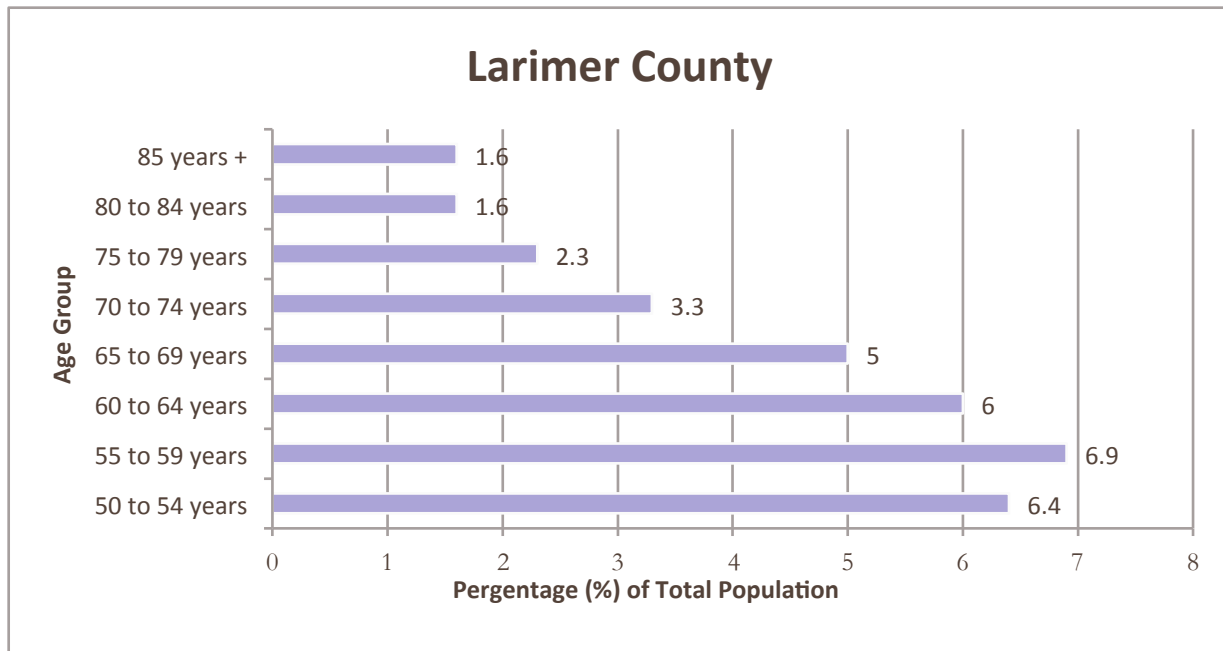
Characteristics of Successful Transportation Operations

Although many models of transportation exist, there are certain qualities that enable them to be successful in catering to rural and older adults. Nine key agency strategies were identified as a result of a recent telephone based survey with seven transportation providers reaching rural areas in various locations of the United States (Bond, Brown, & Wood, 2017). They are as follows:

Quality	Description
Provide Flexible Services and Offerings	Provides flexible routes and services to increase reach and availability of services.
Paratransit	Alternative mode of flexible passenger transportation that does not follow fixed routes or schedules.
Deviated Route Service	Allows driver to modify fixed schedules and routes to pick up add on appointments/passengers.
Connector Service	Links multiple providers to a large network.
Volunteer Drivers	Decreases overhead cost by using volunteer drivers for transportation needs.
Appeal to Older Adults	Utilization of cars/sedans for comfort and familiarity of older adults to reduce their loss of freedom.
Special Programs and Services	Vehicles and drivers equipped to handle elderly and disabled passengers.
Travel Training	Education for older adults and those who recently stopped driving on public and alternative transportation methods.
Increase Organizational Capacity Through Partnerships	Cuts down on duplication of efforts and increases reach and availability of services.

Implications for Larimer County

The 2016 American Community Survey lists the estimated number of individuals age 50 years and older living in Larimer County in 2016 as 113,898 people or 33.5% of the county population (United States Census Bureau, 2016a). A graph of the distribution of the population by age group can be found below. With rapid growth in the number of older adults in Larimer County, we need to be prepared to meet their transportation needs. The following section addresses the current methods of transportation in Larimer County. Given what we know about the methods of transportation and the effects of limited transportation, we can start to get a general idea of how this may be impacting the older adults of Larimer County, particularly rural dwelling individuals.



Source: United States Census Bureau, 2016a



As established earlier, transit using personal automobiles is a preferred method for many older adults. Although it is a popular method, we need to be prepared to accommodate never-drivers as well as older adults who recently stopped driving. We know that around 45% of women stop driving over the age of 70 (Freeman, Gange, Munoz, & West, 2006). This means that there could be as many as 16,200 new non-drivers using this measure alone (United States Census Bureau, 2016a). The actual number of non-drivers in Larimer County is most likely much greater.

Rural older adults are more inclined to rely on personal automobiles as their main form of transit due to longer distances traveled (Park et. al, 2010). Nationally, a larger proportion of older adults live in rural areas compared to urban areas (Smith et. al, 2017). In rural census tracts in Larimer County, an average of 41% of the population is over the age of 50 compared to urban census tracts (29%) (United States Census Bureau, 2016b). More information on the percentage of older adults in various age groups by Larimer County census tracts can be found in Appendix A. Risk associated with driving greatly increase with age. It is estimated that by 2030, older adults will make up 25% of all fatal crash involvements (Silverstein & Turk, 2016). According to Larimer County (2018) the rate of crashes, both fatal and injury, is significantly higher on rural two-lane roadways than state highways and urban city streets. Providing safe and readily available alternatives to driving for rural older adults should be a priority consideration.

Available Alternative/Public Transport Services

Several public and alternative transportation services are available in Larimer County. Tables 2 (Commercial/Private Transportation Companies) and Table 3 (City Operated/Funded Transportation Services) below outline the available services. Rural access was marked yes if companies delivered services to any rural census tract or area outside of city limit. Paratransit as marked yes for companies who provided adapted transit for those who could not use public bus systems or were ADA compliant.

Table 2. Commercial/Private Companies

Name	Type	Paratransit	Rural Access	Cost	Link
Rural Alternative for Transportation (RAFT)	Door to Door Service, Volunteer Drivers	✓	✓ * Limited to residents of Berthoud Fire Protection District	No Fee	http://berthoudraft.org/
Heart & Soul Paratransit	Door to Door Service, Reservations	✓	✓	\$10 per pick up; \$2.50 per mile	http://heartandsoulparatransit.com/
Senior Alternatives in Transportation (SAINT)	Demand-Response/ Modified Fixed Route	x	x	No Fee	http://www.saintvolunteertransportation.org/
Estes Park - Shuttle Service	Reservation, Fixed Route	x	✓ (Fixed Route Only)	One way is \$45, round trip is \$85	https://www.estesparkshuttle.com/
Connecting Health - Van Service	Fixed Schedule, Fixed Route	x	x	No Fee	http://www.columbinehealth.com/brochures/images/connecting_health.pdf
Green Ride Colorado - Shuttle Service	Door to Door Service to DIA only	x	x	Based on trip	https://greenrideco.com/
Colorado Non Emergency Medical Transport (NEMT)	Medical Appointments Only, Reservation, Door to Door	✓	✓ *Must be within 25 miles of appointment	No Fee * Services for Medicaid Patients only	https://medicaidco.com/
Northern Colorado Yellow Cab	Door to Door	✓	x "Fort Collins, Loveland, Greeley and surrounding cities"	Metered Rates: \$2.25 per mile	http://www.fortcollinstaxi.com/

Table 3. City Operated/Funded Transportation Services

Name	Type	Paratransit	Rural Access	Cost	Link
Transfort	Fixed Schedule, Fixed Route	X	X	\$1.25 per ride with discounts for seniors (60 years and older)	http://www.ridetransfort.com/
Transfort: Dial-A-Ride (DAR)/ Dial-A Taxi	Door to Door, Reservation	✓	X	\$2.50 per one-way trip	http://www.ridetransfort.com/routes/dial-a-ride
City of Loveland Transit (COLT)	Fixed Schedule, Fixed Route	X	X	\$1.25, with discounts for youth and senior passengers	http://www.ci.loveland.co.us/departments/public-works/transit-colt
COLT: Dial-A-Ride (DAR)	Door to Door, Reservation	✓	X	\$2.00 per single trip	http://www.ci.loveland.co.us/departments/public-works/transit-colt/paratransit-service
Berthoud Area Transportation Service (BATS)	Door to Door Service, Reservation Only	✓	X	\$1.00-\$4.00. For seniors (60 years and older), no fare is required	http://www.berthoud.org/departments/berthoud-area-transportation-system-bats
CDOT – Bustang Interregional Express Bus	Fixed Schedule, Fixed Route	X	X	\$5.00-\$28.00 dependent on location	https://www.ridebustang.com/

Assessment of Alternative/Public Transport Services

Several low cost and no cost public and private options exist for older adults who can no longer drive. Five of the fourteen services are limited to fixed schedules and fixed routes. Nine of the service providers offer door to door service and somewhat flexible schedules allowing you to make a reservation within their service areas. Seven service providers offer paratransit or ADA accessible vehicles. The most important finding from this review is the lack of service to rural areas. Only four areas services geographies in rural census tracts. Of these four, three were very limited on the places they drive with one being fixed route, one only extending just beyond town limits, and one only taking riders to a location 25 miles within their appointment distance. Only one provider services the whole of Larimer County including rural areas; however, at \$10 per pick up and \$2.50 per mile, average trip cost is not within budget for most rural older adults.

Conclusion

Transportation is an important part of mobility and allows our older adults to remain active and age in place. Although many older adults continue to drive safely as they age, there is a need for alternative and public transportation services for those who can no longer drive. An assessment of available services in Larimer County revealed lack of access to alternative and public transportation methods for rural individuals, despite a larger proportion of older adults living in rural census tracts.

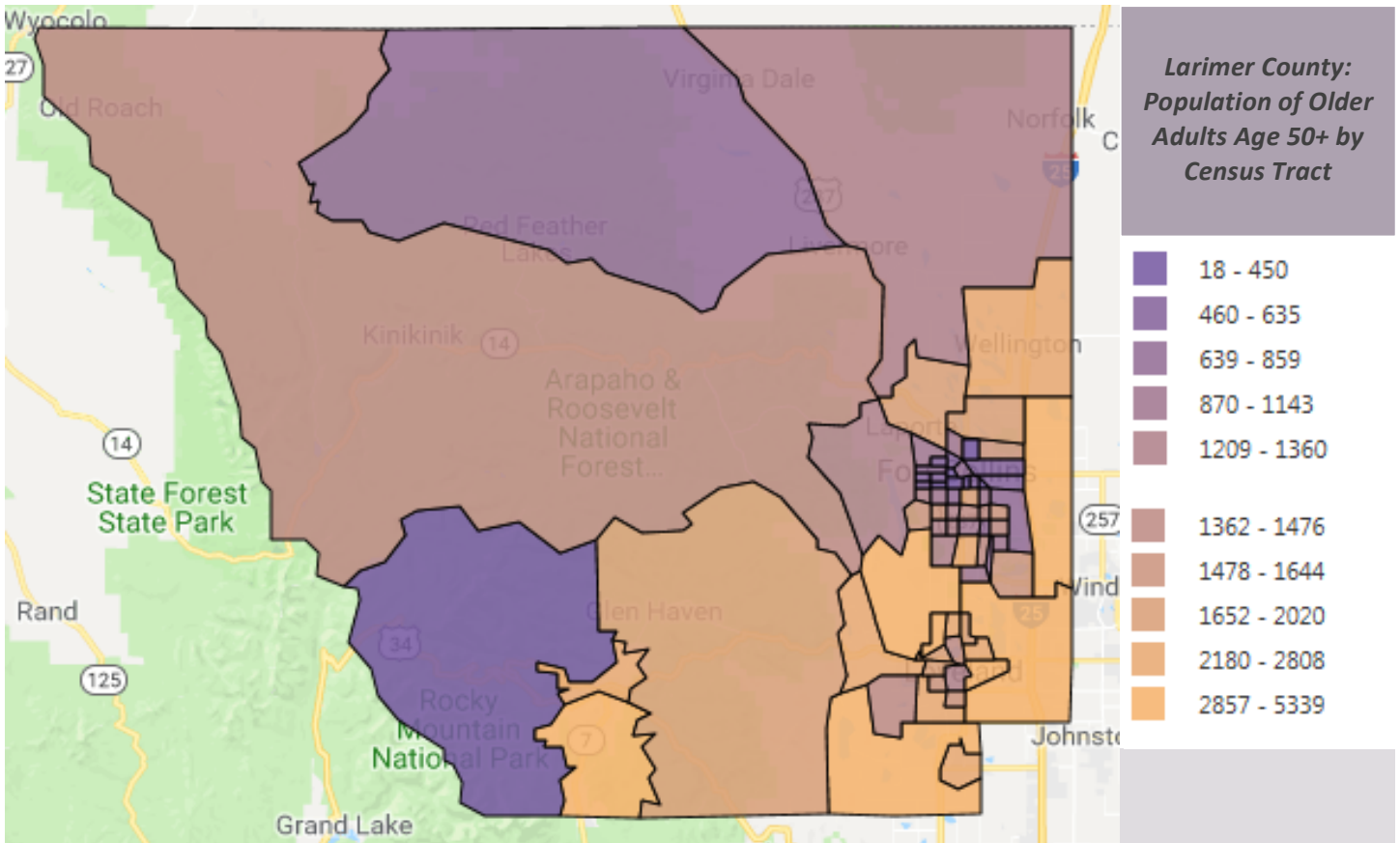
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Appendix A. Older Adults by Census Tract

Census tracts are relatively permanent areas designated by the census bureau. Census data and population characteristics are only available for select cities and towns in Larimer County. Therefore analysis of population characteristics was done by census tracts. All data and information in Appendix A is based off the 2016 American Community Survey-1 year estimates from the United States Census Bureau.



339,993

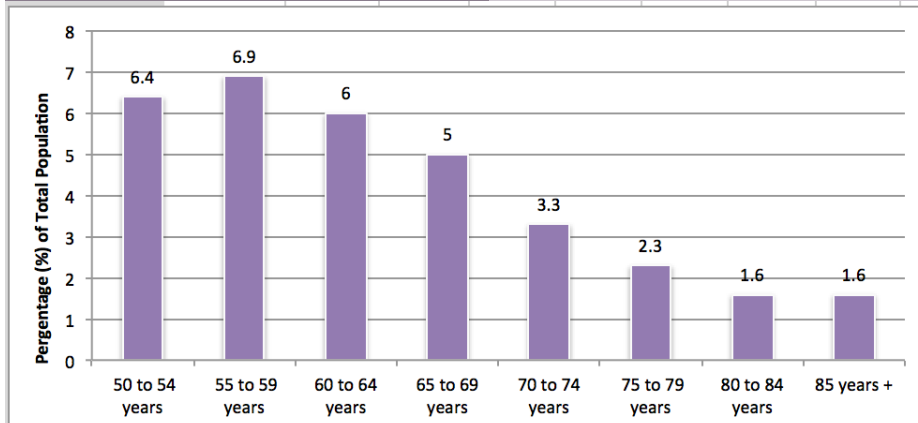
2016 Population Estimate

41%

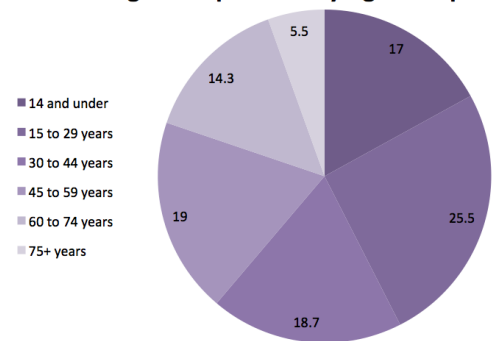
Proportion of older adults age 50+ living in rural census tracts

29%

Proportion of older adults age 50+ living in urban census tracts



Percentage of Population by Age Group

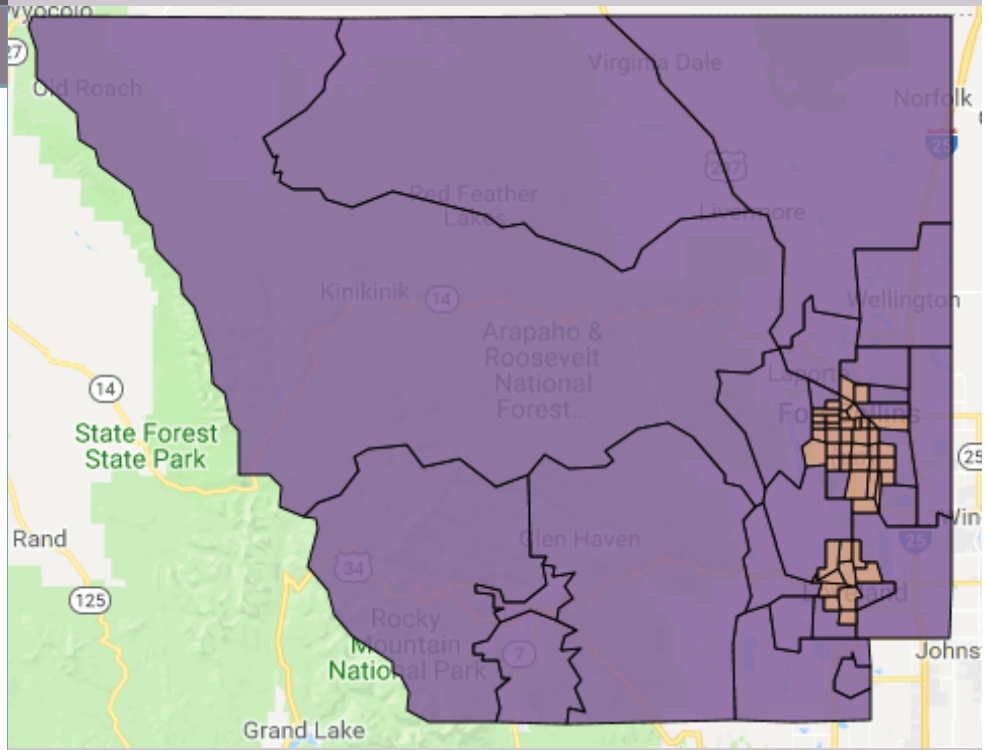


Appendix A.

Older Adults by Census Tract

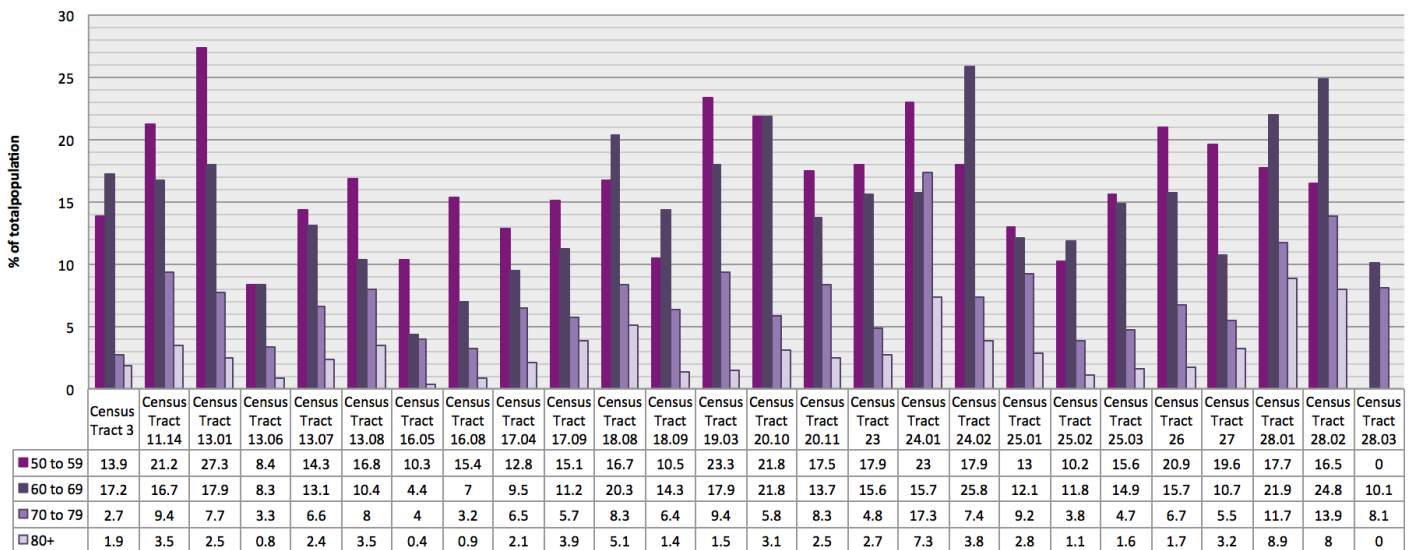
Rural Census Tracts

Census Tract	Pop.	50+
Census Tract 3	2,910	1,039
Census Tract 11.14	2,438	1,239
Census Tract 13.01	3,598	1,993
Census Tract 13.06	2,384	496
Census Tract 13.07	4,378	1,594
Census Tract 13.08	5,217	2,019
Census Tract 16.05	4,498	859
Census Tract 16.08	5,578	1,478
Census Tract 17.04	9,246	2,857
Census Tract 17.09	14,87	5,339
Census Tract 18.08	2	2,468
Census Tract 18.09	4,896	3,666
Census Tract 19.03	1,124	1,878
Census Tract 20.10	4	1,362
Census Tract 20.11	3,604	2,320
Census Tract 23	2,595	1,360
Census Tract 24.01	5,523	761
Census Tract 24.02	3,316	1,459
Census Tract 25.01	1,196	3,484
Census Tract 25.02	2,657	2,697
Census Tract 25.03	9,390	1,283
Census Tract 26	9,110	3,198
Census Tract 27	3,486	2,260
Census Tract 28.01	7,107	2,180
Census Tract 28.02	5,796	3,367
Census Tract 28.03	3,621	18



Selected census tracts shown in purple.

Percentage of Total Population by Age Group

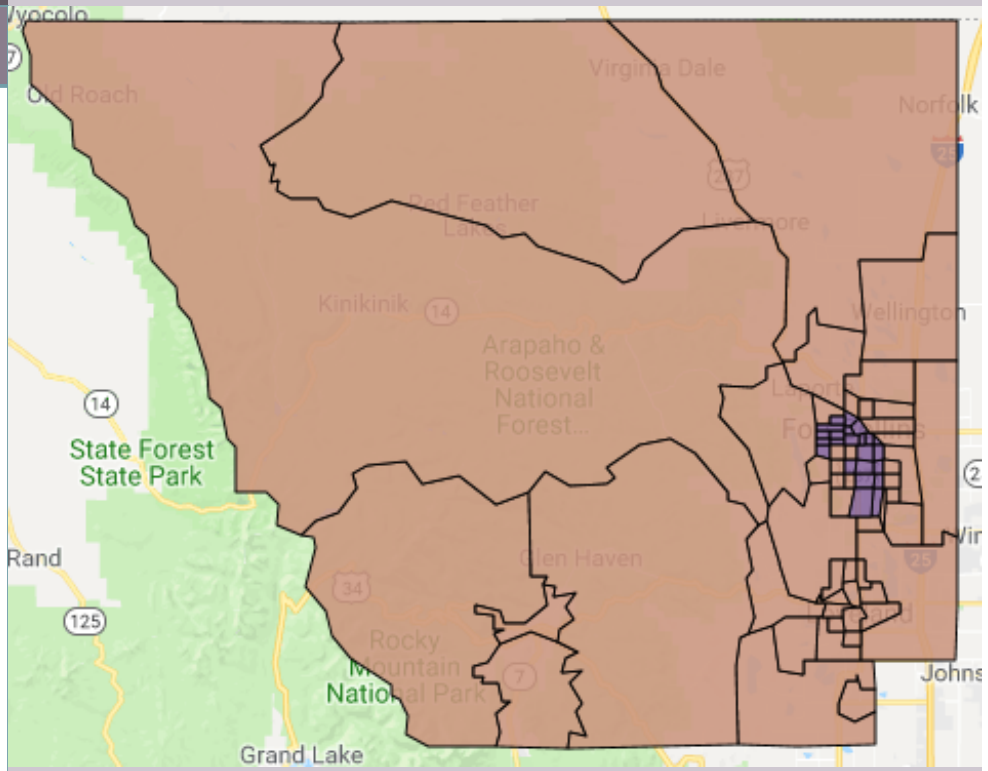


Appendix A.

Older Adults by Census Tract

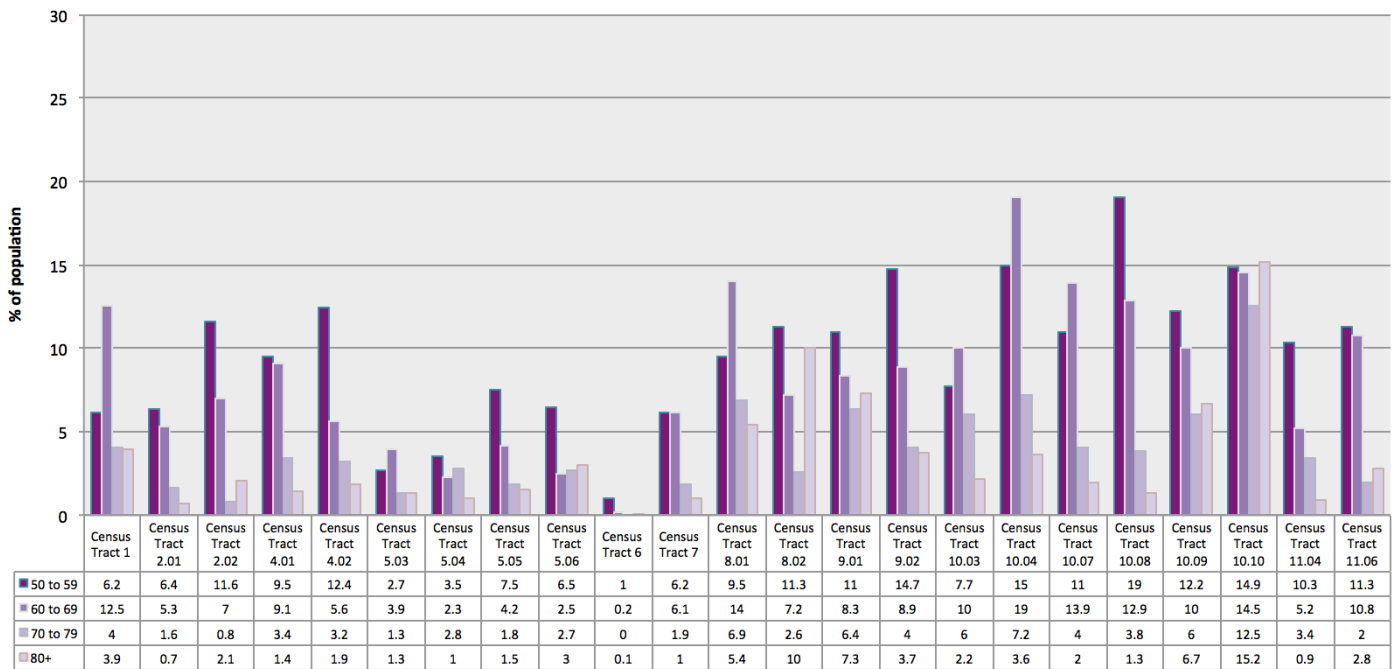
Urban Census Tracts Pt. 1

Census Tract	Pop.	50+
Census Tract 1	2,412	642
Census Tract 2.01	3,073	430
Census Tract 2.02	2,615	562
Census Tract 4.01	1,965	460
Census Tract 4.02	2,766	639
Census Tract 5.03	5,635	518
Census Tract 5.04	3,395	326
Census Tract 5.05	3,738	561
Census Tract 5.06	3,493	513
Census Tract 6	6,608	86
Census Tract 7	2,849	433
Census Tract 8.01	1,774	635
Census Tract 8.02	1,301	405
Census Tract 9.01	5,233	1,727
Census Tract 9.02	3,652	1,143
Census Tract 10.03	5,380	1,375
Census Tract 10.04	3,228	1,446
Census Tract 10.07	3,698	1,143
Census Tract 10.08	1,949	721
Census Tract 10.09	6,340	2,213
Census Tract 10.10	2,560	1,462
Census Tract 11.04	6,319	1,251
Census Tract 11.06	4,618	1,242



Selected census tracts shown in purple.

Percentage of Total Population by Age Group

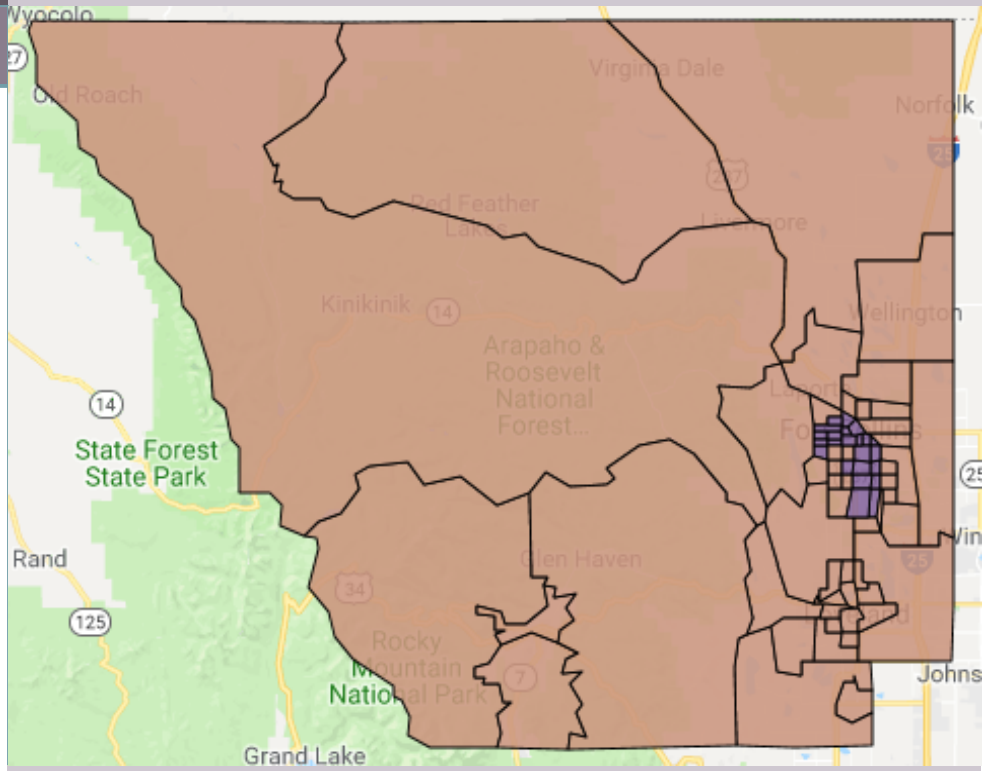


Appendix A.

Older Adults by Census Tract

Urban Census Tracts Pt. 2

Census Tract	Pop.	50+
Census Tract 11.07	5,534	1,527
Census Tract 11.09	5,103	1,240
Census Tract 11.10	5,695	1,082
Census Tract 11.11	2,402	644
Census Tract 11.12	4,657	1,537
Census Tract 11.13	3,434	1,209
Census Tract 13.04	2,703	870
Census Tract 13.05	2,396	450
Census Tract 16.01	1,707	603
Census Tract 16.02	4,892	1,497
Census Tract 16.03	5,568	1,448
Census Tract 16.06	3,132	789
Census Tract 16.07	3,735	1,113
Census Tract 17.06	6,576	2,808
Census Tract 17.07	5,466	1,809
Census Tract 17.08	3,695	998
Census Tract 18.04	4,123	1,476
Census Tract 18.06	7,825	3,388
Census Tract 18.07	5,830	2,571
Census Tract 19.01	4,515	1,652
Census Tract 19.02	4,590	2,020
Census Tract 20.05	5,454	1,636
Census Tract 20.07	3,378	1,324
Census Tract 20.08	4,131	1,644



Selected census tracts shown in purple.

Percentage of Total Population by Age Group

